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Kugluktuk Water Intake
Operations and Maintenance Manual

Project Name
Kugluktuk Water Systems Upgrade

Project Address
Kugluktuk, NT

Prepared For
Government of Nunavut, Community & Government Services

Prepared By
Williams Engineering Canada Inc.

Dated Prepared
October 2014

Client Project No. 04-4417

WEC no. 13655.00

CHAPTER 1

INTRODUCTION

1.1 USE OF THE MANUAL

This manual has been prepared to provide operation and maintenance personnel with a clear and concise understanding of the water intake system operation and the steps that must be followed to keep the system running safely and efficiently.

The primary goal of this manual and of all personnel operating in and around the water intake system is the safe operation of the facility and the prevention of personnel injury, fire losses, and property damage. To meet this goal, the operation and maintenance program includes:

1. Emergency procedures to be followed in the event of an accident

2. Specific operating instructions to be learned and followed at all times to promote safe and efficient operation.

3. Routine maintenance of all facility systems and structures.

4. Detailed inspections of all equipment, systems and structures as well as reporting and correcting deficiencies.

5. Proper record keeping.

6. Maintaining a supply of spare parts, material and equipment necessary to keep the system running safely and efficiently.

This manual is composed of one volume divided into 10 chapters, which contains the following:

- Chapter 1 – Introduction
- Chapter 2 – Table of Contents
- Chapter 3 – Design Data
- Chapter 4 – Schematics & Functional Data
- Chapter 5 – Components Details
- Chapter 6 – Operating Procedures
- Chapter 7 – Lubrication & Maintenance Schedule
- Chapter 8 – Operation & Maintenance Records
- Chapter 9 – Testing and Certification
- Chapter 10 – Manufacturer's Brochures & Manuals

Personnel must review and be familiar with all chapters of the manual to ensure that they have a thorough working knowledge of the entire water intake system. This will enable them to turn directly to the correct chapter should a reference be required.

In order to make full and effective use of this manual, it is imperative that it is updated whenever modifications or substitutions of equipment are made to the facilities.

1.2 LIST OF PROJECT PERSONNEL

Government of Nunavut Project Officer	Shane Slifka Regional Project Manager, CGS Kitikmeot Region Phone: (867) 983-4141 Email: SSlifka@gov.nu.ca Stuart Rostant Project Officer, CGS Kitikmeot Region Phone: (867) 983-4142 Email: SRostant@gov.nu.ca
Project Engineer	Williams Engineering Canada Inc. Project Manager: Willem Janse van Rensburg, P.Eng PO Box 1529, 2nd Floor, 4902 49 Street Yellowknife, NT X1A 1K5 Phone: (867) 873-2395
Geotechnical Engineer	EBA (A Tetra Tech Company) Contact: Ed Hoeve, P. Eng. PO Box 2244, 201 – 4916 49 Street Yellowknife, NT X1A 2P7
General Contractor	King Mechanical Specialty 406 3rd Street Newburgh, IN 47630 Phone: (812) 853-8301
Electrical Sub-contractor	Ryfan Electric Ltd. PO Box 1835, 9 Nahanni Drive Yellowknife, NT XIA 2P4 Phone: (867) 873 - 6158
Project Completion	September 2012

1.3 END USERS AND GOVERNMENT OF NUNAVUT CONTACTS

End User:	Hamlet of Kugluktuk Phone (867) 982-6500

1.4 SCOPE OF WORK

Year of completion:

The objective of Phase 1 of the project is to provide a new raw water intake system for the Hamlet of Kugluktuk, which is able to meet the needs of the community until 2030.

The original scope of work for Phase 1 included the following:

- Preliminary Engineering Services including:
  - Site visit
  - Bathymetric survey
  - River flow modelling
  - Ice loading estimates
  - Preliminary Engineering
- Design services
- Engineering services during construction including
- Resident engineering services
- Post-construction services

1.5 SUMMARY OF UPDATES TO THE MANUAL

It is imperative that all additions are provided for ALL sets of the manual.

This system and manual have been updated to include:

DATE	DESCRIPTION OF CHANGE	ADDED TO ALL SETS OF MANUAL

CHAPTER 2

TABLE OF CONTENTS

CHAPTER 4 SCHEMATICS & FUNCTIONAL DATA

CHAPTER 5 COMPONENT DETAILS

CHAPTER 6 OPERATING PROCEDURES

CHAPTER 3

DESIGN DATA

3.1 GENERAL

The hamlet of Kugluktuk is located on the Arctic Coastline at 67° 49' N latitude and 115° 07' W longitude and is the westernmost community in Nunavut. Kugluktuk, meaning "place of rapids" is the second largest community in the Kitikmeot region, with a rapidly increasing population. The 2012 population, as recorded by the Nunavut Bureau of Statistics, is 1 492. It is approximately 625 km north of Yellowknife and 1 200 km west of Rankin Inlet and it has scheduled air service from Yellowknife.

Kugluktuk is situated on rocky hills at the mouth of Coronation Gulf which feeds into the Arctic Ocean. The climate is humid continental consisting of cool summers and no dry season. It is located in an area of continuous permafrost.

3.2 BACKGROUND DATA

Kugluktuk's water is pumped from the Coppermine River, treated, placed in storage, and trucked to houses. The intake site is close to the ocean; approximately 2.5km upstream from Coronation Gulf. Salt water periodically reaches upstream to the intake site due to the effects of tide and wind. The river has an average width of 570m at the current intake location. Depths are generally less than 3m, but can reach up to 8m in isolated areas.

The water supply intake experiences frequent issues due to sedimentation, which can bury the intake, preventing water flow, and can also cause challenges in filtration. Divers have been retained approximately biannually to clear sand from the intake. In addition, the riverbank at the intake site is unstable and recently differential movement has been observed between the intake and the pumphouse.

3.3 SYSTEM DESCRIPTION

The water treatment plant in the hamlet of Kugluktuk consists of an enhanced slow sand system preceded by a roughing filter.

The coagulation/flocculation/sedimentation (CFS) pre-treatment step within the enhanced slow sand process is only needed during high turbidity months. It is estimated that it would run from May to November annually. This provides adequate downtime for maintenance during the offseason.

The roughing filter reduces the solid loading on the slow sand filter and prolongs the filter runtime between scrapings.

3.4 DESIGN DATA

Design standards

- Good Engineering Practice for Northern Water and Sewer Systems, GNWT Public Works and Services, April 2004.
- Water and Sewage Facilities Capital Program: Standards and Criteria, GNWT Department of Municipal and Community Affairs, July 1993.
- Guidelines for Canadian Drinking Water Quality, Health Canada, Federal-Provincial-Territorial Committee on Drinking Water, May 2008.
- Cold Regions Utilities Monograph, 3rd Edition, American Society of Civil Engineers, 1996.

- National Building Code of Canada, National Research Council Canada, Government of Canada, 2010

Government of the Northwest Territories (GNWT) design standards were used as no Government of Nunavut (GN) water systems design standards were made available or known to exist.

3.4.1 DESIGN CONSTRAINTS

- Harsh arctic climate
- Depth of river
- Saline water infiltration
- Access by air only

3.4.2 DESIGN CRITERIA

- Redundancy to be included in all critical operations
- Capable of recovery from pipe freezes without critical damage
- Capable of producing power to run critical operations
- Provision of and storage for 13 months supply of consumables (except fuel)
- Major alarm conditions must be immediately conveyed to operator
- Treated water must meet Canadian Drinking Water Quality Guidelines
- Ability to treat 256 000 L/day

3.4.3 DESIGN ASSUMPTIONS

Demand

Population	1302 (2010) 2076 (2030)

Climate[1]

Ground snow load roof factor (S_s) Associated rain load (S_r)	
Hourly Wind Pressure (kPa)	0.33 (1/10) 0.46 (1/50)
Design Temperature	January: -44 ºC (2.5%) July: 20 ºC (2.5%)
Interior Temperature	16 ºC (design)
Ground Snow Load (kPa)	S_s: 2.6 S_r: 0.1

Seismic

Spectral acceleration (S_a) Peak ground acceleration (PGA)	
S_a(0.2)	0.12
S_a(0.5)	0.056
S_a(1.0)	0.023
S_a(2.0)	0.006
PGA	0.059

Physical

Truck Size (L x W x H)	6.2m x 2.4m x 2.2m
Truck Turning Radius	12.8m
Maximum permissible road grade	10%
Maximum desirable road grade	6%
Road width	7m
Parking stall (W x L)	2.6m x 5.5m

Electrical

- Prime power from Qulliq distribution system
- Diesel standby generator outage
- Automatic transfer from standby power to prime power with restoration of NWTPC power

[1] 2010 National Building Code of Canada

- Estimated power consumption 15 500kwh per annum

Fuel

- Arctic grade diesel (P50)
- Estimated fuel consumption is 400L per year (based on exercise time and twelve, four hour power outages)
- Automatic transfer from standby power to prime power with restoration of NWTPC power
- Estimated power consumption 15 500kwh per annum
- Power supply: 120/208V, 3 phase, 60Hz, 100A

Building Heat

- Pump room: 1 kW infrared heater normal, identical standby unit
- Generator room: 1kW infrared heater normal, identical standby unit
- Waste heat from standby generator unit is used to heat generator room when it operates

Design Features

- The facility is designed to be easy to operate and maintain. Spares have been provided for components difficult to obtain.
- The system is designed to recover from a freeze-up with no major damage.
- The system provides automatic chlorination of water and has provision for addition of fluoridation at a future date.
- While the facility is designed for a minimum truck-fill rate of 1000 l/min, the actual capacity is dependent on valve settings, equipment conditions and lake level.
- The truck-fill rate is a policy matter and no provision has been made to increase it. Should an increase in truck-fill rate be required it could likely be accommodated by using a larger pump, however this would have to be investigated at the time.
- There is no provision in the design for water storage on site. No expansion of the facility is foreseen since the truck hauling capacity and not the truck-fill station controls the water supply capability.

3.5 STANDBY SYSTEMS

3.5.1 AUTOMATIC STANDBY SYSTEMS

Standby systems discussed below are of the automatic type. No operator intervention is required to activate them.

Stand-by Generator

In the event of failure of the NWTPC power supply, the standby generator starts and provides power for the facility without operator intervention. This is accomplished by the transfer switch.

Infrared Heaters

Electric infrared heaters provide heat to the electrical room. There are two heaters in each room with each unit controlled by an individual thermostat.

The thermostats are set so that only one heater operates for most of the time in each room. The second heater comes on if the temperature drops drastically such as when the door is opened.

3.5.2 MANUAL STANDBY SYSTEMS

Manual standby systems require some action on the part of the operator to activate them.

Heat Trace

The intake has a spare heat trace cable installed. If the main heat trace fails, it can be unplugged from the controller and the spare heat trace plugged in.

As well, a spare, uncontrolled outlet is provided so that both heat trace cables can be plugged in if the intake freezes.

3.5.3 ON-SHELF STANDBY COMPONENTS (SPARES)

On-shelf standby components are spare equipment and parts provided for installation by the owner if required by failure of the originally installed equipment.

Chemical Feed Pump

A spare chemical feed pump is provided, along with accessories. Installation requires unplugging the pump from the receptacle, removal of the bolts holding the installed pump and disconnecting the suction tubing and solution feed tubing. The tubing can then be attached to the replacement pump: the pump bolted down and plugged in.

Pump

A spare water pump has been provided. In the event of a pump failure, the shelf standby pump would be used to replace the faulty pump. To replace the pump, follow the procedure outlined for pump withdrawal and replacement.

Spare Parts

Spares have been provided for components such as fuses, switches, lamps, small valves, gauges and meters which may be expected to require replacement and may not be available locally. Keep the spares cabinets fully stocked, replacing spares as they are used. Spares, as well as consumable items, are listed below.

A list of spares is also contained in Section 8, Operations and Maintenance Records. That list can be used as a checklist to keep track of the quantities on hand and for ordering.

Spare relays are contained in the Alarm panel and control panel.

3.6 EMERGENCY AND TROUBLE RESPONSES

3.6.1 FIRE RESPONSES

In event of a fire, the procedures outlined below should be followed.

The following procedures include the immediate action to be taken in the event of an emergency. A more detailed emergency contingency plan must be followed in the event of a fire. All personnel must be familiar with the contingency plan and the procedure must be practiced several times a year to ensure they can readily be followed in the event of an emergency.

Fire Control

When a fire breaks out in or adjacent to the pumphouse:

1. Alert all persons in and around the pumphouse. Personal safety is of prime importance.
2. Use the emergency stop buttons to shut down operating equipment.
3. Advise the local fire department: (867) 982-2222.
4. Use available fire-fighting extinguishers and equipment unless it is unsafe to do so.
5. Remove trucks and vehicles from site unless it is unsafe to do so.

Fire Extinguisher Operation

1. Remove the fire extinguisher from its mounting bracket by lifting up the bottom of the extinguisher.

2. Follow the **PASS** method of fire extinguisher use.

   - **P**ull the safety pin to release the discharge mechanism.
   - **A**im the nozzle at the base of the fire.
   - **S**queeze the handle to discharge the dry chemical fire extinguishing material.
   - **S**weep back and forth across the base of the fire.

3. After a fire extinguisher has been used, it must be replaced. Contact the XXXX to arrange for recharging the fire extinguisher.

3.6.2 ALARM SYSTEM

The alarm system uses an auto-dialing telephone system to transmit and alarm to the pre-programmed numbers in town when a major trouble condition requires the attendance of the operator. The phone numbers which will be called can be changed by the built in programmer.

The precise trouble condition is indicated by a pilot light on the alarm panel in the pumphouse, with the exception of a complete loss of power. This condition would be apparent upon arrival at the facility.

An alarm received from the auto-dialer should be treated as an emergency condition and the facility operator should go immediately to the pumphouse to determine the cause of the alarm.

Minor trouble conditions, not requiring immediate action, do not transmit an alarm on the telephone auto-dialer system. They are indicated by a pilot light on the alarm panel which will be noticed during routine maintenance.

3.6.3 MAJOR TROUBLE CONDITIONS

Loss-of-power

This alarm is transmitted if the building is without power caused by failure of both Qulliq Energy Corporation supplied power and the standby generator.

A loss-of-power condition will transmit an alarm approximately 5 minutes after total loss of power. The 5 minutes delay prevents an alarm in the time between shutdown of the prime engine and the switchover to the standby engine.

No alarm will be transmitted if the prime engine fails and the standby engine starts and runs normally.

The cause of failure of the standby generator will be indicated on the engine control panel. Conditions which may cause the generator to stop working are:

- No speed signal,
- High engine temperature,
- Low oil pressure,
- Overcrank (engine starter operating for too long without engine starting)

Pumphouse High Temperature

Transmits telephone alarm and illuminates alarm panel light if pumphouse temperature rises above the set point. Alarm triggered by thermostat located in pump room which closes at 35ºC (95ºF).

Pumphouse Low Temperature

Transmits telephone alarm and illuminates alarm panel light if pumphouse temperature falls below the set point. Alarm triggered by thermostat located in pumphouse which opens at 4.5ºC (40ºF).

4.5ºC (40ºF).

Engine Room High Temperature

Transmits telephone alarm and illuminates alarm panel light if engine room temperature falls below the set point. Alarm triggered by thermostat located in engine room which closes at 35ºC (95ºF).

Engine Room Low Temperature

Transmits telephone alarm and illuminates alarm panel light if engine room temperature falls below the set point. Alarm triggered by thermostat located in engine room which closes at 0ºC (40ºF).

Fuel Tank ¼ Full

Transmits telephone alarm signal and illuminates alarm panel light if fuel tank fuel level falls below ¼ full.

CHAPTER 4

SCHEMATICS & FUNCTIONAL DATA

4.1 WATER INTAKE PIPELINE DESCRIPTION

Dwg	Item No.	Sect. 10	Component	Function	Remarks
M-02	1	10.3	Water pump	Pumps water from river to water treatment facility	15hp Grundfos pump
M-02	2	10.9	Pump sled bottom rod	Allows pump to slide inside casing	Welded to 4 stainless steel housing rings.
M-02	3	10.9	Pump sled housing ring	Holds pump sled rods in place	Cut from 8” stainless steel pipe
M-02	11	---	Casing pipe	Protects pipe	355mmø casing pipe with 50mm insulation
M-02	12	10.3	Intake screen	Screens debris from water	325mm Hendrick Screen Co
M-02	Detail A	---	Intake casing	Protects pump	355ø intake casing pipe

4.2 PUMPHOUSE AND ACCESS VAULTS DESCRIPTION

Dwg	Item No.	Sect. 10	Component	Function	Remarks
M-01	1	10.1	Intake pipe	Carries river water from AV2 to AV1	150mmø HDPE with 50mm insulation
M-01	3	10.2	Flange adaptor	Joins auxiliary intake to pipeline	150mmø – HDPE to steel pipe
M-01	4	10.9	Pipe support	Carries the weight of the pipe	Cast pipe support bolts into concrete slab
M-01	6	10.7	Manual flow meter	Measures water flow rate and provides signal to meters	Paddlewheel type flow sensor
M-01	7	10.7	Salinity meter	Measures salt level in water	Pump cutoff setpoint 1ms/cm (1000µs/cm)
M-01	8	---	Sample point	Obtains raw water samples	Valve position: normally closed
M-01	9	10.6	Butterfly valve	River pipeline shut off valve – Isolates main pipe	Valve position: normally open
M-01	10	10.6	Tech-Taylor valve	Mechanism in valve automatically blocks other inlet	
M-01	11	10.1	Carrier pipe	Carries water from river to AV2	Enclosed in casing pipe with rigid polyurethane insulation
M-01	13	10.6	Butterfly valve	Isolates main pipeline A	Valve position: normally open
M-01	15	10.9	Pipe roller support stand	Supports pipe roller	Adjustable pipe roll support for 100mm pipe
M-01	16	10.6	Butterfly valve	Isolates auxiliary pipeline at AV1	Valve position: normally closed

Dwg	Item No.	Sect. 10	Component	Function	Remarks
M-01	17	10.1	Pipe	Carries water through pumphouse	150mm schedule 40 steel, connected to tee that comes with blind flange for future emergency connection
M-01	18	10.1	Pipe (pipeline B)	Carries water at AV2	100mm schedule 40 steel
M-01	19	10.1	Pipe		75mm schedule 40 steel
M-01	20	10.4	Compressor for airburst system	Blows air to clean intake screens	5hp compressor with thermal relay motor protection.
M-01	22	---	Pipe hanger	Suspends pipe from ceiling	
M-01	23	---	Copper tube	Pipe for airburst system	25mm with minimum maintained pressure rating 200 psig.
M-01	24	10.6	Wastewater combination air valve	Exhausts large quantities of air on start-up and admits air on shut-down	
M-01	25	10.7	Pressure gauge	Indicates pressure while pumping	Range 0-1725kpa
M-01	P-7	10.6	Butterfly valve	Isolates auxiliary pipeline	Valve position: normally open

4.3 PUMPHOUSE ELECTRICAL DESCRIPTION & CONTROL PANEL

Dwg	Item No.	Sect. 10	Component	Function	Remarks
EP-2	3		Distribution panelboard “ph”		
EP-2	4	10.8	Disconnect combo starter		Disconnect combo starter c/w ground fault sensor
EP-2	8	10.8	Radiant heater		3.6kW radiant heater
EP-2	9		Thermostat	Controls the heating system in the building	Non-programmable thermostat
EP-2	10		Distribution breakers	Disconnect from Qulliq power & provides protection against short circuits and overload on power system	
EP-2	12	10.4	Air Compressor	Blows air to clean intake screens	5hp compressor with thermal relay motor protection.
EP-2	13	10.8	Pump room light	Normal lighting for pump room	Fluorescent
EP-2	15	10.8	Occupancy sensor		Passive infrared wall switch
EP-2	16	---	Pump room light switch	Switch for pump room lighting	Auto/off
EP-2	17	10.8	Exterior lighting	Normal lighting for exterior of pump room	High pressure sodium exterior lighting fixture
EP-2	18	---	Telephone outlet		
EP-2	19		Thermostat	Ambient sensing thermostat for heat tracing cable	
EP-2	23	10.8	Auto-dialler		Low temperature sensor
EP-2	24		Emergency battery pack		
EP-2	29		Salinity meter	Measures salt level in water	Pump cutoff setpoint 1ms/cm (1000µs/cm)
EP-2 & EP-3	31	10.8	Contact pushbuttons		
EP-2 & EP-3	32		Selector switch		Two-position selector switch, panel mount.
EP-2 &	33		Indicating light		LED indicating light

Dwg	Item No.	Sect. 10	Component	Function	Remarks
EP-3					
EP-2	34	10.8			
EP-2	35		Automatic reset timer	Automatic reset timer for building heater	Enclosure timer set at 1 hr
EP-2	36	10.8	Start/stop push button	Push button for building heater control	Standard duty station momentary contact start/stop push button c/w pilot light for building heater control
EP-2 & EP-3	38		Panel mount resettable AC hour meter		

CHAPTER 5

COMPONENT DETAILS

5.1 GENERAL

Section 5.2 contains detailed information on equipment, including manufacturer, model, size, setting and a reference number to the manufacturer's brochures in section 10 and system sketches in Section 4. The suppliers name address and telephone number are also listed on this table.

5.2 TABLE OF COMPONENTS & SUPPLIERS

5.2.1 Pipelines

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
10.1		High Density Polyethylene (HDPE)Pipe	Urecon	Urecon 5010-43 Avenue Calmar, AB Tel.(780)985-3636
10.1		U.I.P. Insulation System	Urecon	Urecon 5010-43 Avenue Calmar, AB Tel.(780)985-3636
10.1		Standard Spiwrap Pipe	Urecon	Urecon 5010-43 Avenue Calmar, AB Tel.(780)985-3636
10.1		Mastic – Sealant (Polyethylene Hand Roll Tape)	Urecon	Urecon 5010-43 Avenue Calmar, AB Tel.(780)985-3636
10.1		Cut and Rolled Galvanized Steel (Field Applied)– UIP half-shels	Urecon	Urecon 5010-43 Avenue Calmar, AB Tel.(780)985-3636
10.1		Insulation Kits with Polymer Coating	Urecon	Urecon 5010-43 Avenue Calmar, AB Tel.(780)985-3636
10.1		Insulation Kits for Spiwrap System	Urecon	Urecon 5010-43 Avenue Calmar, AB Tel.(780)985-3636
		Plastic Trace Conduits	Urecon	Urecon 5010-43 Avenue Calmar, AB Tel.(780)985-3636
10.1		Polyethylene Hand Roll Tape	Urecon	Urecon 5010-43 Avenue Calmar, AB Tel.(780)985-3636

5.2.2 Fusion & Flange Connectors

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
10.2		Butt Fittings (90º Butt Elbow, Butt Tee, Butt Reducers)	Georg Fischer Central Plastics	Corix Water Products Inc. 1188 West Georgia Street, Suite 1160, Vancouver, BC Tel.(604)697-6700
10.2		Socket Fittings (Couplings)	Georg Fischer Central Plastics	Corix Water Products Inc. 1188 West Georgia Street, Suite 1160, Vancouver, BC Tel.(604)697-6700
10.2		Flange Adapters	Georg Fischer Central Plastics	Corix Water Products Inc. 1188 West Georgia Street, Suite 1160, Vancouver, BC Tel.(604)697-6700
10.2		Flange Adapters (Blind Flanges)	Griffin Pipe Products Co.	Griffin Pipe Products 10 Adams Street, Lynchburg, VA Tel.(434)845-8021
10.2		Flange Adapters (HDP Flange)	Shurjoint Piping Products	CCTF 5407 - 53 Avenue NW Edmonton, AB Tel.(780)463-8700
10.2		Rigid Coupling	Shurjoint Piping Products	CCTF 5407 - 53 Avenue NW Edmonton, AB Tel.(780)463-8700
10.2		Tee	Shurjoint Piping Products	CCTF 5407 - 53 Avenue NW Edmonton, AB Tel.(780)463-8700
10.2		End Cap	Shurjoint Piping Products	CCTF 5407 - 53 Avenue NW Edmonton, AB Tel.(780)463-8700
10.2		Reducers	Shurjoint Piping Products	CCTF 5407 - 53 Avenue NW Edmonton, AB Tel.(780)463-8700
10.2		Elbows	Shurjoint Piping Products	CCTF 5407 - 53 Avenue NW Edmonton, AB Tel.(780)463-8700
10.2		Ductile Iron Flange Backing Rings (Epoxy Coated)	Specified Fittings Inc.	Specified Fittings Inc. 164 West Smith Road Bellingham, WA Tel.(888)734-8846
10.2		Electrofusion (Couplings)	Georg Fischer Central Plastics	Corix Water Products Inc. 1188 West Georgia Street, Suite 1160, Vancouver, BC

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
				Tel.(604)697-6700
10.2		Flexible Ball Joint	EBAA Iron Inc.	EBAA Iron Sales Inc. 385 Willow St Parksville, BC Tel.(250)248-6133

5.2.3 Pumps & Intake Screen

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
10.3		Grundfos Water Pump	Grundfos Canada Inc.	Grundfos Canada Inc. 2941 Brighton Road Oakville, ON Tel.(800)644-9599
10.3		Tee Intake Screen	Hendrick Screen Co.	Enviro Power Equipment Ste 204, 6030 88th Street Edmonton, AB Tel.(780)490-4995

5.2.4 Airburst System

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
10.4		Hendrick Airburst System	Hendrick Screen Co.	King Mechanical Specialty 406 3rd Street, Newburgh IN Tel.(812)853-8301
10.4		Air Compressor	Ingersoll Rand	Thermo King Western Inc 15825 118 Ave NW, Edmonton, AB Tel.(780)447-1578
10.4		Vertical Air Receiver	King Mechanical Specialty	King Mechanical Specialty 406 3rd Street, Newburgh IN Tel.(812)853-8301
10.4		Electric Drain Valve	Ingersoll Rand	Thermo King Western Inc 15825 118 Ave NW, Edmonton, AB Tel.(780)447-1578
10.4		Pressure Switch	Ashcroft	Corix Control Solutions Inc. 8803 - 58 Avenue Edmonton, AB Tel.(780)468-6950
10.4		Ball Valves	Sharpe Valves	Process & Steam Specialties 7031 - 56 Avenue Edmonton, AB Tel.(780)484-0577
10.4		Duratec Airline Pipe	Ipex Inc.	Ipex Inc. 4225-92nd Avenue Edmonton, AB Tel.(780)415-5300
10.4		Brass Ball Valves	NCI Canada Inc.	NCI Canada Inc. 19335-96th Ave. Surrey, BC Tel.(604)513-4307
10.4		EVERLOC Fittings (Sleeves, Couplings, Plugs, Copper Adapters, Dual MPT/Copper Adapters, Straight Tees, EVERLOC to EVERLOC)	REHAU	BC Plumbing Supplies 7975 Enterprise Street Burnaby , BC Tel.(604)444-2000

5.2.5 Heat Trace

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
10.5	4.3	Self-Regulating Heating Cables	Pentair Thermal Management (Raychem)	Brett Woods – Manager technical sales Tel.(403)827-7842
10.5	4.3	End Seal and Lighted End Seal Kits	Pentair Thermal Management (Raychem)	Brett Woods – Manager technical sales Tel.(403)827-7842
10.5	4.3	Multiple-entry Power/Splice/Tee Connection with Junction Box	Pentair Thermal Management (Raychem)	Brett Woods – Manager technical sales Tel.(403)827-7842
10.5	4.3	Single Entry Power Connection	Pentair Thermal Management (Raychem)	Brett Woods – Manager technical sales Tel.(403)827-7842
10.5	4.3	Splice or Tee Connection Kit	Pentair Thermal Management (Raychem)	Brett Woods – Manager technical sales Tel.(403)827-7842
10.5	4.3	Low Profile Splice – Cold Applied	Pentair Thermal Management (Raychem)	Brett Woods – Manager technical sales Tel.(403)827-7842
10.5	4.3	Plastic Trace Conduits	Urecon	Urecon 5010-43 Avenue Calmar, AB Tel.(780)985-3636

5.2.6 Specialized Valves

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
10.6		Wastewater Combination Air Valve	Val-Matic Valve & Manufacturing Corporation	Summit Valves & Controls, Inc. 5304-68 Avenue Edmonton, AB Tel.(780)468-6900
10.6		Tech-Taylor Valve	FLSmidth Ltd. (Krebs)	FLSmidth Ltd. 174 West St. south Orillia, ON Tel.(705)325-6181
10.6		Clow R/W Valve	Clow Canada	Emco Norwood Waterworks 9439 -34th St. Edmonton, AB Tel.(780)488-7714
10.6	4.2	Grooved End Butterfly Valve	KVC Industries Corp.	KVC Industries Corp. 105 – 2455 192nd Street Surrey, BC V3S 3X1 Tel. (604)531-6527

5.2.7 Gauges & Sensors

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
10.7		Pressure Gauge	Ashcroft	Corix Control Solutions Inc. 8803 - 58 Avenue Edmonton, AB Tel.(780)468-6950
10.7	4.2 & 4.3	Electrodeless Conductivity Controller (Salinity Meter)	Walchem	Promag Enviro Systems LTD 8042 Winston Street Burnaby, BC Tel.(604)421-6844
10.7	4.2	Flow Sensors	Georg Fischer Piping Systems (Signet)	Georg Fischer Piping Systems 6200 Vipond Drive, Mississauga, ON Tel.(905)792-8005

5.2.8 Electrical

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
10.8		Emergency Lighting	Thomas&Betts (Lumacell)	Bartle & Gibson Co-Yellowknife 4003, School Draw Ave. Yellowknife, NT Tel.(867)920-2248
10.8	4.3	Wallpack IV (Wall Mounted Luminaire)	Holophane	Acuity Brands Lighting Canada, INC. 35B Minthorn Blvd . Markham, ON Tel.1(800)461-3210
10.8		Occupancy Sensor	Legrand	Eecol Electric 23 Melville Dr, Yellowknife, NT Tel.(867)873-3964
10.8		Metalux Lighting (VT2)	Cooper Lighting - Metalux	Eecol Electric 23 Melville Dr, Yellowknife, NT Tel.(867)873-3964
10.8	4.3	Remote Monitoring and Alarm Notification System (Auto-dialler)	Sensaphone	G.A.S. Analytical Systems Suite 221 6030 88th Street Edmonton, AB Tel.1(866)319-2230
10.8	4.3	Epoxy Encapsulated Transformer	Rex Power Magnetics	Brodwell Industrial Sales 7 Rowland Cres St.Albert , AB Tel.(780)458.1500
10.8	4.3	Overhead Radiant Space Heater	Chromalox	*For Western Canada – Directly shipped from US* Etirex 103 Gamma Drive Pittsburgh, PA Tel.(877)238-4754
10.8	4.3	Enclosed Circuit Breakers & Enclosures	Eaton	Wesco #201-12844 Anvil Way Surrey, BC Tel.(604)599-1100
10.8	4.3	Heavy-Duty Industrial Relays	Allen-Bradley	Westburne Supply 135 Enterprise Drive Yellowknife, NT Tel.(867)669-9690
10.8		NEMA Combination Starter	Rockwell Automation	Rockwell Automation 11510 168th Street Edmonton, AB Tel.(780)444-1101
10.8		Panel Details	G.T.K. Electric Controls Ltd.	9635 41 Ave NW, Edmonton, AB Tel.(780)466-8028

5.2.9 Miscellaneous

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
10.9		Scotchkote Liquid Epoxy Coating for Fittings	3M	Acklands Grainger Inc 11708 167 St NW Edmonton, AB Tel. (780)453-0300
10.9		Door – Deadbolts (Auxiliary Locks – D200 Series – Grade 2)	Ingersoll Rand Security Technologies (Falcon)	Ingersoll Rand Security Technologies 410-9120 156th Street NW Edmonton, AB Tel.(780)483-0087
10.9		Door – Deadbolts (Single Cylinder)	Ingersoll Rand Security Technologies (Schlage)	Ingersoll Rand Security Technologies 410-9120 156th Street NW Edmonton, AB Tel.(780)483-0087
10.9		Door Lock Installation (with Leavers)	Ingersoll Rand Security Technologies (Falcon)	Ingersoll Rand Security Technologies 410-9120 156th Street NW Edmonton, AB Tel.(780)483-0087
10.9		Door – Standard Cylinders	Ingersoll Rand Security Technologies (Schlage)	Ingersoll Rand Security Technologies 410-9120 156th Street NW Edmonton, AB Tel.(780)483-0087
10.9	4.1	Stainless Steel Pump Sled Detail	NDL Construction Ltd.	NDL Construction Ltd. 83 Symington Lane Winnipeg, MB Tel.(204)255-7300
10.9		Gabions – Rectangular Wire Mesh baskets Filled with Rocks	Maccaferri Canada Ltd.	14922-128 Ave Edmonton, AB Tel. (780)447-2719
10.9		Vault 2 Wall Detail (Container)	NDL Construction Ltd.	NDL Construction Ltd. 83 Symington Lane Winnipeg, MB Tel.(204)255-7300
10.9	4.2	Pipe Roller Support	Erico	Delaney & Associates P O Box 54066 Village Square Calgary, AB Tel. (403)589-6565
10.9		Cease-Fire Waste Receptacles	Acklands-Grainger Inc.	Acklands Grainger Inc. 324 Old Airport Road Yellowknife, NT Tel. (867)873-4100
10.9		Rubber Flooring Tile	Activa Rubber Flooring	PRF (Canada)Ltd 147 Liberty Street, Toronto, ON

Section 10 Tab	Section 4 Item	Component	Manufacturer	Supplier
				Tel. (416)532-8710
10.9		Pump House Specifications	Bally Refrigerated Boxes Inc.	Bally Refrigerated Boxes Inc. 135 Little Nine Drive Morehead City, NC Tel. (252)240-2829
10.9		Fire Extinguishers (RED LINE Cartridge-Operated)	ANSUL	SimplexGrinnell 17402 - 116 Avenue Edmonton , AB Tel. (780)452-5280

5.2.10 Training Materials

Section 10 Tab	Section 4 Item	Description	Manufacturer
10.10 (c)	4.2 & 4.3	Electrodeless Conductivity Controller Instruction Manual (WEC/WDEC410 Series)	Walchem
10.10 (c)		Active Electrodeless Sensors	Walchem
10.10 (d)	4.2	Flow Transmitter (Signet 8550-1)	Georg Fischer Signet
10.10 (e)	4.3	Environmental Monitoring System - 1400 (Remote Monitoring and Alarm notification System – Auto-dialler)	Sensaphone
10.10 (f)	4.4	Air Compressor	Ingersoll-Rand

CHAPTER 6

OPERATING PROCEDURES

6.1 GENERAL

The water intake station is designed to be operated by simple controls at the control panel in the pumphouse. Access into the building is not required for normal water intake operations. Access is required for maintenance only and should be restricted to the facility operator.

6.2 START-UP PROCEDURES

Throughout the normal life of the building, the system should rarely, if ever, have to be started from an off condition. If, for some reason, all power to the pumphouse station has been switched off, including generator power, follow the procedure below to restore power.

The location for performing the following procedure is in the pump room and the engine room.

6.2.1 START-UP WITH QULLIQ ENERGY CORPORATION

1. Switch all breakers at the main distribution panel in pumphouse to the *OFF* position.
2. Switch the main breaker (Main Service Disconnect) to the *ON* position. Do not attempt to switch the main breaker to the *ON* position before switching all breakers in the main panel to the *OFF* position.
3. Switch the breakers to the *ON* position one at a time, in any order. The lights, electric heaters and water pump should work at this time. If they do not work, go to part 6.2.2 “Start-up Procedures-Standby Generator”.
4. Check that all fuel and lubricating oil supply valves are open. The valves that must be open are listed as follows:
    a. Fuel main shutoff (outside)
    b. Fire shutoff (inside)
    c. Fuel isolation (inside)
5. Check that the breaker mounted on the generator is in the *ON* position.
6. The transfer switch has a 3 position switch labeled *MAN*, *AUTO* and *TEST*. Set this to the *AUTO* position.
7. The generator control panel has a 3-position switch on the front labeled *RUN, OFF* and *AUTO*. Set this switch to the *AUTO* position.

6.2.2 START-UP PROCEDURE WITH STANDBY GENERATOR

1. Switch all breakers at the main distribution panel in pumphouse to the *OFF* position.
2. Switch the main breaker (Main Service Disconnect) to the *ON* position. Do not attempt to switch the main breaker to the *ON* position before switching all breakers in the main panel to the *OFF* position.
3. Check that all fuel and lubricating oil supply valves are open. The valves that must be open are listed as follows:
    a. Fuel main shutoff (outside)

b. Fire shutoff (inside)
c. Fuel isolation (inside)

4. Check that the breaker mounted on the generator is in the *ON* position.
5. The transfer switch has a 3 position switch labeled *MAN*, *AUTO* and *TEST*. Set this switch to the *AUTO* position.
6. The generator control panel has a 3 positions switch on the front labeled *MAN*, *OFF* and *AUTO*. Set this switch to *AUTO*.
7. If the engine does not start, turn the MAN / OFF / AUTO switch on the engine control panel to OFF.
8. Check that all fuel and lubrication valves are open, all switches are in the correct position, battery connections are tight, batteries are charged and all fuses are good.
9. Switch the *ON* / *OFF* switch to *AUTO*.
10. If the engine still does not start, turn the switch to *OFF* and refer to the engine owners manual in the 'Manufacturer's Brochures' section of this manual or contact the Area Maintenance Officer.
11. Switch the breakers in the main panel in the pump room to the *ON* position one at a time, in any order.
12. Switch the transfer switch to the "Auto" position.

6.2.3 SWITCHING BACK FROM STANDBY GENERATOR TO QULLIQ ENERGY

The power supply will switch back automatically to Qulliq Energy power once this power comes on. The switch does not occur instantly. There is a delay to allow for the Qulliq Energy power supply to stabilize. The stand-by generator will run for a short time after power is switched back to Qulliq Energy to allow the engine to cool-off.

6.3 NORMAL OPERATING PROCEDURES

6.3.1 HEAT TRACE / FREEZE PROTECTION

In normal operation one heat trace cable is plugged into the heat trace controller receptacle. This is the 'duty' cable. The spare heat trace receptacle is not used.

The heat trace controller will turn off the heat trace cable when the temperature of the intake casing at the top end reaches 25ºC.

6.4 HEATING AND COOLING

The heating and cooling system is completely automatic and normally will not require any adjustment by the operator.

Heating for the building is provided by electric infrared heaters. There are two heaters in the pump room and two heaters in the engine room.

One heater is the duty heater with the thermostat set at 10ºC. The other heater thermostat is set at 5ºC and will come on if additional heat is required such as when the door is open.

The engine room has additional duct work and fans to provide air for the engine and to cool the room when the engine is operating. When the engine is not operating, the dampers will be closed to keep warm air in the room.

When the engine starts the supply air damper will open partway and the fan will blow air into the room to provide combustion air for the engine. The recirculating air damper will open fully so that warm air from the engine will be used to heat the room.

As the temperature in the room increases above 21ºC, the exhaust damper will open to blow hot air from the engine outside. The supply air damper will also open more to provide more cooling air to the room. All three dampers will open and close automatically to keep the engine room at 21ºC while the engine is running.

When the engine stops the supply air and exhaust air dampers will close and the electric heaters will come on to keep the room warm.

6.5 SPECIAL PROCEDURES

6.5.1 HEAT TRACE CABLE FAILURE

Each intake contains a spare installed heat trace cable. This can be plugged into the heat trace controller receptacle if the duty cable fails.

6.5.2 PUMP WITHDRAWAL

If it is necessary to remove a pump for service or replacement, this procedure should be followed. It will be necessary to have at least one assistant to hold the discharge pipe off the ground while pulling the pump. As well, it will be necessary to have an electrician available to disconnect and connect the pump wiring.

1. Get the winch post and winch from under the hypochlorinator stand.
2. Remove the cover plate from the winch socket and install the winch post in the socket. Attach the winch to the winch post.
3. Turn off the breakers at the main panel for the heat trace and water pump.
4. Turn the switch on the pump starter to ‘Off’.
5. Disconnect the pump power cord, heat trace cable, and heat trace controller thermistor. ***The pump power cord must be disconnected by an electrician.***
6. Disconnect the polyethylene (plastic) discharge pipe from the steel pipe and remove the 90º bend from the control valve leaving the valve in place.
7. Remove the piper retainer straps, split blind flange and casing seal plug. Do <u>not</u> remove the wear ring from the casing pipe.
8. Pass the steel pull cable through the winch. Pull the pump and pipe assembly from the intake casing. A helper will be necessary to hold the end of the pipe off the ground as it is being pulled.
9. Be careful that the thermistor is not damaged. It can be removed as soon as it appears. The power cable and heat trace ducts are taped to the discharge pipe and the tape can wear through if the discharge pipe drags on the edge of the casing. A helper to lift the pipe away from the casing will prevent this.

10. Mark the pump wires before disconnecting them so that the same wires can be connected when installing the pump. Disconnect the pump power cable from the pump. ***The pump power cord must be disconnected by an electrician.***

11. Disconnect the pump from the discharge pipe.

Reverse this procedure to re-install the pump and discharge pipe. Be careful that the duct tape is in good condition and re-tape if necessary.

If re-installing the same pump, make sure the power cable is hooked up to the same pump wires to make sure the pump rotates in the same direction.

If installing a new pump, check the rotation direction before installing the pump. Apply power to the pump for no more than half a second and check the rotation. If the pump is turning in the wrong direction, interchange any two of the three pump power wires.

Do not let pump and pipe slip uncontrolled into the casing. Do use the winch to lower it. If the pump and pipe get away, they can slide into the casing past the proper position. It might be very difficult to pull them back out.

6.6 TROUBLE SHOOTING

6.6.1 ALARM SYSTEM

The alarm system transmits an alarm by an auto-dial telephone system to pre-programmed numbers within Kugluktuk when a major trouble condition requires the attendance of the operator. ***Any alarm received should be treated as an emergency condition and the truck fill station operator should go immediately to the station.***

The precise trouble condition is indicated by a pilot light on the alarm panel, with the exception of a complete loss of power. This condition would be apparent upon arrival at the facility.

The auto-dialer will call up to three numbers and transmit a message which has been previously recorded on the auto-dialer. The telephone numbers called and the message transmitted can be changed in the pumphouse.

In addition to the auto-dialer, a red light will go on outside the truckfill station to indicate an alarm condition which requires immediate attention by the truckfill station operator. A green light will be on if everything is OK and the alarm system is operating properly. If there is no light, the alarm system should be checked.

Minor trouble conditions, not requiring the operator's presence, do not transmit an alarm. They are indicated by a pilot light on the alarm panel in the pump room only.

Loss-of-Power

This alarm transmits if the building is without power caused by failure of both Qulliq Energy supplied power and the standby generator.

A loss-of-power condition will transmit an alarm approximately 5 minutes after the loss of power.

The cause of failure of the standby generator will be indicated on the engine control panel in the engine room. Conditions which may cause the generator to stop working are:

- No speed dial,
- High engine temperature,
- Low oil pressure
- Overcrank (engine starter operating for too long without engine starting),
- Out of fuel

Pumphouse High Temperature

Transmits telephone message and illuminates alarm panel light if pump room temperature rises above the set point. Alarm triggered by thermostat located in pumphouse which closes at 35ºC (95ºF).

Pumphouse Low Temperature

Transmits telephone message and illuminates alarm panel light if pump room temperature falls below the set point. Alarm triggered by thermostat located in engine room which closes at 35ºC (95ºF).

Engine Room High Temperature

Transmits telephone message and illuminates alarm panel light if engine room temperature falls below the set point. Alarm triggered by thermostat located in engine room which closes at 35ºC (95ºC).

Fuel Tank ¼ Full

Transmits telephone message and illuminates alarm panel light if fuel tank fuel level falls below ¼ full.

6.6.2 ALARM RESPONSES

General

The following responses are based on a real trouble condition and do not discuss alarms caused by alarm system malfunction, by improper control settings, or by improper alarm sensor settings.

Note: after correcting the alarm condition, push the '***Reset'*** button on the Alarm Panel.

Loss-of-Power

The main emergency lights are switched to ensure there is battery capacity when the operator responds. Switch the emergency lights on. The emergency light switch for each room is located near the door, higher than the normal light switch and is painted red.

An automatic emergency light on a separate battery will come on if power fails.

Determine the reason for the loss-of-power condition.

Correct the cause of the Qulliq Energy power failure or the standby generator failure and restart the engine if necessary.

If the power supply cannot be restored immediately, the intake casing should be protected. The intake casing and pump discharge pipe will freeze if the heat trace cables are not powered during freezing weather. The time required to freeze will depend on the outside temperature, but it should freeze solid in less than 24 hours at -45ºC. If it appears that the power loss will be longer than this, a small portable generator can be connected to the heat trace cable. A generator of about 1.5 kW output will be required to power one cable. ***An electrician will be required to connect the heat trace cable to the generator.***

Eyewash fluid should be protected from freezing. Store it in a warm place until power is restored.

Pumphouse High Temperature

This condition could be caused by a fire in the pumphouse or by overheating caused by a malfunctioning heater thermostat.

In case of a fire, contact the Kugluktuk Fire Department.

A small fire extinguisher is located immediately inside the door of the pumphouse. ***This extinguisher is suitable for very small fires only***.

If the condition is caused by a faulty thermostat, a spare thermostat can be installed to replace the faulty thermostat.

Pumphouse Low Temperature

This condition could be caused by a failure of both prime and back-up heaters and thermostats, or by the door being left open in cold weather.

Faulty thermostats should be replaced by spare thermostats. Faulty heaters should be replaced by spare thermostats. No spares have been provided since failure of both heaters at the same time is unlikely.

If the door has been left open it should be closed.

If the condition cannot be immediately fixed and the room temperature is dropping close to freezing, the hypochlorinator pump and eyewash fluid should be protected as discussed under ‘Loss-of-Power’.

Engine Room High Temperature

This condition could be caused by a fire in the engine room or a failure in the engine cooling or room ventilation system.

In case of a fire, contact the Kugaaruk Fire Department.

A small fire extinguisher is located immediately inside the door of the engine room. **This extinguisher is suitable for very small fires only**.

The engine room is heated by infrared heaters similar to those in the pumphouse. This heat is supplemented when the engine is running by a damper which by-passes engine cooling air exhaust into the engine room instead of outdoors.

The engine room could overheat if the bypass damper sticks open or if the thermostat is improperly set.

A fan supplies fresh air to the engine room while the engine is running. If the fan does not work properly, the room temperature could rise to the alarm point.

Engine Building Low Temperature

This condition could be caused by a failure of both prime and back-up heaters and thermostats, or by the door being left open in cold weather.

Faulty thermostats should be replaced by spare thermostats. Faulty heaters should be replaced. No spares have been provided since failure of both heaters at the same time is unlikely.

If the door has been left open it should be closed.

6.6.3 POWER SYSTEM

No Power

Check the appropriate circuit breakers and reset if necessary. If the breaker trips again, determine the cause if possible. Notify the electrician at the Regional Office if you need assistance.

If the power line is broken, or otherwise out of service, notify the Qulliq Energy representative.

If the Qulliq Energy power is out and the standby generator is not running, try and start the standby engine. If it does not start, check the fuel tank, fuel valves, fuel filters and batteries.

Check the engine control panel alarm lights to determine the cause of the shutdown.

'No speed Signal' light indicated that the RPM signal is not being received by the engine controller. Either the engine stopped running or the signal was interrupted by one of the engine shut-down conditions.

'High Engine Temperature' indicates the engine was shut down because it was overheating. Check the cooling system for blockages, and make sure the cooling air is being exhausted to the outside of the building. Make sure that the engine temperature alarm setting on the engine temperature gauge has not been accidently changed. The alarm should be set at 160ºC (320ºF).

'Low Oil Pressure' indicates that the engine was shut down because the oil pressure was too low. This may be caused by a valve being left closed by an oil leak or low oil. Make sure that the engine oil pressure alarm setting on the engine oil pressure gauge has not been accidentally changed. The alarm should be set at 85 kPa (12 PSI).

'Overcrank' indicates that the engine did not start after 20 seconds of cranking. Check that the engine is getting fuel and the battery is fully charged.

'Overspeed' indicates the engine shut down because it was running too fast. The engine will shut down if the engine speed exceeds 3900 rpm.

The engine operation manual contains more information regarding the engine. Refer to the Trouble Shooting section of the manual.

6.6.4 WATER SUPPLY SYSTEM

Frozen Intake

A frozen intake can be thawed using the heat trace cables installed in the intake. The time required to thaw the intake depends primarily on the temperature of the ice in the intake. Therefore, the sooner thawing starts, the less time will be required.

The spare heat trace cable in the intake should be plugged into the receptacle provided, so that two cables are used to thaw the intake.

A completely frozen intake can be thawed in 36 to 72 hours using two heat trace cables.

Always unplug the spare heat trace cable as soon as the casing is thawed.

No water pumped

If no water is being pumped, check the following:

- There is power at the building.
- Pump starter for pump to be operated is in *AUTO* position.
- Breaker in Panel 'A' is not tripped. If tripped, reset. If it trips again, find out why it is tripping.
- Shut-off/control valve ( ) is open.
- Pipes are not frozen. If the pipe is frozen, see section 6.6.4., frozen intake.
- Ground fault interrupter on the pump protection panel has not tripped. If the **Red Light** is on, this means that the ground fault interrupter has tripped. Press the **Reset** button. If it trips again, there is a short circuit which must be corrected before the pump can be operated. ***Turn off the breaker for the pump, call an electrician immediately and do not operate the pump*.**

If it appears that the pump is faulty and all of the above items are OK, pull the pump and replace it with the spare pump.

6.6.5 HEATING & FREEZE PROTECTION

Heat trace is not working

- Is 'Power on' lamp off? Check that breaker in panel 'a' is not tripped.

- Is 'Heater Normal' lamp on and cable cold to touch? Check that heat trace cable is plugged into proper receptacle. Check that thermistor is plugged into receptacle and working.

- Plug the spare heat cable into the controller receptacle. Touch the heat trace cable between the receptacle and the intake casing. If the cable warms up the controller and thermistor are probably OK.

- Plug heat trace cable into spare cable receptacle. If cable warms up, its controller or thermistor may be faulty. Try the spare thermistor.

By trying different combinations of cables, thermistors and controllers, it should be possible to isolate the problem.

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6.7 PROCEDURES WHICH MUST NOT BE USED

The following procedures must not be used as they will result in damage to equipment, potential damage or failure, higher operating costs, or other unforeseen results.

- Do not remove steel wear ring from intake casing when removing or installing a pump. The cable will wear into the intake casing and damage it.
- Do not leave the spare heat trace cable plugged in unless thawing a frozen intake. It is not required to keep the intake from freezing and will use power unnecessarily.
- Do not pull or lower the pump without using the winch. The pump is not particularly heavy but it may get away from you and slide down the intake taking the end of the cable with it. If it pulls the cable into the intake there will be no way to get it back out.
- Do not operate the facility if any breakers trip and cannot be reset. Call an electrician immediately.

CHAPTER 7

LUBRICATIONS AND MAINTENANCE SCHEDULES

7.1 GENERAL

Section 7.1 lists required routine maintenance and lubrication tasks.

Section 7.2 lists maintenance tasks in table form by item of equipment. Equipment codes refer to detailed component information in section 10.

Section 7.3 is a summary of maintenance tasks by frequency of service. You can see from this list what needs to be done each day, each week, each month and so on.

Section 8 contains forms to record maintenance work done. All routine maintenance work and repair work should be recorded in these log forms. It is very important that this log be kept up to date. It can be very useful when trouble shooting problems.

Maintenance booklets provided by the equipment manufacturers have been included in Section 10.10. Refer to these if you are not sure what needs to be done or how to do it.

7.2 TABLE OF COMPONENTS & SUPPLIERS

Section 10 Tab	Section 4 Item	Component	Maintenance Item	Schedule
10.1 & 10.2 Pipes and Pipe Fittings				
		Couplings Fittings Bolted Branch Outlet	Check and tighten Check and tighten Check and tighten	Yearly Yearly Yearly
10.3 Pumps				
		Water Pump Pump Protection Panel	Record pressure and flow rate Press “test” button	Weekly Weekly
10.4 Airburst System				
		Air Compressor Electric Drain Valve Pressure Switch Ball Valves Brass Ball Valves		
10.5 Heat Trace				
		Self-Regulating Heating Cables End Seal and Lighted End Seal Kits Multiple-entry Power/Splice/Tee Connection with Junction Box Single Entry Power Connection Splice or Tee Connection Kit	Check amperage, feel exposed cable for warmth	Weekly
10.6 Specialized Valves				
		Wastewater Combination Air Valve Tech-Taylor Valve Clow R/W Valve		
10.7 Gauges & Sensors				
		Pressure Gauge Salinity Meter Flow Sensors	Record water pressure with control valve closed Record water volume pumped Check connections	Weekly Daily Monthly

Section 10 Tab	Section 4 Item	Component	Maintenance Item	Schedule
10.8	**Electrical**			
		Emergency Lighting Wallpack IV (Wall Mounted Luminaire) Occupancy Sensor Metalux Lighting (VT2) Remote Monitoring and Alarm Notification System Epoxy Encapsulated Transformer Overhead Radiant Space heater Enclosed Circuit Breakers & Enclosures Heavy-Duty Industrial Relays NEMA Combination Starter Panel Details		
10.9	**Miscellaneous**			
		Door Painless Steel Pump Sled Detail Gabions Pipe Roller Support Cease-Fire Waste Receptacles Rubber Flooring Pump House Specifications Fire Extinguishers	Check Service	Check weekly Recharge yearly

CHAPTER 8

OPERATION & MAINTENANCE SCHEDULES

8.1 GENERAL

It is very important that good logs and records are kept. These should be updated on a regular basis, while you are actually doing the work. Don't leave the record keeping to the end of the day back in the office because it is very easy to forget exactly what you did.

Keep the records in the treatment facility so they are handy while you are doing the work.

It may seem that you are writing down a lot of information that you never use, so why bother.

This information may not be used regularly but, when it is required, it is very important. For example, the maintenance log can help determine what the problem is if you are troubleshooting. Or, if the station capacity ever has to be increased, it is very important to know how much water is being used.

The original forms are enclosed in a plastic pocket so that they can be copied when you need more forms. Don't use the copies in the pocket for recording information. Keep them in the pocket so that they are clean when you need them.

Operating Records

The operating record should be filled out every day while at the treatment plant. Operating logs have been provided to record daily, weekly, monthly and yearly service.

Spares Inventory

Spares are provided so that you can quickly and easily replace any small items that can be expected to wear out or burn out, without having to wait while new parts are shipped. This is not possible if the last spare has been used and somebody has forgotten to order more. **Order more spares before you use the last ones**.

A list of spares, with the quantity that should be kept on hand, is provided to help in re-ordering. Refer to the list of suppliers in Section 5 for the names and addresses of the suppliers.

8.2 TABLE OF SPARES

Section 10 Tab	Item	Quantity	Supplier	Storage Location
10.8	Breakers (1P–15A)	3	Wesco #201-12844 Anvil Way Surrey, BC Tel.(604)599-1100	
10.9	Expellant gas cartridge	1 (for each portable fire extinguisher)	SimplexGrinnell 17402 - 116 Avenue Edmonton , AB Tel. (780)452-5280	
10.9	Pail of dry chemical extinguishing agent	20.4kg	SimplexGrinnell 17402 - 116 Avenue Edmonton , AB Tel. (780)452-5280	

8.3 DAILY MAINTENANCE FORMS

1. Record volume of water pumped on water meter
2. Record reading on heat trace controller ammeter (winter)
3. Check to see if exposed heat trace is warm (winter)
4. Check fire extinguishers

Day	Date	Initials	Water Meter Reading (m^3)	Heat Trace Ammeter (amps)	Heat Trace Warm (yes/no)	Fire Ext. OK?	Comments
Sun							
Mon							
Tue							
Wed							
Thu							
Fri							
Sat							
Sun							
Mon							
Tue							
Wed							
Thu							
Fri							
Sat							

Day	Date	Initials	Water Meter Reading (m^3)	Heat Trace Ammeter (amps)	Heat Trace Warm (yes/no)	Fire Ext. OK?	Comments (Location, problem, action required, etc.)
Sun							
Mon							
Tue							
Wed							
Thu							
Fri							
Sat							
Sun							
Mon							
Tue							
Wed							
Thu							
Fri							
Sat							
Sun							
Mon							
Tue							
Wed							
Thu							
Fri							
Sat							

8.4 WEEKLY MAINTENANCE FORMS

	Date							
	Initial							
Telephone Autodialer Test	OK/Fail							
Water Pump Pressure (control valve closed)	kPa							
Water Pump Flow Rate (control valve open)	L/min							
Circuit Breakers On	any off?							
Air Filter Cleaned	Yes/No							
Ice Removed from Muffler	Yes/No							
Battery Charger Amps	Amps							
Battery Charger Voltage	Volts							
Emergency Lights Test	Yes/No							
Building Cleaned	Yes/No							
Comments (items replaced/repaired, supplies ordered, etc)								

8.5 MONTHLY MAINTENANCE FORMS

	Date							
	Initial							
Comments (Location, problem, action required, etc.)								

8.6 YEARLY MAINTENANCE CHECKLIST

	Date							
	Initial							
All Pipe Couplings Tightened								
All Pipe Fittings Tightened								
All Bolted Branch Outlet Tightened								
Coupler on Intake casing Tightened								
Fuel Line Connections Tightened								
Fire Extinguisher Recharged								
Building Paint Touched Up								
Winch Grease								
Comments (items replaced/repaired, supplies ordered, etc)								

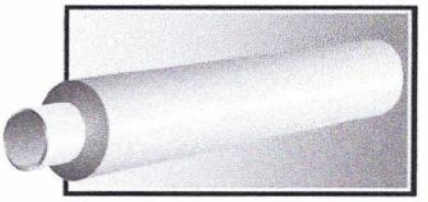
CHAPTER 10

MANUFACTURER'S BROCHURES & MANUALS

TAB 6 – Specialized Valves	Val-Matic Wastewater Combination Air Valve Tech-Taylor Valve Clow R/W Valve Grooved end Butterfly Valve
TAB 7 – Gauges & Sensors	Ashcroft pressure Gauge Walchem Electrodeless Conductivity Controller Signet Flow Sensor/Transmitter
TAB 8 – Electrical	Lumacell Emergency Lighting Holophane Wallpack IV Legrand occupancy Sensor Cooper Lighting Remote Monitoring and Alarm Notification System Rex – Epoxy encapsulated Transformer Overhead Radiant Space Heater Eaton – Enclosed Circuit Breakers & Enclosures Allen-Bradley – Heavy-duty Industrial Relays Rockwell Automation G.T.K. Electric Controls – Panel Details
TAB 9 – Miscellaneous	3M Scotchkote Steel Pipe Coating Security Astragal Schlage Deadbolts Falcon Door Leavers Door Standard Cylinders Stainless Steel Pump Sled Detail Maccaferri Gabions Vault 2 Wall Detail Pipe Roller Support Justrite Cease-Fire Waste Receptacles Activa BR Rubber Flooring Bally Building (Pump House) Specs Extinguisher Servicing Materials Ansul Extinguisher Data/Specs
TAB 10 – Additional Training Materials	

URECON
PRE-INSULATED PIPE

Submittal Data



High Density Polyethylene Pipe (I.P.S. dims)

General

Pipe shall be high density polyethylene manufactured of PE 3408 materials as per ASTM F-714. The product shall comply with AWWA Standard C-901 (12mm-75mm *(1 ½ in.-3 in.)*) and C906 (100mm-1600mm *(4 in.-63 in.)*). The product shall also comply with NSF Standard 61 and/or Standard 14, and must be certified by the NSF for portable water.

Material

Materials used for the manufacture of high density polyethylene pipe and fittings shall comply with all requirements for Type III, Class C, Category 5, Grade P34 according to ASTM D1248, and have a PPI recommended designation of PE3408. Pipe shall further meet ASTM D3350 General Cell Classification of 345444C. The raw material shall contain a minimum of 2%, well dispersed, carbon black. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification and from the same raw material supplier. The pipe manufacturer shall provide, upon request, an outline of quality control procedures performed on polyethylene system components. The pipe shall have product traceability; this shall be accomplished by the inclusion of a product code into the printline of all products.

The printline shall notate the manufacturer, the date of manufacture, the lot and supplier of raw material, the location of manufacture, and the production shift on which the product was produced.

Joining Methods

Wherever possible the polyethylene pipe should be joined by the method of thermal butt-fusion, as outlined in ASTM-D2657, Heat Joining Polyolefin Pipe and Fittings. Butt-fusion joining of pipe and fittings shall be performed in accordance with the procedures recommended by the manufacturer. The polyethylene pipe may be adapted to fittings or other systems by means of an assembly consisting of a polyethylene stub-end butt-fused to the pipe, a back up flange of ductile iron made to Class 150, ANSI B16.5 dimensional standards with bolts of compatible material and suitable gasket. In all cases, the bolts shall be drawn up evenly and in line. No pipe or fittings shall be joined by fusion by any contractor unless he/she is adequately trained and qualified in the techniques involved. Polyethylene pipes of the same outside diameter but different wall thickness shall be joined by means of a flange assembly as designated above. Mechanical fittings acceptable for use with polyethylene pipe shall follow the recommendations of the mechanical fittings manufacturer.

HIGH DENSITY POLYETHYLENE PIPE

Nom. Pipe Size	Nom. Outside Diam.	DR 32.5			DR 26			DR 21			DR 17			DR 15.5			
		Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	
3	3.500				3.214	0.135	0.62	3.146	0.167	0.76	3.063	0.206	0.93	3.021	0.226	1.01	
4	4.500				4.133	0.173	1.03	4.046	0.214	1.26	3.938	0.265	1.54	3.885	0.290	1.67	
5	5.563				5.109	0.214	1.57	5.001	0.265	1.93	4.870	0.327	2.35	4.802	0.359	2.56	
6	6.625	6.193	0.204	1.80	6.084	0.255	2.23	5.957	0.315	2.73	5.798	0.390	3.33	5.720	0.427	3.63	
7	7.125	6.661	0.219	2.08	6.544	0.274	2.58	6.406	0.339	3.16	6.237	0.419	3.85	6.150	0.460	4.20	
8	8.625	8.063	0.265	3.05	7.921	0.332	3.78	7.754	0.411	4.63	7.550	0.507	5.65	7.446	0.556	6.15	
10	10.750	10.048	0.331	4.73	9.874	0.413	5.87	9.665	0.512	7.19	9.410	0.632	8.77	9.279	0.694	9.56	
12	12.750	11.919	0.392	6.66	11.711	0.490	8.26	11.463	0.607	10.11	11.160	0.750	12.34	11.005	0.823	13.44	
13	13.375	12.502	0.412	7.33	12.285	0.514	9.08	12.025	0.637	11.13	11.707	0.787	13.57	11.545	0.863	14.80	
14	14.000	13.086	0.431	8.03	12.859	0.538	9.95	12.586	0.667	12.19	12.253	0.824	14.88	12.086	0.903	16.21	
16	16.000	14.957	0.492	10.48	14.696	0.615	13.00	14.385	0.762	15.93	14.005	0.941	19.43	13.812	1.032	21.17	
18	18.000	16.826	0.554	13.27	16.533	0.692	16.44	16.183	0.857	20.16	15.755	1.059	24.59	15.539	1.161	26.80	
20	20.000	18.696	0.615	16.39	18.370	0.769	20.31	17.982	0.952	24.89	17.507	1.176	30.36	17.265	1.290	33.08	
22	22.000	20.565	0.677	19.82	20.206	0.846	24.57	19.778	1.048	30.11	19.257	1.294	36.73	18.992	1.419	40.03	
24	24.000	22.435	0.738	23.60	22.043	0.923	29.24	21.577	1.143	35.84	21.007	1.412	43.72	20.718	1.548	47.64	
28	28.000	26.173	0.862	32.11	25.717	1.077	39.80	25.174	1.333	48.78	24.508	1.647	59.51	24.171	1.806	64.84	
32	31.594	29.541	0.969	40.74	29.024	1.213	50.58	28.415	1.500	61.93	27.663	1.854	75.60	27.288	2.031	82.30	
36	36.000	33.651	1.108	53.09	33.064	1.385	65.80	32.366	1.714	80.63	31.510	2.118	98.36				
40	39.469	36.898	1.213	63.72	36.255	1.516	78.97	35.496	1.874	96.66							
42	42.000	39.261	1.292	72.24	38.576	1.615	89.55	37.760	2.000	109.76							
48	47.382	44.302	1.453	91.64	43.526	1.819	113.76	42.616	2.248	139.20							
55	55.295	51.698	1.697	124.91	50.805	2.118	154.63	49.728	2.626	189.75							
63	63.209	59.102	1.937	163.00	58.076	2.421	202.05										

Nom. Pipe Size	Nom. Outside Diam.	DR 13.5			DR 11			DR 9			DR 7.3			DR 6.3			
		Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	
3	3.500	2.951	0.259	1.15	2.826	0.318	1.38	2.675	0.389	1.65	2.485	0.479	1.97				
4	4.500	3.794	0.333	1.90	3.633	0.409	2.29	3.440	0.500	2.73	3.194	0.616	3.26	2.986	0.714	3.68	
5	5.563	4.690	0.412	2.91	4.490	0.506	3.50	4.253	0.618	4.17	3.948	0.762	4.99	3.691	0.883	5.62	
6	6.625	5.584	0.491	4.12	5.349	0.602	4.96	5.065	0.736	5.92	4.700	0.908	7.07	4.395	1.052	7.97	
7	7.125	6.006	0.528	4.77	5.751	0.648	5.74	5.446	0.792	6.85	5.056	0.976	8.18	4.727	1.131	9.22	
8	8.625	7.270	0.639	6.99	6.963	0.784	8.41	6.594	0.958	10.03	6.119	1.182	11.99	5.723	1.369	13.51	
10	10.750	9.062	0.796	10.86	8.679	0.977	13.06	8.219	1.194	15.59	7.627	1.473	18.62	7.133	1.706	20.99	
12	12.750	10.749	0.944	15.27	10.293	1.159	18.38	9.746	1.417	21.93	9.046	1.747	26.19	8.459	2.024	29.53	
13	13.375	11.274	0.991	16.80	10.797	1.216	20.22	10.225	1.486	24.13	9.491	1.832	28.83				
14	14.000	11.802	1.037	18.41	11.301	1.273	22.16	10.701	1.556	26.44	9.934	1.918	31.58				
16	16.000	13.488	1.185	24.04	12.915	1.455	28.94	12.231	1.778	34.53	11.353	2.192	41.25				
18	18.000	15.174	1.333	30.43	14.532	1.636	36.62	13.760	2.000	43.71							
20	20.000	16.860	1.481	37.57	16.146	1.818	45.21	15.289	2.222	53.95							
22	22.000	18.544	1.630	45.46	17.760	2.000	54.71										
24	24.000	20.231	1.778	54.11	19.374	2.182	65.11										
28	28.000	23.603	2.074	73.64	22.605	2.545	88.62										
32																	
36																	
40																	
42																	
48																	
55																	
63																	

NPS and Metric Dimensions are in accordance with ASTM F714-85 and ISO 161.
Nominal Weight calculations are based on Plastic Pipe Institute (PPI) Report #TR-7.
Other diameters and DR's are available upon request.

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir
Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

Fittings

Both pipe and fittings shall carry the same pressure rating. All fittings shall be pressure rated to match the system piping to which they are joined. At the fusion, the outside diameter and minimum wall thickness of the fitting shall meet the outside diameter and minimum wall thickness specifications of ASTM F714 for the same size of pipe. All fittings shall be properly derated according to manufacturers written recommendations, and clearly labeled on the fitting as such. Manufacturer shall have a written specification for all standard fittings which establishes Quality Control criteria and tolerances.

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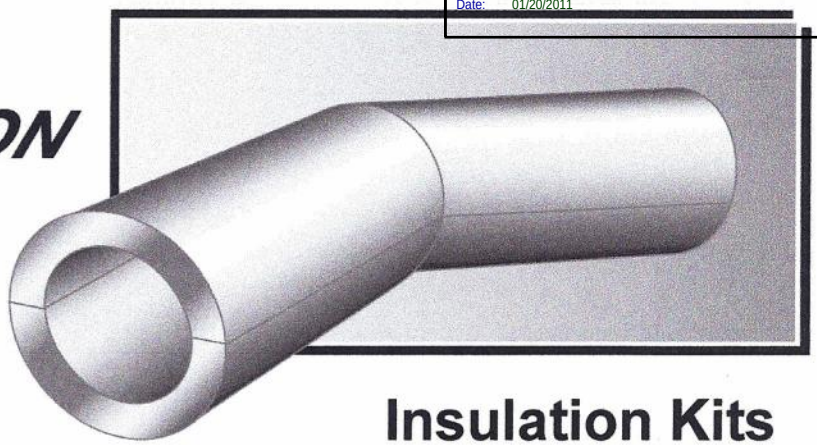
WEB SITE: www.urecon.com

Submittal Data

URECON
PRE-INSULATED PIPE



Insulation Kits
with polymer coating

Urecon factory fabricated insulation kits are easy to field install and provide equivalent insulation value as that of the pre-insulated pipe. Kits are fabricated for standard dimensional steel, PVC, CPVC, copper, and HDPE fittings. Non standard kits are also available if required. Specify the type of fittings being insulated when ordering. (Urecon can supply bare pipe fittings in addition to insulation if desired).

Our superior quality kits are manufactured from closed cell polyurethane or polyisocyanurate foam and are coated with a polymer outer jacket. They are a wise choice for applications where moisture resistance is essential.

Application:

Urecon form fitting insulation kits are ideally suited for the above or below ground insulation of chilled, domestic hot and process water piping up to a maximum service temperature of 86^{0}C *(185^{0}F)*.

Kit Components:

- Polyurethane or polyisocyanurate inner form fitting insulation halfshells.
- Polymer coating on all surfaces.
- Silicone caulking for the seam between halfshells.
- 100mm or 150mm *(4 in or 6 in)* wide polyethylene adhesive backed butyl mastic tape shall be provided to provide a waterproof seal between the insulated pipe and kit.
- For above ground with metal Spiwrap jacket: kit includes a metal cover consistent with the pipe jacket*.

Insulation:

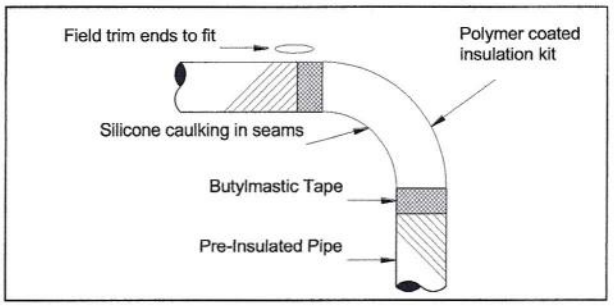
- Rigid polyisocyanurate or polyurethane foam.
- Density: (ASTM D 1622) 27 to 32 kg/m^3 *(1.7 to 2 lbs/ft^3)*.
- Compressive Strength: (ASTM D 1621) 131 to 158 kPa *(19 to 23 lbs/in^2)*.
- Closed Cell Content: 90% minimum.
- Water Absorption: 4% by volume.
- K factor: (ASTM C 518) 0,027 W/m^{0}C *(0.19 Btu. In/ft^2.hr.0F)*.
- Thickness: shall match pipe insulation.

Polymer coating:

- Two component high density polyurethane coating, gray or black in color.
- Density: 1170 kg/m^3 *(73 lbs/ft^3)*.
- Durometer D scale 60.
- Tensile strength: 11,000 kPa *(1610 lbs/in^2)*.
- Tear strength: 26,5 N/mm *(151 lbs/in.)*.
- Thickness: flash coat interior surface, 0,7 mm *(20 mils.)* exterior surface; Urecon BL-20-20EP.

Butyl mastic tape:

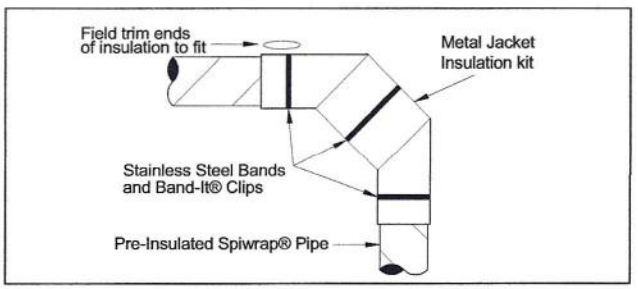
- To seal seams between pre-insulated pipe and kit.
- Width: 100mm *(4 in)*.or 150mm *(6 in)*.
- Backing: Low density Polyethylene.
- Adhesive: Butyl rubber and resin.
- Thickness: 0,90 mm *(35 mils)*.
- Meets AWWA C-209 Standard.
- Note: Butyl mastic tape not required for above ground application with metal covers.



Fitting kit configurations:

Urecon insulation kits are manufactured to suit the fitting and accommodate the factory insulation cut-back on the adjacent pipes.
These are:

- Butt-welded steel @ 150mm *(6 in.)*
- All solvent weld or Bell x Spigot jointed pipe @ spigot insertion depth.
- Butt-fused HDPE @ 225mm *(9 in.)*
- Soldered copper @ 75mm *(3 in.)* for up to 37mm *(1½ in.)*, and 150 mm *(6 in.)* for 50 mm *(2 in.)* and larger.



****Metal Cover:***

- Two piece pre-formed metal with extension legs to suit.
- All metal overlaps shall be 50mm *(2 in.)* minimum and shall be field installed in such a way as to shed water.
- Stainless steel straps and Band-it® clips.
- Note: Butyl mastic tape not required for above ground application with metal covers.

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

URECON PRE-INSULATED PIPE

Submittal Data

Insulation Kits for Spiwrap® System

Urecon factory fabricated insulation kits are easy to field install and provide equivalent insulation value to that of the pre-insulated pipe. Kits are fabricated for standard dimensional steel, PVC, CPVC, copper, and HDPE fittings. Non standard kits are also available if required. Specify the type of fittings being insulated when ordering. (Urecon can supply bare pipe fittings in addition to insulation if desired).

Our superior quality kits are manufactured from closed cell polyurethane or polyisocyanurate foam and include a metal cover consistent with the pipe jacket.

Application:

Urecon form fitting insulation kits are ideally suited to compliment our above ground Spiwrap® system up to a maximum service temperature of 149^{0}C *(300^{0}F).*

Kit Components:

- Polyurethane or polyisocyanurate inner form fitting insulation half shells.
- Split metal cover consistent with the jacket material on the pipe.
- Stainless steel bands and Band-it® clips.

Insulation:

- Rigid polyisocyanurate or polyurethane foam.
- Density:(ASTM D 1622) 27 to 32 kg/m^3*(1.7 to 2 lbs/ft^3).*
- Compressive Strength: (ASTM D 1621) 131 to 158 kPa *(19 to 23 lbs/in^2).*
- Closed Cell Content: 90% minimum.
- Water Absorption:4% by volume.
- K factor:(ASTM C 518) 0,027 W/m^{0}C *(0.19 Btu. In/ft^2.hr.0F).*
- Thickness: shall match pipe insulation.

Metal Cover:

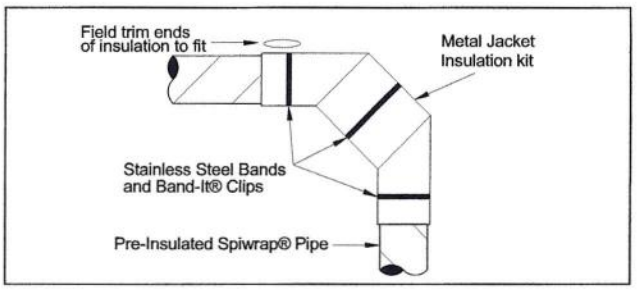
- Two piece pre-formed metal with extension legs to suit.
- All metal overlaps shall be 50mm *(2 in.)* minimum and shall be field installed in such a way as to shed water.
- Stainless steel straps and Band-it® clips.

Fitting kit configurations:

Urecon insulation kits are manufactured to suit the fitting and accommodate the factory insulation cut-back on the adjacent pipes.

These are:

- Butt-welded steel @ 150mm *(6 in.)*
- All solvent weld or Bell x Spigot jointed pipe @ spigot insertion depth.
- Butt-fused HDPE @225mm *(9 in.)*
- Soldered copper @ 75mm *(3 in.)* for up to 37mm *(1½ in.)*, and 150 mm *(6 in.)* for 50 mm *(2 in.)* and larger.
- Solvent weld PVC or CPVC @ flush with bell end and insertion depth on spigot end.
- Gasket joint PVC, CPVC or Ductile iron are usually mechanically re-strained when used above ground. The cut-back provided varies with the method of restraint used.



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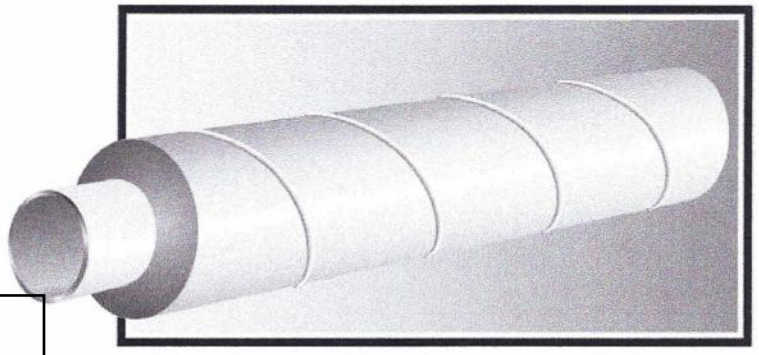
URECON

PRE-INSULATED PIPE



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Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray EIT, Williams Engir.

Date: 26/10/2010

Standard Spiwrap® system
for pipe with plain ends

Urecon's "U.I.P."® factory insulation piping process and related ISO-9000 quality control procedures assure you of the highest quality product on the market today. A galvanized steel, aluminum or stainless steel locked seam metal jacket protects the system once the "U.I.P."® foam has cured.

Application:

Urecon's Spiwrap® pre-insulated piping system is suitable for

- Above ground chilled water lines in warmer climates
- Above ground lines for freeze protection of bridge crossings, mining and industrial lines.

Core Pipe:

All types of plain end pipe may be factory insulated with the "U.I.P."® process; refer to the attached pipe manufacturer's data sheet for information on the core pipe(s) chosen for this project.

Pipe Preparation:

Pipe and jacket interior shall be cleaned of surface dust and dirt to insure a positive bond of the foam to the entire pipe surface. The pipe and jacket may be treated by sand blasting, steam cleaning or the application of a chemical foam-bonding compound if deemed necessary by Urecon.

Insulation:

- Material, rigid polyurethane foam, factory applied.
- Thickness: as required, refer to accompanying thickness chart.
- Density: (ASTM D 1622) 35 to 46 kg/m^3 *(2.2 to 3.0 lbs/ft^3).*
- Closed cell content: (ASTM D 2856) 90%,minimum.
- Water absorption: (ASTM D 2842) 4.0% by volume .
- Thermal conductivity: (ASTM C518) 0,020 to 0,026 W/m ^{0}C *(0.14 to 0.17 Btu • in/ft^2 •hr • ^{0}F).*

System Properties:

- System compressive strength: (modified ASTM D 1621 with locked seam jacket) approximately 1379 kPa *(200 lbs/in^2),* varies with gauge, type of jacket material and pipe diameter.
- Temperature limitations:
  - in service*, -45^0 to 85^{0}C*(-49^0 to 185^{0}F)*

Outer Jacket:

The outer protective jacket shall be supplied with 4-ply lock seam as indicated on the following chart:

Jacket Material	Gauge*				
	18	20	22	24	26
Galvanized Steel			X		
Aluminum					
Stainless Steel					

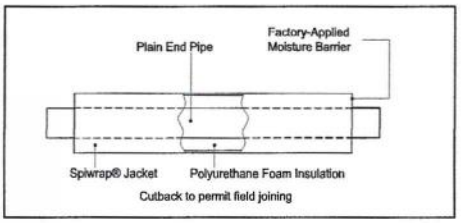
Plain End Joints:

The pipe is provided with the appropriate cut-backs to allow for joining in the field. These are typically:

- Butt-welded steel @ 150mm *(6 in.)*
- Butt-fused HDPE @ 225mm *(9 in.)*
- Soldered copper @ 75mm 150mm *(6 in.)* for up to 37mm *(1 ½ in.)*, and 225mm *(9 in.)* for 50mm *(2 in.)* and larger.

Joint insulation kits consist of a preformed set of urethane or polyisocyanurate foam half shells and metal jacket consistent with the pipe jacket secured with stainless steel straps and Band-it® clips to suit. All metal overlaps shall be 50mm (2 in.) minimum and shall be field positioned in such a way as to shed water.

Fittings:
Refer to the accompanying data sheet 'Insulation Kits for Spiwrap® system' for details.



Spiwrap® System*													
		25mm *(1")*				35mm *(1 ½")*				50mm *(2")*			
Pipe Size		Jacket Size		Foam		Jacket Size		Foam		Jacket Size		Foam	
in	mm	*in*	mm	*in*	mm	*in*	mm	*in*	mm	*in*	mm	*in*	mm
1/2"	12	*x*	x	*x*	x	*4.0*	100	*1.580*	40	*5.0*	127	*2.080*	53
3/4"	19	*x*	x	*x*	x	*4.0*	100	*1.475*	37	*5.0*	127	*1.975*	50
1"	25	*4.0*	100	*1.343*	34	*5.0*	127	*1.843*	47	*6.0*	152	*2.343*	60
1 1/4"	32	*4.0*	100	*1.170*	30	*5.0*	127	*1.670*	42	*6.0*	152	*2.170*	55
1 1/2"	38	*4.0*	100	*1.050*	26	*5.0*	127	*1.550*	39	*6.0*	152	*2.050*	52
2"	50	*5.0*	127	*1.313*	33	*6.0*	152	*1.813*	46	*7.0*	178	*2.313*	59
2 1/2"	64	*5.0*	127	*1.063*	27	*6.0*	152	*1.563*	40	*7.0*	178	*2.063*	52
3"	76	*6.0*	152	*1.250*	32	*7.0*	178	*1.750*	44	*8.0*	203	*2.250*	57
4"	100	*7.0*	178	*1.250*	32	*8.0*	203	*1.750*	44	*9.0*	229	*2.250*	57
5"	127	*8.0*	203	*1.219*	31	*9.0*	229	*1.719*	44	*10.0*	254	*2.219*	56
6"	150	*9.0*	229	*1.188*	30	*10.0*	254	*1.688*	43	*11.0*	279	*2.188*	55
8"	200	*11.0*	279	*1.188*	30	*12.0*	305	*1.688*	43	*13.0*	330	*2.188*	55
10"	254	*13.0*	330	*1.125*	29	*14.0*	356	*1.625*	41	*15.0*	381	*2.125*	54
12"	305	*15.0*	381	*1.125*	29	*16.0*	406	*1.625*	41	*17.0*	432	*2.625*	67
14"	14.0	*16.0*	406	*1.000*	25	*x*	x	*x*	x	*18.0*	457	*2.000*	51
16"	16.0	*18.0*	457	*1.000*	25	*x*	x	*x*	x	*20.0*	508	*2.000*	51
18"	457	*20.0*	508	*1.000*	25	*x*	x	*x*	x	*22.0*	559	*2.000*	51
20"	508	*22.0*	559	*1.000*	25	*x*	x	*x*	x	*24.0*	607	*2.000*	51
22"	559	*24.0*	607	*1.000*	25	*x*	x	*x*	x	*26.0*	660	*2.000*	51
24"	607	*26.0*	660	*1.000*	25	*x*	x	*x*	x	*28.00*	711	*2.000*	51

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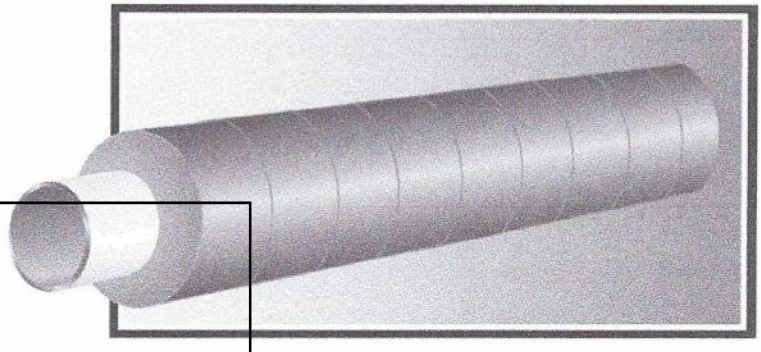
Submittal Data

URECON
PRE-INSULATED PIPE



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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir .

Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

U.I.P.® system
Below grade applications for pipe with plain ends

Urecon's "U.I.P."® factory insulation piping process and related ISO-9000 quality control procedures assure you of the highest quality product on the market today. This unique, time proven, void free process allows us to visually inspect the urethane foam insulation prior to jacket application. A gray or UV inhibited black polyethylene jacket protects the system once the "U.I.P."® foam has cured.

Application:
Urecon's standard "U.I.P."® pre-insulated piping system is suitable for

- underground chilled water lines in warmer climates
- underground potable water or sewer lines to prevent freezing in colder regions.
- underground warm water lines to 86^{0}C *(185^{0}F)*
- temporary above ground lines (black jacket).

Core Pipe:
All types of plain end pipe may be factory insulated with the "U.I.P."® process; refer to the attached pipe manufacturer's data sheet for information on the core pipe(s) chosen for this project.

Pipe Preparation:
Pipe shall be cleaned of surface dust and dirt to insure a positive bond of the foam to the entire pipe surface. The pipes may be treated by sand blasting or the application of a chemical foam-bonding compound if deemed necessary by Urecon.

Insulation:

- Material, rigid polyurethane foam, factory applied.
- Thickness: as required, refer to accompanying thickness chart.
- Density: (ASTM D 1622) 35 to 46 kg/m^3 *(2.2 to 3.0 lbs/ft^3)*.
- Closed cell content: (ASTM D 2856) 90%,minimum.
- Water absorption: (ASTM D 2842) 4.0% by volume .
- Thermal conductivity: (ASTM C518) 0,020 to 0,026 W/m ^{0}C *(0.14 to 0.17 Btu • in/ft^2 •hr • ^{0}F)*.

System Properties:

- System compressive strength: (modified ASTM D 1621 with 50 mil jacket) approximately 414 to 552 kPa *(60-80 lbs/in^2)*, varies with pipe diameter.
- b) Temperature limitations:
  - in service, -45^0 to 86^{0}C*(-49^0 to 185^{0}F)*
  - installation, to -34^0 C *(-30^{0}F)*

Outer Jacket on Pipe Insulation:
The outer protective jacket shall consist of custom blended black polyethylene, 1,27 mm *(50 mils)* thick, UV inhibited factory applied. The jacket shall have a modified butyl rubber adhesive to ensure positive adhesion to the foam insulation and shall be applied hot in two counterwound and overlapping layers each 0,64 mm (*25 mils*) thick to ensure a waterproof bond throughout its entire length. Exposed ends of insulation shall be coated with an approved waterproofing sealant prior to leaving the factory, when required.

Outer Jacket Characteristics:

- jacket material: gray or black (UV inhibited) polyethylene
- sealant: butyl rubber, resin
- jacket thickness: 1,27 mm *(50 mils)*
- minimum elongation: (ASTM D 1000) 300%, 6 month test
- tensile strength: (ASTM D-1000) 8,93 kg/cm *(38 lbs/in)*

Plain End Joints:
The pipe is provided with the appropriate cut-backs to allow for joining in the field. These are typically:

- butt-welded steel @ 150mm *(6 in.)*
- butt-fused HDPE @ 225mm *(9 in.)*

- soldered copper @ 150mm *(6 in.)* for up to 37mm *(1 ½ in.)*, and 225mm *(9 in.)* for 50mm *(2 in.)* and larger.

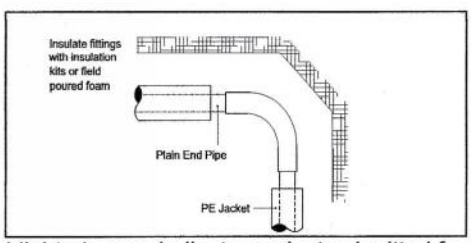
Joint insulation kits consist of a preformed set of urethane or polyisocyanurate foam half shells and adequate butyl mastic tape.

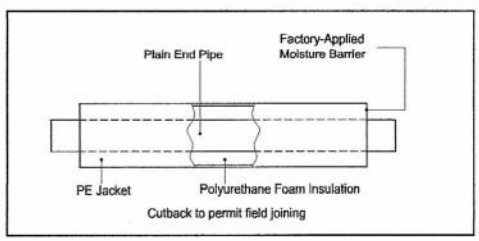
- width: 100mm *(4 in.)* or 150mm *(6 in.)*.
- backing: Low density polyethylene.
- adhesive: Butyl rubber and resin.
- thickness: 0,90mm *(35 mils)*.
- meets AWWA C-209 standard.

Fittings:

May be supplied factory insulated if the fitting has long tangential legs (such as with fabricated Steel fittings) or insulation kits may be provided for field installation. These kits match the thickness of the insulation on the pipe complete with extension legs to suit the cut-back on the pipe. Refer to Urecon's 'Submittal Data for Insulation Kits' for details.

UIP® System													
		25mm *(1")*				35mm *(1 ½")*				50mm *(2")*			
Pipe Size		OD		Foam		OD		Foam		OD		Foam	
In	mm	*in*	mm	*in*	mm	*in*	Mm	*In*	mm	*in*	mm	*in*	mm
½"	12	*3.00*	76	*1.1*	28	*3.67*	93	*1.4*	36	*5.25*	133	*2.2*	56
¾"	19	*3.35*	85	*1.2*	30	*4.25*	108	*1.6*	41	*5.25*	133	*2.1*	53
1"	25	*3.75*	95	*1.2*	30	*4.50*	114	*1.7*	43	*5.25*	133	*2.1*	53
1 1/4"	32	*4.00*	102	*1.2*	30	*4.50*	114	*1.4*	36	*5.50*	140	*1.9*	48
1 1/2"	38	*4.25*	108	*1.2*	30	*5.00*	127	*1.6*	41	*6.13*	156	*2.1*	53
2"	51	*4.63*	118	*1.1*	28	*5.75*	146	*1.7*	43	*6.50*	165	*2.1*	53
2 1/2"	64	*5.13*	130	*1.1*	28	*6.13*	156	*1.6*	41	*6.75*	171	*1.9*	48
3"	76	*5.75*	146	*1.2*	30	*6.75*	171	*1.7*	43	*7.75*	197	*2.2*	56
4"	102	*6.75*	171	*1.1*	28	*7.75*	197	*1.6*	41	*8.75*	222	*2.2*	56
5"	127	*8.00*	203	*1.2*	30	*8.75*	222	*1.6*	41	*10.00*	254	*2.2*	56
6"	152	*9.00*	229	*1.2*	30	*10.00*	254	*1.7*	43	*11.00*	279	*2.2*	56
8"	203	*11.00*	279	*1.2*	30	*12.00*	305	*1.7*	43	*13.25*	337	*2.3*	58
10"	254	*13.75*	349	*1.5*	38	*14.00*	356	*1.6*	41	*15.50*	394	*2.4*	61
12"	305	*15.70*	399	*1.5*	38	*16.00*	406	*1.6*	41	*17.50*	445	*2.4*	61
14"	356	*x*	x	*x*	x	*17.75*	450	*1.9*	48	*18.80*	478	*2.4*	61
16"	406	*x*	x	*x*	x	*19.75*	502	*1.9*	48	*21.00*	533	*2.5*	64
18"	457	*x*	x	*x*	x	*x*	x	*x*	x	*23.00*	584	*2.5*	64
20"	508	*x*	x	*xx*	x	*x*	x	*x*	x	*25.00*	635	*2.5*	64





*Highlighted areas indicate product submitted for this project.

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PRE-INSULATED PIPE

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Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir
Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

DETAILED SPECIFICATION

UIP® half-shells

1) General

The urethane foam half-shells shall be manufactured using the U.I.P.® insulation process in accordance to ISO 9001-2000 Standards, or approved equal.

2) Insulation

a) Material, rigid polyurethane foam.
b) Thickness: nominal 37 mm *(1 1/2 in),* or as required.
c) Density: (ASTM D 1622) 35 to 46 kg/m^3 *(2.2 to 3.0 lbs/ft^3).*
d) Closed cell content: (ASTM D 2856) 90%, minimum.
e) Water absorption: (ASTM C 272) 2.0% by volume .
f) Thermal conductivity: (ASTM C518) 0,020 to 0,026 W/m ^{0}C *(0.14 to 0.17 Btu • in/ft^2 •hr • ^{0}F).*
g) Temperature limitations: -45° to 93^{0}C *(-49^0 to 200°F).*

3) Packaging

The product is typically supplied in 1.52 m (*5 ft.*) lengths bundled and wrapped in a UV protective sheath. Other lengths are available on request.

4) Outer Jacket on Pipe Insulation

The UIP® half shells are provided with a mirror smooth outer urethane 'skin' that allows for greater ease of field installation of the final outer jacket required. For below ground applications the jacket of choice is typically 0,305mm (*12 mil*) PE hand-roll tape spirally applied with a 50% overlap; refer to Submittal data #257 for more detail on this product.

5) Insulation kits for fittings

Urethane half-shell covers are available for all types of fittings to match the insulation system used on the pipe.

Note: -Physical characteristics are nominal and may vary depending on pipe type and diameter. (Revised Feb. 2010)

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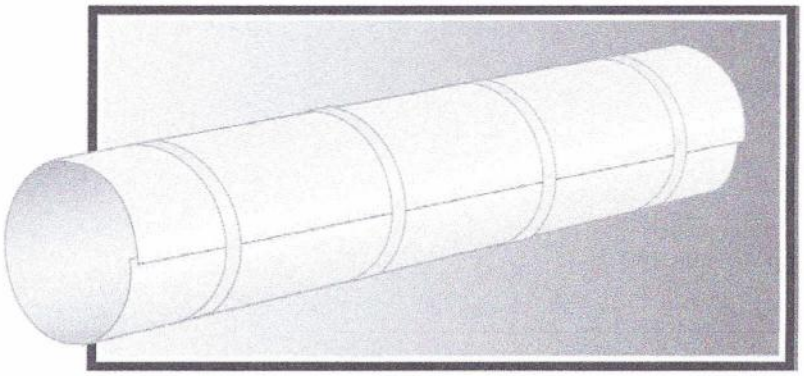

Cut and rolled galvanized steel (field applied)

Urecon's products and related ISO-9000 quality control procedures assure you of the highest quality product on the market today.

Application:
Urecon's cut and rolled galvanized steel field applied jacket is suitable where factory insulating the pipe is either not possible or practical. This would include

- Above ground hot water lines
- Above ground chilled water lines in warmer climates
- Above ground lines for freeze protection of bridge crossings, mining and industrial lines
- Any above ground application where a short section of pipeline may require additional mechanical protection

Metal jacket:

The protective metal jacket for the pipe shall be supplied to site cut and rolled to a diameter that yields 50 mm (*2 in*) overlap circumferentially once installed. In the field this lap should be positioned in such a way as to shed water, and each piece shall lap the next by 50 mm (*2 in*). The jacket shall be supplied with stainless steel bands and crimp seals (or Band-It® clips if removable /reusable is required) .

Cut and rolled galvanized steel field applied submittal data sheet cont'd.

Gauge	Thick-ness (mm)	Thick-ness (inches)	Lbs/sq ft	Kgs/sq m
14	1.994	0.0785	3.281	16.01
16	1.613	0.0635	2.656	12.96
18	1.311	0.0516	1.8974	10.52
20	1.006	0.0396	1.4486	8.08
22	0.8534	0.0336	1.2038	6.86
24	0.7010	0.0276	0.9590	5.64
26	0.5512	0.0217	0.7591	4.42

*Highlighted areas indicate product submitted for this project.

Fittings:
Refer to the accompanying data sheet 'Insulation Kits for Spiwrap® system' for details.

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URECON
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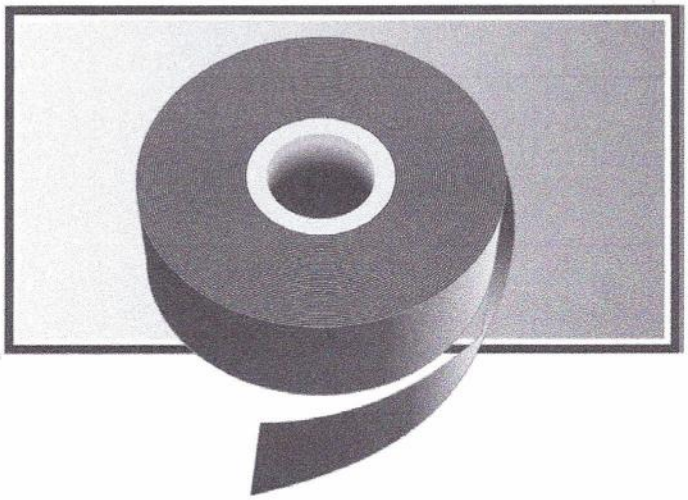

Polyethylene hand roll tape

Renwrap #300 is a general purpose pipeline utility tape for use over Urecon's polyurethane or polyisocyanurate foam half shells in the field. When properly applied it provides a watertight jacket along with mechanical protection of the insulation. This pressure sensitive product can be applied over a wide range of temperatures and exhibits very good adhesion to itself and / or the adjacent factory insulated P.E. jacket.

Product Properties

- Thickness: 0,305mm (*12 mil*)
- Color: black or gray (southern climates only).
- Backing: low density polyethylene
- Adhesive: synthetic rubber and resin
- Widths:
- 0,50mm X 30 meters/roll (*2 in X 100 ft*)...24/case
- 100mm X 30 meters/roll (*4 in X 100 ft*)...12 rolls /case
- 150mm X 30 meters/roll (*6 in X 100 ft*)...8 rolls/case

Installation

The 50mm (*2 in*) product should be used (and be reserved for) over insulated fittings and any other compound curve areas. If the ambient temperature is below freezing, the tape should be pre-warmed prior to application for ease of application.

The total applied thickness is dependant on the engineer and / or the specification for the project. As a general rule, Urecon recommends applying the product in two counter wound layers allowing a 50% overlap onto itself in both directions; the resultant jacket being 1,22mm (*48 mil*) thick.

Adequate tension should be applied to the tape to provide approximately 3.2mm (*1/8 in*) 'neck down' during application.

Polyethylene Hand roll tape
submittal data sheet cont'd.

Physical Properties	***metric***	***imperial***
Total thickness[1]	0,305mm	12 mils
Backing thickness[1]	0,203mm	8 mils
Adhesive thickness[1]	0,102	4 mils
Tensile strength[1]	4.46 kg/cm width	25 lb/in width
Elongation[1]	150%	150%
Adhesion to backing[1]	0,56 kg/cm width	50 oz/in
Dielectric strength[1]	13 KV	13KV
Insulation resistance[2]	1,000,000 Mega ohms	1,000,000 Mega ohms
Water Vapor transmission rate	< 0.03 g/100 cm^2/ 24 hr.	< 0.2 g/100 in^2/24 hr.
Temperature range	-34° C to 71° C	-30° F to 160° F

[1]=ASTM D 1000 [2]=ASTM D 257 [3]=ASTM E 398
Note: Values listed are averages and should not be used as maximums or minimums.

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Local Representative

Submittal Data

Mastic – Sealant

Short Form Specifications

The solvent based asphaltic mastic vapour barrier coating is designed to give superior protection against water ingress. The mastic shall be supplied by Urecon in 20 liter *(5 US Gal.)* pails for field application on exposed urethane foam.

Product Description and Application

The mastic sealant is black in color and contains petroleum solvents (complete physical properties listed below). The mastic can be brushed, hand applied or trowel applied (recommended 0.625 mm *(1/16")* thick) direct to the exposed urethane insulation

Physical properties of mastic - Sealant

Color	Drying Times - Based on 21°C *(70°F)* at 50% RH	Density	Water Vapour Permeability	Flash Point	Min. Application Temp.	Service Temperature
Black	Touch Dry: 4 hrs Firm Dry: 48 hours	1.07kg/liter *(8.9 lbs/US Gal.)*	1.2 ng/Pa.m^2.s *(0.018 – 0.020 perms)*	39°C *(100°F)*	5°C *(40°F)*	Minus 30°C – 95°C *(minus 22°F – 250°F)*

Limitations

It will not freeze, but warming of the product in cold weather is necessary before application. It should not be applied on damp or frosty surfaces. There is a solvent odor, and the mastic may attack some plastic foams; test before using.

Standards, Tests & Approvals

The mastic conforms to ASTM E96 on water vapour permeance 1.2ng/Pa.m^2.s *(.018 - .020 perms)*

Precautions

Contains flammable solvents. Do not allow any ignition sources (i.e. smoking, welding, etc.) in the working area. Also allow for proper ventilation, as there is a strong solvent odor. Product is harmful if swallowed.

Warning: The mastic does contain flammable solvents, which may constitute a fire hazard if improperly used.

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Per,

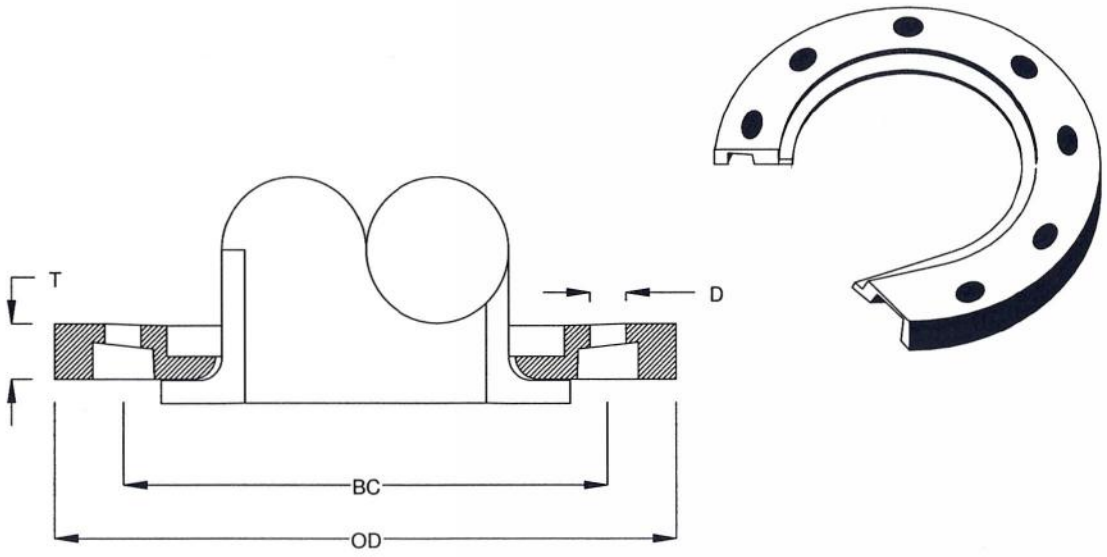
WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

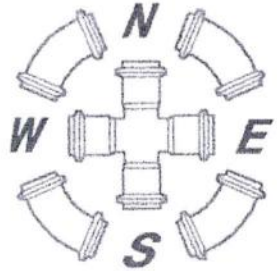
SIZE	BC	BOLT DIAM	#OF BOLTS	T
2"	4.75	0.75	4	0.75
3"	6.0	0.75	4	0.94
4"	7.5	0.75	8	0.94
6"	9.5	0.88	8	1.0
8"	11.75	0.88	8	1.12
10"	14.25	1.0	12	1.19
12"	17.0	1.0	12	1.25
14"	18.75	1.13	12	1.38
16"	21.25	1.13	16	1.44
18"	22.75	1.25	16	1.56
20"	25.0	1.25	20	1.69
24"	29.5	1.38	20	1.88



Flange adapters in diameters 14" and greater shall be equipped with an epoxy coated ductile iron backing ring rings coated with: RAL037 epoxy powder containing: --epoxy resin (#604), polyester resin, titanium dioxide, solidifier, and others, heated to 450 degrees to a thickness of 7-12 mil

DISCLAIMER - PLEASE READ

Due to various factors affecting production, all dimensions are approximate. Dimensions an apperance are subject to change without notice due to design or production modifications. Angle tolerance for elbows is =/- 2 degrees. All fittings are subject to Specified Fittings "Standard Terms and Conditions." A copy of this drawing must accompany all purchase orders for this fitting. All other dimensions are to tolerances of +/- 1"



SPECIFIED FITTINGS
164 WEST SMITH RD.
BELLINGHAM WA 98226
888-734-8846
888-734-8258 (fax)

TITLE

EPOXY COATED
DUCTILE IRON FLANGE
BACKING RINGS

SIZE	CAGE CODE	DWG NO	REV
A4			

SCALE NOT TO SCALE

SHEET

Conventional Fusion: Allowable Operating Pressures

The following charts represent the Allowable Operating Pressure for fittings manufactured from three grades of polyethylene resin used in our products. These values represent the most common Standard Dimension Ratios (SDR) used in the industries that we service and are further divided based on the design factors determined by each of their related governing authorities.

- .32 for natural gas distribution systems regardless of resin used
- .50 for water applications for PE3408 resins
- .63 for water applications for PE4710 resins

All design factors are assuming a standard operating temperature of 73° F

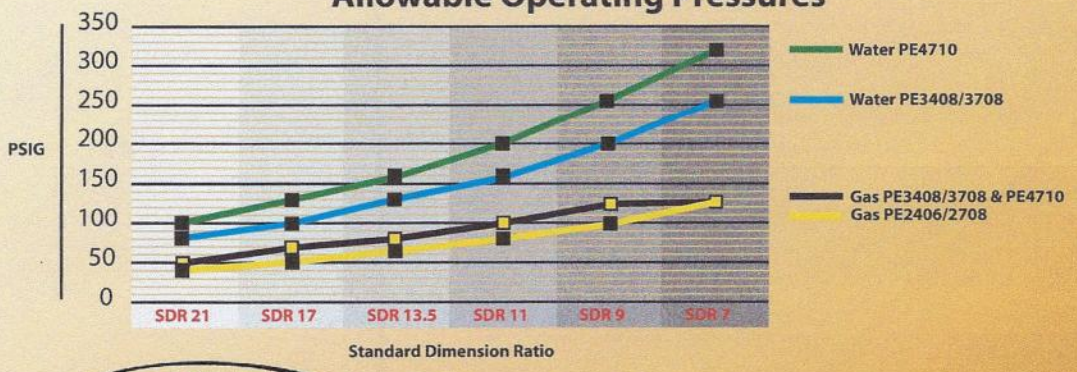
NOTE: For other fluids, temperatures, chemicals and environmental considerations additional design factors may be required. (i.e. Canadian gas utilities use a .40 design factor for their natural gas applications.)

DOT Allowable Operating Pressure for Natural Gas Plastic Pipe Systems			
.32 design factor @ 73° F			
SDR	PE2406/PE2708 **DOT Allowable**	PE3408 **DOT Allowable**	PE4710 **DOT Allowable**
21	40	50	50
17	50	64	64
13.5	64	80	80
11	80	100	100
9	100	125**	125**
7	125**	125**	125**

** **DOT Regulations only allow a 125 psig max for natural gas plastic pipe systems regardless of the materials Maximum Allowable Operating Pressure (MAOP).**

Allowable Operating Pressure for Municipal & Industrial Applications		
SDR	PE3408 **.50 design factor @ 73° F**	PE4710 **.63 design factor @ 73° F**
21	80	100
17	100	130
13.5	130	160
11	160	200
9	200	255
7	265	335

Allowable Operating Pressures



NOTE: Operating Pressure for Conventional Tapping Tees and Conventional Branch Saddles are determined by the material used, the outlet SDR and the governing regulations.

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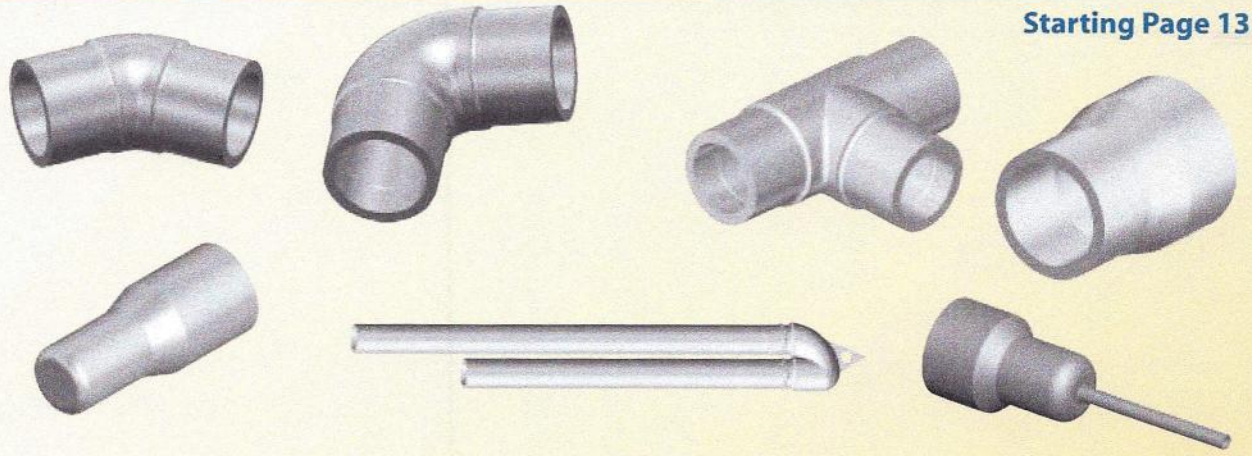
Conventional Fusion: Butt Fusion Fittings

Starting Page 13



Central's Molded PE2406/PE2708 Butt fittings are manufactured and tested to the requirements of ASTM D2513 and ASTM D3261 and are sized for use with pipe conforming to ASTM D2513 and with Butt fittings conforming to ASTM D3261. Central's PE2406 /PE2708 Butt fittings are molded from a virgin yellow medium density resin in accordance with the material specifications listed in ASTM D3350 with a designation of PE2406/PE2708. All Central Plastics PE2406/ PE2708 Butt Fittings are compatible for heat fusion with any pipe or fitting manufactured from a like or similar resin. Central's PE2406/PE2708 fittings have been qualified for fusion using PPI generic fusion procedures.

Central's Molded PE3408/PE4710 Butt fittings are manufactured and tested to the requirements of ASTM D2513, ASTM D3261, and ANSI/AWWA C906 for use with outside diameter controlled pipe and fittings conforming to ASTM D2513, ASTM D3035, ASTM F-714. Central's PE3408/PE4710 Butt fittings are molded from an NSF listed resin in accordance with the material specifications listed in ASTM D3350 with a designation of PE3408/PE4710. Central Plastics PE3408/PE4710 Butt fittings are manufactured and tested to the requirements of ASTM D2513 and ASTM D3261 (where applicable) and are compatible for heat fusion with any pipe and or fitting manufactured from a like or similar resin. Central's PE3408/PE4710 fittings have been qualified for fusion using PPI generic fusion procedures.

FEATURES:

- Pressure rated for natural gas and potable water applications.
- IAPMO Approved (where applicable).
- CSA Approved (where applicable).
- PE3408/PE4710 FM Approved (where applicable).
- PE3408/PE4710 fittings are tested to the requirements of AWWA C906.
- Can be joined by butt, socket , electrofusion or mechanical methods.
- Can be heat fused with all conventional and electrofusion fusion methods.

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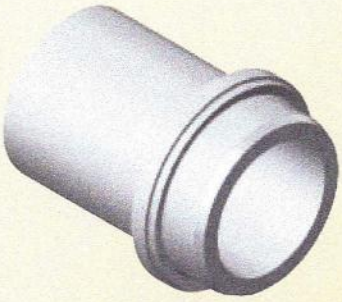
Conventional Fusion: PE Adapters

Starting Page 80

Flange Adapter



MJ Adapter

Gasketed Adapter

Central's PE3408/PE4710 Flange Adapters and MJ Adapters are manufactured and tested to the requirements of ASTM D3261 and ASTM D3261 and ANSI/AWWA C906 for use with pipe conforming to ASTM D2513/3035, F-714 and with Butt fittings conforming to ASTM D3261 as applicable. Central's PE3408/PE4710 Flange Adapters and MJ Adapters are molded from an NSF listed resin in accordance with the material specifications listed in ASTM D3350. All Central Plastic's PE3408/PE4710 Flange Adapters and MJ Adapters are compatible for heat fusion with any pipe or fitting manufactured from a like or similar resin.

FEATURES:

- Pressure rated for municipal and trial applications.
- PE3408/PE4710 FM Approved (where applicable).
- PE3408/PE4710 fittings are tested to the requirements of AWWA C906.
- Can be heat fused using conventional and electrofusion fusion methods.
- Can be beveled for butterfly valves when requested.
- MJ Adapters can be provided with stiffeners when requested.

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Butt Fittings: 90° Butt Elbow

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Revise and Re-Submit	( )
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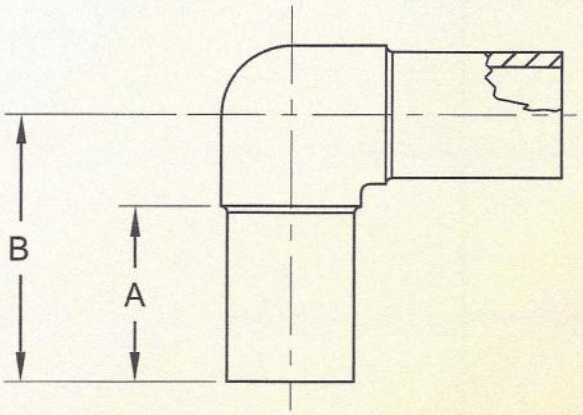
By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011



90° CTS & IPS ELBOW DIMENSIONS

Nominal Size	A	B	L
3/4" IPS	2.63	4.00	*
1" CTS	2.25	3.69	*
1" IPS	2.63	4.00	*
1-1/4" IPS	2.63	4.00	*
1-1/2" IPS	2.63	4.00	*
2" IPS	2.81	4.50	*
3" IPS	3.00	5.13	*
4" IPS	3.00	5.75	*
6" IPS	4.38	9.00	*
8" IPS	6.00	12.00	*
10" IPS	6.00	13.25	*
12" IPS	7.50	15.88	*

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Butt Fittings: 90° Butt Elbow

(PE3408/PE4710) 90° IPS BUTT ELBOWS					
Size	SDR	Part Number	Pack Qty.	Wt.	AWWA
3/4" IPS	DR 11	10004109	100	0.15	YES
3/4" IPS	DR 9.3	10004110	100	0.15	YES
1" IPS	DR 11	10004111	100	0.14	YES
1" IPS	DR 9.3	10003813	100	0.19	YES
1-1/4" IPS	DR 11	10002945	100	0.26	YES
1-1/4" IPS	DR 9.3	10004112	100	0.29	YES
1-1/2" IPS	DR 11	10004113	40	0.34	YES
1-1/2" IPS	DR 9.3	10004114	80	0.37	YES
2" IPS	DR 17	10004130	10	0.59	YES
2" IPS	DR 11	10002946	10	0.74	YES
2" IPS	DR 9/9.3	10004131	10	0.66	YES
3" IPS	DR 17	10004132	10	1.54	YES
3" IPS	DR 11	10002947	10	1.75	YES
3" IPS	DR 9/9.3	10004133	10	1.67	YES
4" IPS	DR 17	10003465	10	3.15	YES
4" IPS	DR 11	10001630	10	3.61	YES
4" IPS	DR 9/9.3	10004137	10	3.12	YES
6" IPS	DR 17	10004143	2	9.96	YES
6" IPS	DR 11	10002948	2	9.76	YES
6" IPS	DR 9/9.3	10004148	2	9.37	YES
6" IPS	DR 9	10004146	2	9.75	YES
8" IPS	DR 17	10004153	2	21.10	YES
8" IPS	DR 11	10002949	2	21.40	YES
8" IPS	DR 9	10004155	2	20.20	YES
10" IPS	DR 17	10004119	1	33.00	YES
10" IPS	DR 11	10004116	1	35.80	YES
10" IPS	DR 9	10004121	1	43.50	YES
12" IPS	DR 17	10004127	1	56.50	YES
12" IPS	DR 11	10003853	1	59.70	YES
12" IPS	DR 9	10003928	1	71.00	YES

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Call for availability of other sizes and dimensions.

Butt Fittings: Butt Tee

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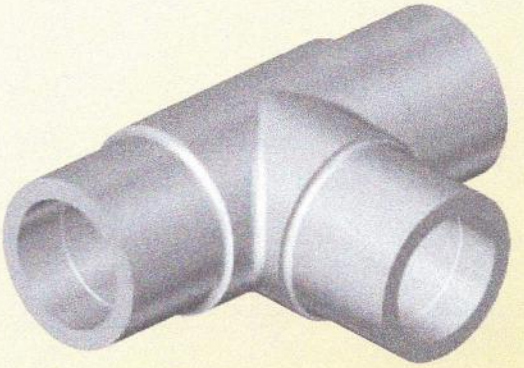

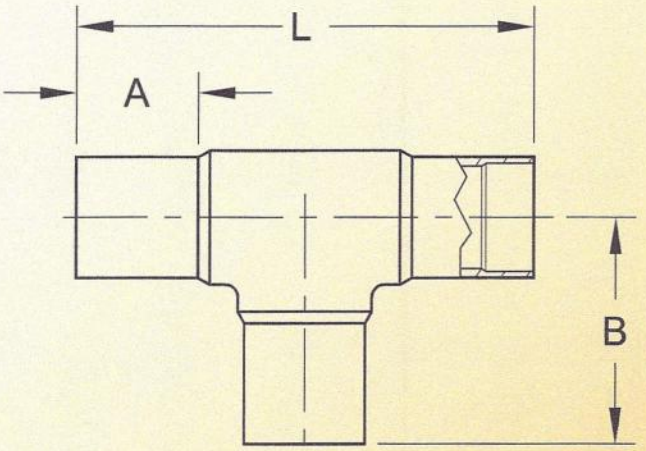

CTS & IPS BUTT TEE DIMENSIONS

Nominal Size	A	B	L
3/4" CTS	1.75	2.85	5.70
3/4" IPS	1.75	3.06	6.12
1" CTS	2.25	3.62	7.25
1" IPS	1.75	3.19	6.38
1-1/4" IPS	1.88	3.38	6.76
1-1/2" IPS	2.30	4.25	8.50
2" IPS	2.54	4.61	9.28
3" IPS	2.90	5.13	10.26
4" IPS	2.90	5.60	11.20
6" IPS	4.38	9.00	18.00
8" IPS	6.00	12.00	24.00
10" IPS	6.00	13.25	26.50
10" IPS	6.00	13.25	26.50
12" IPS	7.50	15.88	31.75

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Butt Fittings: Butt Tee

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Date: 01/20/2011

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(PE3408/PE4710) CTS & IPS BUTT TEES

Size	SDR	Part Number	Pack Qty.	Wt.	AWWA
1/2" CTS	.090 WALL	10004229	100	0.08	YES
3/4" IPS	DR 11	10003969	100	0.13	YES
1" CTS	.101 WALL	10002906	50	0.18	-
1" IPS	DR 11	10003838	100	0.19	YES
1-1/4" IPS	DR 11	10003815	50	0.42	YES
1-1/2" IPS	DR 11	10004230	40	0.49	YES
1-1/2" IPS	DR 9.3	10003931	40	0.49	YES
2" IPS	DR 11	10002956	10	0.99	YES
2" IPS	DR 9.3/9.3	10004250	10	0.91	YES
3" IPS	DR 17	10004252	10	2.01	YES
3" IPS	DR 11	10002957	10	2.30	YES
3" IPS	DR 9/9.3	10004253	10	2.31	YES
4" IPS	DR 17	10003478	8	4.50	YES
4" IPS	DR 11	10000853	8	4.50	YES
4" IPS	DR 9	10002073	10	5.40	YES
6" IPS	DR 17	10004261	1	13.50	YES
6" IPS	DR 11	10002958	1	14.13	YES
6" IPS	DR 9	10004263	1	15.10	YES
8" IPS	DR 17	10004270	1	29.90	YES
8" IPS	DR 11	10002959	1	30.51	YES
8" IPS	DR 9	10004273	1	28.00	YES
10" IPS	DR 17	10004237	1	46.50	YES
10" IPS	DR 11	10004233	1	56.50	YES
10" IPS	DR 9	10004238	1	59.00	YES
12" IPS	DR 17	10004246	1	74.50	YES
12" IPS	DR 11	10004242	1	79.30	YES
12" IPS	DR 9	10004247	1	82.30	YES

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Call for availability of other sizes and dimensions.

Butt Fittings: Butt Reducers

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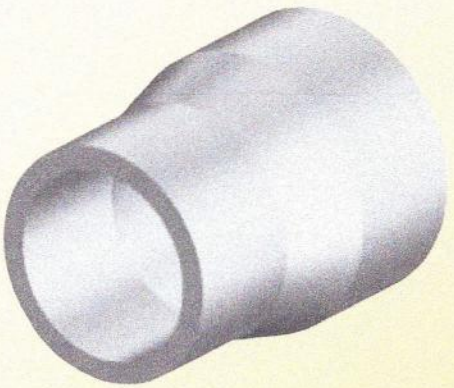

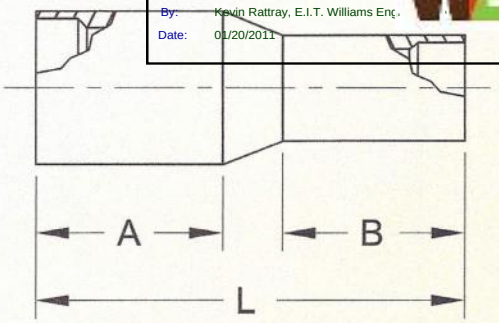

CTS BUTT REDUCER DIMENSIONS

Nominal Size	A	B	L
1" CTS X 1/2" CTS	1.79	2.00	4.00
1 IPS X 1/2" CTS	1.44	1.80	4.50
1 IPS X 3/4" CTS	1.50	1.80	4.50
1 IPS X 1" CTS	1.60	2.25	4.50
1-1/4 CTS X 1" IPS	1.50	2.00	3.84
1-1/4 IPS X 1-1/4" CTS	2.50	2.50	5.75
2" IPS X 1-1/4" CTS	2.49	2.88	6.31
2" IPS X 1-1/2" CTS	2.19	2.29	5.00
2" IPS X 2" CTS	2.75	3.00	6.00
2" IPS X 2" CTS	2.75	3.00	6.00

IPS BUTT REDUCER DIMENSIONS

Nominal Size	A	B	L
1 X 1/2"	1.50	1.25	4.00
1 X 3/4"	1.50	1.75	4.50
1-1/4" X 1"	1.86	1.92	4.25
1-1/2" X 3/4"	2.50	2.40	5.69
1-1/2" X 1"	2.50	2.28	5.75
2" X 1"	2.49	2.88	6.31
2" X 1-1/4"	3.15	2.56	6.44
2" X 1-1/2"	2.50	2.72	6.00
3" X 2"	3.22	2.50	6.65
4" X 2"	3.00	3.00	11.87
4" X 2"	2.75	2.75	7.16
4" X 3"	3.13	3.13	8.62
6" X 4"	4.22	3.75	9.13
8" X 6"	5.00	4.64	10.70
10" X 8"	6.00	5.95	16.00
12" X 10"	6.00	6.00	16.00

Call for availability of other sizes and dimensions.

Butt Fittings: Butt Reducers

(PE3408/PE4710) CTS & IPS REDUCERS					
Size	SDR	Part Number	Pack Qty.	Wt.	AWWA
3/4" IPS X 3/4" CTS	DR 11 X .090 WALL	10004186	100	0.03	-
1" CTS X 1/2" CTS	.101 WALL X .090 WALL	10004187	100	0.04	YES
1" IPS X 3/4" CTS	DR 11 X .090 WALL	10004188	100	0.07	YES
1" IPS X 1/2" CTS	DR 9.3 X .090 WALL	10004189	50	0.09	YES
1" IPS X 1/2" IPS	DR 9.3	10004190	100	0.07	YES
1" IPS X 3/4" IPS	DR 9.3	10004192	100	0.09	YES
1" IPS X 3/4" CTS	DR 9.3 X .090 WALL	10004191	100	0.09	YES
1" IPS X 1" CTS	DR 9.3 X .121 WALL	10004194	100	0.10	YES
1-1/4" CTS X 1" IPS	.090 WALL X DR 9.3	10003945	100	0.07	YES
1-1/4" IPS X 1" IPS	DR 11	10004197	100	0.11	YES
1-1/4" IPS X 1-1/4" CTS	DR 9.3 X .090 WALL	10003946	100	0.15	YES
1-1/2" IPS X 1" IPS	DR 11	10004198	100	0.16	YES
1-1/2" IPS X 3/4" IPS	DR 9.3	10003947	100	0.18	YES
1-1/2" IPS X 1" IPS	DR 9.3	10004199	100	0.19	YES
2" IPS X 1" IPS	DR 11	10003948	100	0.29	YES
2" IPS X 1-1/4" CTS	DR 11 X .090 WALL	10004200	100	0.30	YES
2" IPS X 1-1/4" IPS	DR 11	10002950	100	0.33	YES
2" IPS X 1-1/2" IPS	DR 11	10003814	50	0.30	YES
2" IPS X 2" CTS	DR 11 X .193 WALL	10004202	20	0.57	YES
3" IPS X 2" IPS	DR 11	10002951	10	0.65	YES
3" IPS X 2 IPS	DR 9	10004208	10	1.21	YES
3" IPS X 2" IPS	DR 9/9.3	10004209	10	1.15	YES
4" IPS X 2" IPS	DR 17	10004212	10	0.89	YES
4" IPS X 2" IPS	DR 11	10002952	10	1.02	YES
4" IPS X 2" IPS	DR 9/9.3	10004215	10	0.89	YES
4" IPS X 3" IPS	DR 17	10004213	10	0.98	YES
4" IPS X 3" IPS	DR 11	10002953	10	1.18	YES
4" IPS X 3" IPS	DR 9/9.3	10004216	10	1.73	YES
6" IPS X 4" IPS	DR 17	10004219	5	3.30	YES
6" IPS X 4" IPS	DR 11	10002954	5	3.26	YES
6" IPS X 4" IPS	DR 9	10004221	5	3.67	YES
8" IPS X 6" IPS	DR 17	10004224	5	5.41	YES
8" IPS X 6" IPS	DR 11	6912955	6	6.13	YES
8" IPS X 6" IPS	DR 9	10004227	6	7.69	YES

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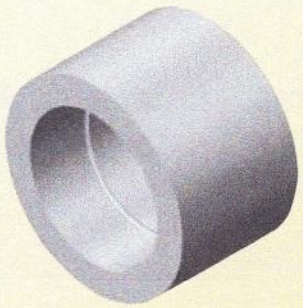
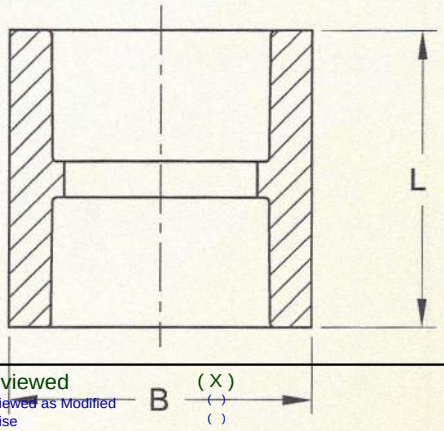
Socket Fittings: Couplings





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WILLIAMS ENGINEERING CANADA

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

SOCKET COUPLING DIMENSIONS

Nominal Size	A	B	L
1/2" CTS	-	1.08	2.19
1/2" IPS	-	1.20	2.19
3/4" CTS	-	1.21	2.19
3/4" IPS	-	1.46	2.19
1" CTS	-	1.46	2.20
1" IPS	-	1.82	2.19
1-1/4" IPS	-	2.27	2.19
1-1/2" IPS	-	2.55	2.18
2" IPS	-	3.27	2.36
2" IPS SIDR 9	-	3.27	2.30
3" IPS	-	5.07	2.81
4" IPS	-	6.48	3.18

(PE3408/PE4710) SOCKET COUPLINGS

Main Size	Part Number	Pack. Qty.	Wt.	AWWA
1/2" IPS	10005378	100	0.06	YES
3/4" IPS	10005379	100	0.07	YES
1" CTS	10005380	100	0.06	YES
1" IPS	10005381	100	0.11	YES
1-1/4" IPS	10005382	100	0.15	YES
1-1/2" IPS	10005383	100	0.19	YES
2" IPS	10005384	100	0.34	YES
3" IPS	10005385	10	1.17	YES
4" IPS	10005386	10	1.96	YES

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The connection since 1955

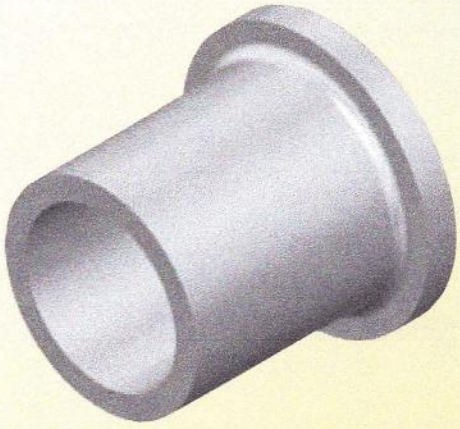
Call for availability of other sizes and dimensions.

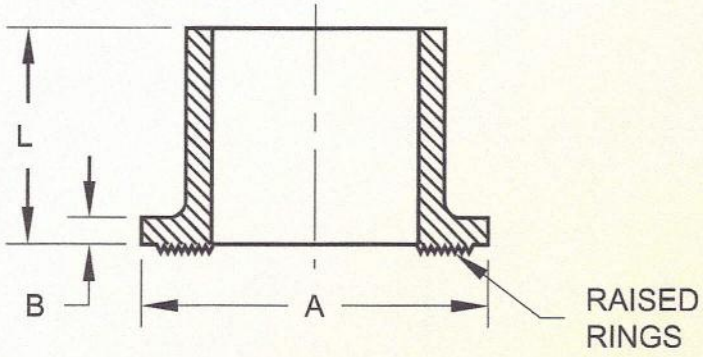
The Right Connection

1-800-654-3872
1-405-273-6302
www.centralplastics.com

Flange Adapters:

(Beveled for Butterfly Valves available on request.
Standard 45° bevel unless otherwise specified by customer.)**





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Revise	( )
Revise and Re-Submit	( )
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Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

IPS FLANGE ADAPTER DIMENSIONS

Nominal Size	A	B	L
2" IPS	3.94	0.39	6.00
3" IPS	5.00	0.63	6.00
4" IPS	6.00	0.54	6.00
6" IPS	8.50	0.78	8.00
8" IPS	10.63	1.00	11.00
10" IPS	12.75	1.28	12.00
12" IPS	15.00	1.54	12.00
14" IPS	17.50	1.50	12.00
16" IPS	20.00	1.75	12.00
18" IPS	21.38	1.88	12.00
20" IPS	23.47	2.27	12.00
22" IPS	25.59	2.50	12.00
24" IPS	27.85	2.82	12.00

CENTRAL
The connection since 1955

**Do to variations in valve dimensions, the installer should verify proper function of the valve at the time of installation. Call for availability of other sizes and dimensions.

The Right Connection

Flange Adapters:

(Beveled for Butterfly Valves available on request.
Standard 45° bevel unless otherwise specified by customer.)**

(PE3408/PE4710) IPS FLANGE ADAPTERS					
Size	SDR	Part Number	Pack. Qty.	Wt.	AWWA
2" IPS	DR17	10004395	10	0.40	YES
2" IPS	DR11	10004392	10	0.49	YES
2" IPS	DR9/9.3	10004397	10	0.55	YES
2" IPS	DR7/7.3	10004396	10	0.65	YES
3" IPS	DR17	10004443	10	0.76	YES
3" IPS	DR11	10004439	10	0.95	YES
3" IPS	DR9/9.3	10004447	10	1.15	YES
3" IPS	DR7/7.3	10004446	10	1.28	YES
4" IPS	DR17	6910823	4	1.54	YES
4" IPS	DR11	6912104	4	1.58	YES
4" IPS	DR9/9.3	10003642	4	1.74	YES
4" IPS	DR7/7.3	6912368	4	2.38	YES
6" IPS	DR17	6910835	2	4.16	YES
6" IPS	DR11	6912105	2	4.43	YES
6" IPS	DR9/9.3	6910361	2	4.25	YES
6" IPS	DR7/7.3	10004473	2	5.91	YES
8" IPS	DR17	6911501	2	10.10	YES
8" IPS	DR11	6912124	2	10.10	YES
8" IPS	DR9/9.3	6910849	2	9.48	YES
8" IPS	DR7/7.3	10004490	2	11.10	YES
10" IPS	DR17	10004330	2	10.82	YES
10" IPS	DR11	6912376	2	16.25	YES
10" IPS	DR9	10004336	2	14.70	YES
10" IPS	DR7	10004335	2	16.60	YES
12" IPS	DR17	10003354	2	15.42	YES
12" IPS	DR11	6912126	2	22.89	YES
12" IPS	DR9	10003129	2	25.00	YES
12" IPS	DR7	10004350	2	29.05	YES
14" IPS	DR17	10004357	1	21.50	YES
14" IPS	DR11	10004353	1	30.38	YES
14" IPS	DR9	10004362	1	35.90	YES
14" IPS	DR7	10004361	1	41.80	YES

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The connection since 1955

**Do to variations in valve dimensions, the installer should verify proper function of the valve at the time of installation. Call for availability of other sizes and dimensions.

The Right Connection

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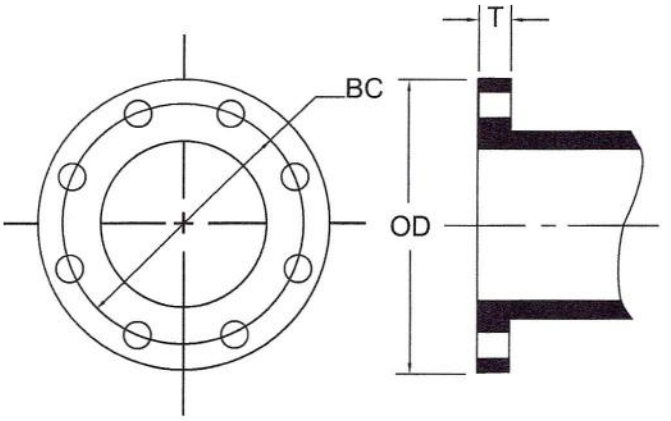
1-405-273-6302
www.centralplastics.com

Ductile and Cast Iron Flanged Fittings

- **All Griffin Pipe Flanged Fittings are 100% hydrostatically tested at 1.5 times rated working pressure.**
- Griffin Pipe Flanged Fittings are suitable for both waterworks and industrial applications and are manufactured in accordance to ANSI/AWWA C110/A21-10.
- All flanges manufactured to AWWA C110 standards conform to the drilling and facing of ANSI specification B16.1 class 125.
- 2" - 12" fittings are listed by Underwriter Laboratories for fire protection service.
- Unless otherwise specified, Griffin Pipe furnished flanged fittings cement lined and tar coated inside in accordance to ANSI/AWWA C104/A21.4 and prime coated outside.
- Griffin Pipe can also provide bare fittings for special coatings.
- Fitting sizes 2" - 12" are adequate for water pressure of 250 PSI. In cast or ductile Iron.
- Fittings sizes 14" - 36" are adequate for water pressure of 150 PSI. In cast iron.
- Fittings sizes 14" - 36" are adequate for water pressure of 250 PSI in ductile iron.



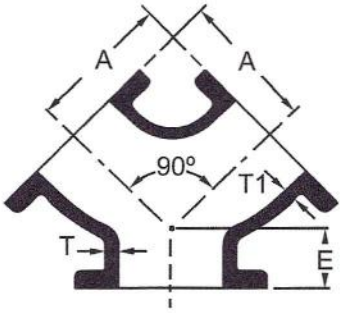
Size	OD	BC	T	Hole Dia.	Bolt Size	No. Bolts
2	6.00	4.75	.62	.75	5/8 x 2-1/4	4
2-1/2	7.00	5.50	.69	.75	5/8 x 2-1/2	4
3	7.50	6.00	.75	.75	5/8 x 2-1/2	4
4	9.00	7.50	.94	.75	5/8 x 3	8
5	10.00	8.50	.94	.88	3/4 x 3	8
6	11.00	9.50	1.00	.88	3/4 x 3-1/2	8
8	13.50	11.75	1.12	.88	3/4 x 3-1/2	8
10	16.00	14.25	1.19	1.00	7/8 x 4	12
12	19.00	17.00	1.25	1.00	7/8 x 4	12
14	21.00	18.75	1.38	1.12	1 x 4-1/2	12
16	23.50	21.25	1.44	1.12	1 x 4-1/2	16
18	25.00	22.75	1.56	1.25	1-1/8 x 5	16
20	27.50	25.00	1.69	1.25	1-1/8 x 5	20
24	32.00	29.50	1.88	1.37	1-1/4 x 5-1/2	20
30	38.75	36.00	2.12	1.37	1-1/4 x 6-1/2	28
36	46.00	42.75	2.38	1.62	1-1/2 x 7	32

ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in Pounds.

TRUE WYES

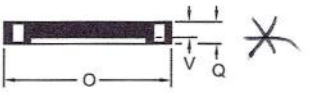
Size	Wt	T	T1	A	E
4	55	.52	.52	6.5	3.0
6	85	.55	.55	8.0	3.5
8	140	.60	.60	9.0	4.5
10	205	.68	.68	11.0	5.0
12	300	.75	.75	12.0	5.5



BLIND FLANGES*

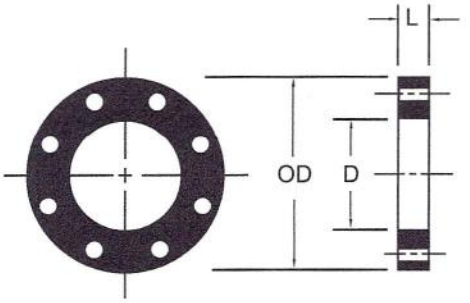
* Blind Flanges can be provided tapped according to customer's requirement.

Size	Wt	O	Q	V
3	9	7.50	.75	.69
4	16	9.00	.94	.88
6	25	11.00	1.00	.94
8	42	13.50	1.12	1.06
10	63	16.00	1.19	1.12
12	85	19.00	1.25	.81
14	120	21.00	1.38	.88
16	145	23.50	1.44	1.00
18	185	25.00	1.56	1.06
20	245	27.50	1.69	1.12
24	370	32.00	1.88	1.25
30	500	38.75	2.12	1.44
36	790	46.00	2.38	1.62



10" and Smaller

12" and Larger



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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

FLANGE FILLERS

Size		Wt & Length				
D	O.D.	1″	1-1/2″	2″	3″	4″
3	7.5	9	14	18	28	36
4	9.0	12	19	25	37	50
5	10.0	14	21	28	42	50
6	11.0	16	24	32	48	64
8	13.5	23	34	46	69	92
10	16.0	29	44	59	88	118
12	19.0	42	63	84	126	168
14	21.0	47	70	94	141	188
16	23.5	56	85	113	169	226
18	25.0	62	92	123	184	246
20	27.5	66	100	133	199	266
24	32.0	84	126	168	251	336
30	38.7	112	168	224	336	448
36	46.0	150	225	300	451	600

ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in Pounds.

ENGINEERING SUBMITTAL DATA
GRIFFIN PIPE PRODUCTS CO.'S COMMITMENT TO QUALITY

Griffin Pipe Products Co. manufactures Class 125 Cast & Ductile Iron Flanged Fittings for both Waterworks and Industrial applications. All of our fittings are manufactured in accordance with ANSI Specification B16.1 and AWWA C110. Griffin 2″ through 12″ Flanged Fittings are also listed by Underwriters Laboratories for fire protection service.

Griffin Pipe Products Co.'s quality control department maintains strict control over all manufacturing standards. Our fittings are produced to the following tolerances:

Mechanical Properties
Cast Iron to ASTM A 48 - Minimum Tensile Strength 30,000 psi
Ductile Iron to ASTM A 536 - Minimum Tensile Strength 70,000 psi
Yield Strength 50,000 psi
Elongation 5%
Chemical Properties
Phosphorous, Maximum 0.75%
Sulfur, Maximum 0.15%
Dimensional Tolerances

Center to face distance	+ or - .03 in.
Wall thickness	-0.10 in.
Angle of bends	+ or - 1/2 degree
Flange thickness	+.12 in. - 0 in.

As standard procedure **Griffin Pipe Products Co. hydrostatically tests every fitting** to insure quality casting integrity. These tests are performed at 1.5 times the rated working pressure.

At the buyers request Griffin Pipe Products Co. will also provide fittings cement-lined and tar-coated in accordance with **ANSI A 21.4** and **AWWA C104**. Griffin Pipe Products Co. fittings are provided with either a tar coated or epoxy primed exterior surface at the customers discretion.

We pride ourselves in producing the finest quality Flanged Fittings available in today's market. Our manufacturing standards and quality control procedures make certain that we abide by our commitment to be the best!

Electrofusion: Allowable Operating Pressures

The following charts represent the Allowable Operating Pressure for fittings manufactured from three grades of polyethylene resin used in our products. These values represent the most common Standard Dimension Ratios (SDR) used in the two primary industries that we service and are further divided up based on the design factors determined by each of their related governing authorities.

- .32 for natural gas distribution systems regardless of resin used
- .50 for water applications for PE3408/PE3608 resins
- .63 for water applications for PE4710 resins

} **All designs factors are assuming a standard operating temperature of 73° F**

NOTE: For other fluids, temperatures, chemicals and environmental considerations additional design factors may be required. (Canadian gas utilities use a .40 design factor for their natural gas applications.)

DOT Allowable Operating Pressure for Natural Gas Plastic Pipe Systems

(.32 design factor @ 73° F)

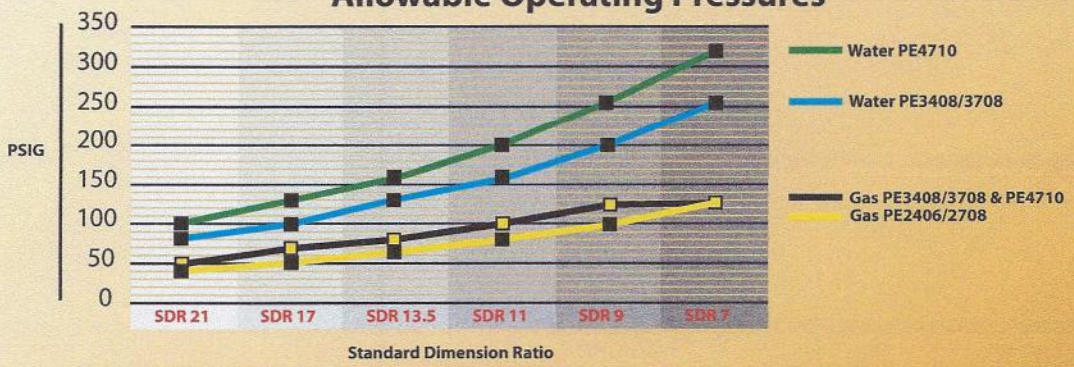
SDR	PE 2406/PE2708 **DOT Allowable**	PE 3408 **DOT Allowable**	PE4710 **DOT Allowable**
21	40	50	50
17	50	64	64
13.5	64	80	80
11	80	100	100
9	100	125**	125**
7	125**	125**	125**

Allowable Operating Pressure for Municipal & I Industrial Applications

SDR	PE 3408 **(.50 design factor @ 73° F)**	PE4710 **(.63 design factor @ 73° F)**
21	80	100
17	100	130
13.5	130	160
11	160	200
9	200	255
7	265	335

**** DOT Regulations only allow a 125 psi max for natural gas plastic pipe systems regardless of the materials Maximum Allowable Operating Pressure (MAOP).**

Allowable Operating Pressures



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NOTE: Operating Pressure for Electrofusion Tapping Tees and Electrofusion Branch Saddles are determined by the material used, the outlet SDR and the governing regulations.

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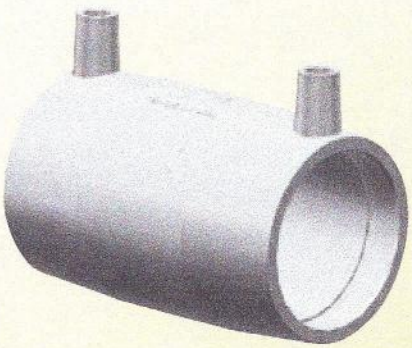
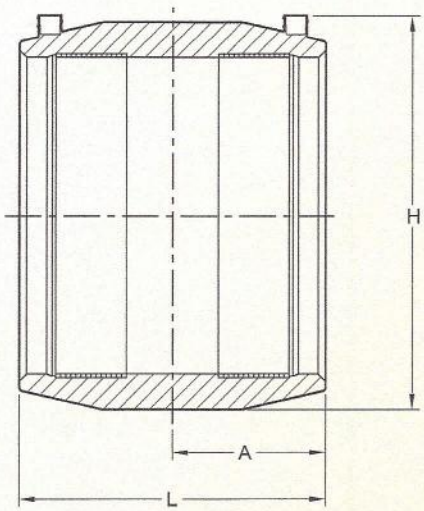
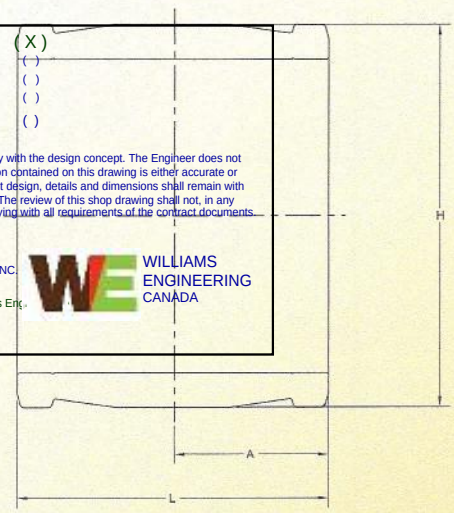
www.centralplastics.com

Electrofusion Fittings: Couplings

NOTE: Operating Pressure is 200 psi for PE4710 Couplings in allowable applications.







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WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

EF COUPLING DIMENSIONS

Nominal Size	H	L	A
1/2" CTS	2.01	3.15	1.57
1/2" IPS	2.15	2.98	1.42
3/4" CTS	2.15	2.98	1.42
3/4" IPS	2.48	3.46	1.73
1" CTS	2.52	3.46	1.73
1" IPS	2.63	3.46	1.73
1-1/4" CTS	2.56	3.30	1.57
*1-1/4" DUCT (CON.)	3.00	3.70	1.82
1-1/4" IPS	3.04	3.86	1.93
*1-1/4" SIDR 9 (CON.)	3.00	3.70	1.82
1-1/2" IPS	3.36	4.33	2.17
2" IPS	3.78	4.72	2.36
2" CTS	3.59	4.37	2.12
2" IPS	3.82	4.31	2.09
2" IPS CONDUIT	3.55	4.32	2.09
2-1/2" CONDUIT	4.17	4.25	2.06
3" IPS	5.18	5.59	2.72
4" IPS	6.51	6.14	3.00
4" DIPS	6.06	6.93	3.46
5" IPS	7.56	7.17	3.54
6" IPS	8.70	8.35	4.10
6" DIPS	8.74	8.19	4.09
7" IPS	8.93	8.19	4.09
8" IPS	11.20	9.48	4.70
8" DIPS	11.14	10.16	5.08
10" IPS	13.41	10.50	5.00
10" DIPS	13.70	10.90	5.50
12" IPS	15.84	11.50	5.50
12" DIPS	16.20	12.80	6.40

*Industrial Non-Compliant ASTM Fittings.
Sizes not listed can be furnished on request.

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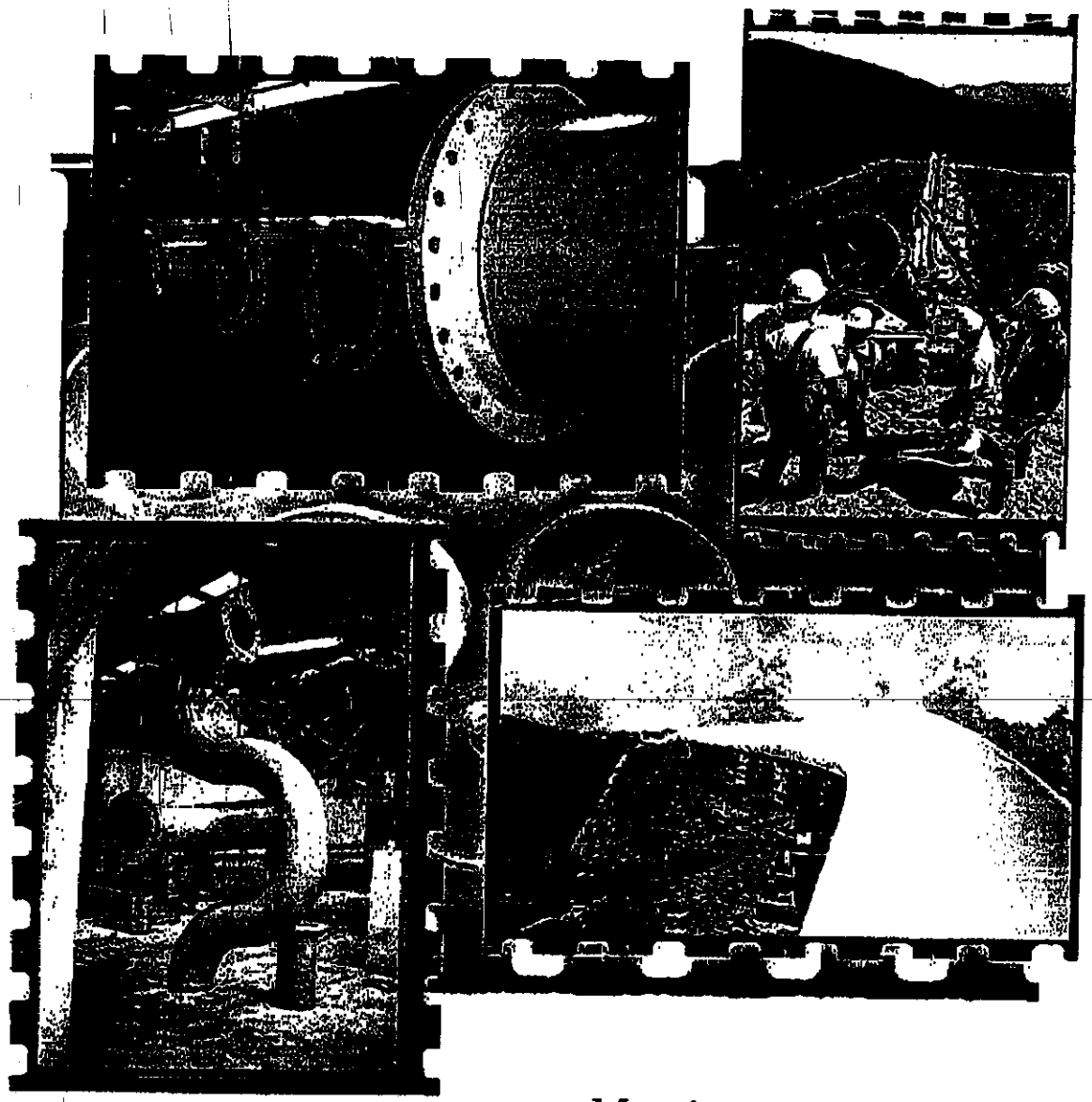
Electrofusion Fittings: Couplings

NOTE: Operating Pressure is 200 psi for PE4710 Couplings in allowable applications.

(PE3408/PE4710) ELECTROFUSION COUPLINGS						
Size	Description	Pin Type	Part Number	Pack. Qty.	Wt.	AWWA
1/2" CTS	ASTM D2513/F1055	4.7 R	5760019	50	0.09	YES
3/4" CTS	ASTM D2513/F1055	4.7 R	10004578	40	0.10	YES
1" CTS	ASTM D2513/F1055	4.7 R	5760023	25	0.18	YES
1 1/4" CTS	ASTM D2513/F1055	4.7 R	10004573	30	0.16	YES
2" CTS	ASTM D2513/F1055	4.7 S	10004580	30	0.46	-
1/2" IPS	ASTM D2513/F1055	4.7 R	10004627	40	0.13	YES
3/4" IPS	ASTM D2513/F1055	4.7 R	5760022	25	0.29	YES
1" IPS	ASTM D2513/F1055	4.7 R	5760024	25	0.14	YES
1 1/4" IPS	ASTM D2513/F1055	4.7 R	5760026	50	0.28	YES
1 1/2" IPS	ASTM D2513/F1055	4.7 R	5760028	35	0.34	YES
2" IPS	ASTM D2513/F1055	4.7 R	5760030	25	0.38	YES
2 1/2" IPS	CONDUIT PSI=0	3 Pin	5754047	20	0.55	-
3" IPS	ASTM D2513/F1055	4.7 R	10000358	36	1.57	YES
4" IPS	ASTM D2513/F1055	4.7 R	10000360	10	1.67	YES
6" IPS	ASTM D2513/F1055	4.7 R	10000359	8	4.37	YES
7" IPS	ASTM F1055	4.7 S	10003970	4	7.86	-
8" IPS	ASTM D2513/F1055	4.7 R	10000361	4	8.43	YES
10" IPS	ASTM D2513/F1055	4.7 R	10004579	1	15.40	YES
10" IPS **	ASTM D2513/F1055	4.7 S	10000362	1	15.24	YES
12" IPS	ASTM D2513/F1055	4.7 R	10004571	1	23.10	YES
12" IPS **	ASTM D2513/F1055	4.7 S	10000363	1	23.90	YES
1-1/4" SIDR 7	1.488 OD CONDUIT PSI=0	4.7 R	10004575	40	0.29	-
1-1/4" SIDR 9	1.580 OD CONDUIT PSI=0	4.7 R	10002826	30	0.24	-
4" DIPS	ASTM D2513/ F1055	4.7 S	10000353	10	2.34	YES
6" DIPS	ASTM D2513/ F1055	4.7 S	10000354	8	4.59	YES
8" DIPS	ASTM D2513/ F1055	4.7 S	10000355	4	8.37	YES
10" DIPS	ASTM D2513/ F1055	4.7 S	10000356	1	17.43	YES
12" DIPS	ASTM D2513/F1055	4.7 S	10000357	1	25.67	YES

Call for availability of other sizes and dimensions.
** For Use with Bar-Code Processor Only
4.7R = 4.7 Pin with Resistor
4.7S = 4.7 Solid Pin

3M™ Scotchkote™
Corrosion Protection Products



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WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engr.

Date: 25/03/2011

WILLIAMS ENGINEERING CANADA

3M *Innovation*

Fusion Bonded for Proven Performance

Corrosion Protection

3M, the leader in functional epoxy coating technology, offers a complete line of 3M™ Scotchkote™ powder coatings engineered for optimum corrosion protection of metal in the harshest environments, including saltwater, wastewater, petrochemicals, solvents and corrosive gases. Several of these coatings also provide enhanced properties for operation at elevated temperature, mechanical damage protection, compression, wear, abrasion, and cavitation resistance. Scotchkote heat-cured fusion bonded epoxy coatings are 100 percent-solids; thermosetting materials that achieve a high bond to metal surfaces as a result of a heat generated chemical reaction. They can be applied by fluidized bed, flocking (air spray), or electrostatic spray and are available through a worldwide network of applicators.

3M also provides several Scotchkote high-build liquid epoxy coatings for field application as primary corrosion protection coatings or as easy field repair materials for Scotchkote Fusion Bonded Epoxy coatings. Surface primers are available to enhance chemical resistance and raise temperature-operating range.

Scotchkote Fusion Bonded Epoxy Coatings

Features	Benefits
Resistant to Cathodic Disbondment	Long term performance under a range of service conditions and temperatures.
Excellent chemical resistance	Long term performance in a variety of soil conditions.
Abrasion, gouge and impact resistant	Added protection for bores, river crossings, rough handling and applications requiring mechanical damage resistance.
High adhesion to metal	Resistant to soil stress.
Thermosetting	Resistant to penetration and will not cold flow under pressure. Does not soften at elevated temperature.
Balanced gel and flow characteristics	Enhanced coating continuity and application on metal.
Sag Resistant	Excellent coverage on sharp edges.
Machinable	Can meet close tolerances.
Lightweight	Lower shipping costs.
Compatible with other coating systems	Can be overcoated with other materials for UV protection. Provides an excellent base coat for multilayer pipe coating systems.
Plant Applied	Controlled application conditions.
NSF and AWWA Standard C213 Approved (Several specific products only)	Good for potable water applications.
Established network of applicators	Widely available for pipeline (external and internal), reinforcing steel and custom coating applications.

1 Header piping for a water purification plant illustrates the types of complex shapes that can be coated with 3M™ Scotchkote™ coating.

2 Valve cutaway illustrates total coverage capability of 3M™ Scotchkote™ FBE coating.

3 3M™ Scotchkote™ coating protects this pump housing from salt water and cavitation damage.

4 Application of 3M™ Scotchkote™ epoxy coating on rebar.

5 Stacked pipe with 3M™ Scotchkote™ coating ready for installation.

To The Specifying Engineer

How to Specify 3M™ Scotchkote™ Coatings

It is possible for applicators to apply powder coatings by various methods. Please consult your 3M Corrosion Protection Products Sales Representative or customer service representative for the names and capabilities of local applicators. Key application steps to consider when writing specifications are as follows:

- Remove oil and grease
- Abrasive blast to near white metal
- Remove blast media dust
- Inspect for surface imperfections, such as weld spatter and smooth by grinding (does not apply to reinforcing steel)
- Acid or deionized water wash (optional) to remove residual inorganic contaminants.
- Preheat parts to suggested application temperature

Pipe rehabilitation project completed using 3M Scotchkote coating — and repaired with Scotchkote hotmelt patchsticks. 6

- Apply Scotchkote coating to the specified thickness
- Electrically inspect for continuity
- Repair as required

*Industry Standards and Specifications**

Pipe (External)

- **CSA Z245.20/06** - Canadian Standards Association External Fusion Bond Epoxy Coating for Steel Pipe/External Polyethylene Coating for Pipe
- **NFA 49-711** - French standard for steel tubes, three-layer external coating based on polypropylene by extrusion
- **DIN 30670** - German standard for polyethylene coatings for steel pipe fittings
- **NACE RP0394** - National Association of Corrosion Engineers Standard Recommended Practice, Application, Performance, and Quality Control of Plant-Applied, Fusion bonded Epoxy External Pipe Coating
- **NAPCA Bulletin 12-78** - National Association of Pipe Coating Applicators External Application Procedures for Plant Applied Fusion bonded Epoxy (FBE) To Steel Pipe
- **AWWA C213** - American Water Works Association Standard for Fusion-Bonded Epoxy Coating For The Interior and Exterior of Steel Water Pipelines

Reinforcing Steel

- **AASHTO M 284/M 284M** - Standard Specification for Epoxy Coated Reinforcing Bars
- **AASHTO T 253** - Standard Method of Test for Coated Dowel Bars
- **ASTM A 775/A 775M** - American Society for Testing Materials Standard Specification For Epoxy-Coated Reinforcing Steel
- **ASTM A 884/A 884M** - American Society For Testing Materials Standard Specification For Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcing Steel
- **ASTM A 934/A 934M** - American Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
- **ASTM D 3963/D D 3963M - 01**
- **NACE RP0395** - National Association of Corrosion Engineers Standard Recommended Practice Epoxy-Coated Steel Reinforcing Bars

Piles

- **ASTM A 950/A 950M** - American Society For Testing Materials Standard Specification For Fusion bonded Epoxy-Coated Structural H-Piles and Sheet Piles
- **ASTM A 972//A 972M** - American Society For Testing Materials Standard Specification For Fusion bonded Epoxy-Coated Pipe Piles

Pipes (Internal)

- **NSF/ANSI Standard 61,** Drinking Water System Components, for use with potable water.

**Specifications and Standards usually include the year in which they were last changed as part of the specification designator. These dates have not been included in the list.*

Internal Linings

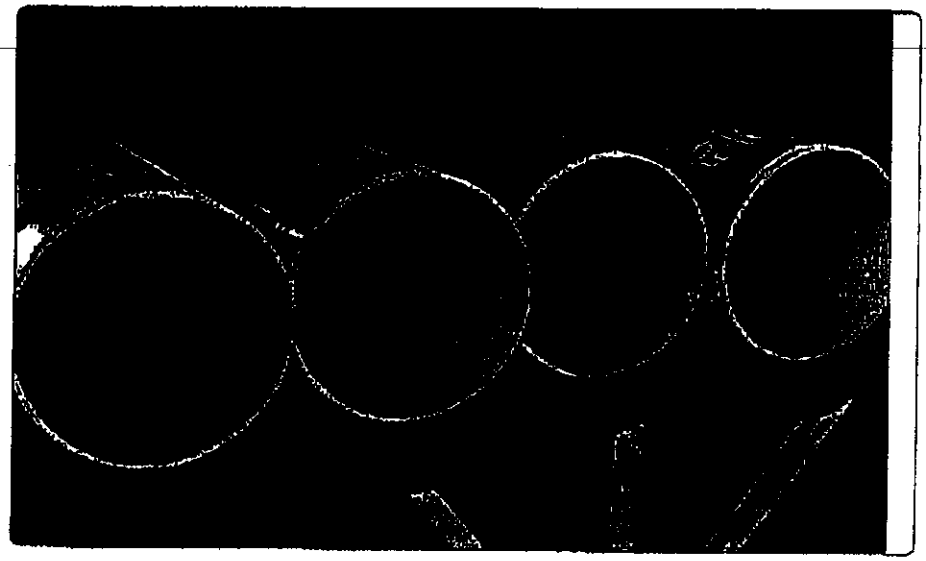
3M™ Scotchkote™ FBE coatings are available with extended gel, flow and cure characteristics for application to the interior surfaces of pipe. In some cases, existing pipeline or custom coating products may have been adapted for internal use by modifying these properties. Scotchkote products that have been adapted for internal pipe coating use and described in other sections of this brochure are Scotchkote 134, 135, and 206N Extra Long Gel and 6258. Other 3M coatings not listed, such as Scotchkote 6171 are available to meet special service requirements. Liquid primers are sometimes used with these coatings to enhance performance properties in particularly severe environments, such as those encountered in downhole oil production. Proper selection of internal coatings depends upon pipe size, type and service conditions. Contact your 3M sales or customer service representative for further information.

Scotchkote 345 Liquid Phenolic Primer

Scotchkote 345 Liquid Phenolic Primer is designed specifically for application to metal surfaces prior to top coating with Scotchkote FBE coatings. When properly applied, Scotchkote 345 primer and topcoat systems provide excellent resistance to CO_2, H_2S, CH_4, petroleum distillates, and brine at elevated temperatures and pressures.

Scotchkote 500N Water Base Primer

Scotchkote 500N Water Base Primer is a water-based metal treatment designed to increase adhesion of fusion bonded epoxy coatings. Properly applied to blast-cleaned steel, it provides protection for metal surfaces and a uniform bonding base for increased coating performance. This primer significantly improves hot water resistance, autoclave resistance, and cathodic disbondment and salt spray resistance of the coating. It is easily applied with minimal application equipment and promotes a chemically uniform steel surface condition.

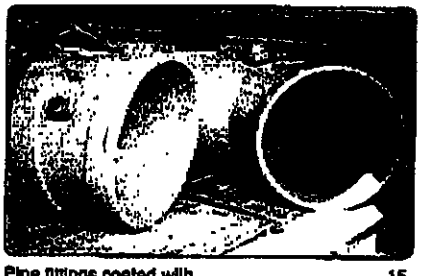


Pipe internally coated with 3M™ Scotchkote™ coating. 11

Pump volutes protected against corrosion with 3M™ Scotchkote™ 134. 12

Application of 3M™ Scotchkote™ 134 custom coating on a turbine. 13

Fluid bed dip application of 3M™ Scotchkote™ 206N. 14



Pipe fittings coated with 3M™ Scotchkote™ 206N. 15

Custom Coating

3M™ Scotchkote™ FBE coatings can be applied to a variety of parts for corrosion protection. Example applications include valves, pumps, tapping saddles, pipe appurtenances, manifolds, sewage aerators, tanks, pipe hangars, ladders, hydrants, cast iron risers and flow meters. Coating is accomplished by manual flocking (air spray), electrostatic spray, or fluid bed dip application.

Scotchkote 134 and Scotchkote 135

Scotchkote 134 (green) and Scotchkote135(gray)are bothdesigned for flock or electrostatic spray application. Because of their long gel time (upto 2.5 minutes at 350°F/177°C), Scotchkote 134 and 135 maximize the time of application so that large surface areas or parts with complex recesses can be coated without overspray or laminations. Balanced formula and controlled viscosity allow high thickness build and edge coverage without sag or drips. The coatings can also be applied cold electrostatically. Scotchkote 134 conforms to the requirements of NSF Standard 61, for use as a coating in contact with potable water and has been used extensively in the water/wastewater industry since 1965. Scotchkote 134 and 135 meet the requirements of AWWA Standard C213, for valves and appurtenances. A custom coating grade with Scotchkote 6171 is also available.

Scotchkote 206N Fluid Bed Grade

Scotchkote 206N Fluid Bed Grade is specifically designed for the fluidized bed application process. Product gel and flow are carefully controlled to produce a smooth, continuous coating film with high edge coverage. Special fluidizing materials have been thoroughly blended to enable even dispersion of product and optimum fluidization in the largest of fluid beds. The coating cures quickly from residual heat retained in the part and does not usually require postbaking. Scotchkote 206N Fluid Bed Grade has a growing list of international approvals for use as a coating in contact with potable water, including conformance to the requirements of NSF Standard 61.

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Revise and Re-Submit	( )
Not Reviewed	( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 25/03/2011

WILLIAMS ENGINEERING CANADA

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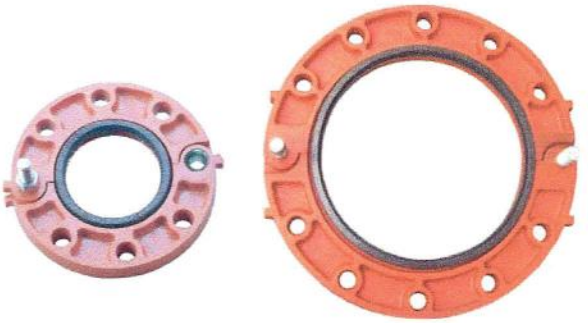
www.shurjoint.com

7041 **D-01**

c UL us LISTED FM APPROVED

MODEL 7041 FLANGE ADAPTER - ANSI 125/150

The Model 7041 Flange Adapter allows for a direct connection with ANSI class 125/150 flanges. The specially designed gasket enables the transition from a grooved system to a flanged system or component with this single flange adapter. The two-segment design provides an easy and fast installation. 2" through 12" flange adapters are supplied hinged as a single assembly, while 14" -24" (Model 7041N) are supplied with two separate segments and a drawer kit. All include an EPDM rubber gasket and plated track bolts and nuts. Housing segments are supplied with our standard painted finishes, i.e. orange or RAL3000 red. Optional finishes such as hot dipped zinc galvanized and custom epoxy coatings are available.



MODEL 7041 MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12, min. tensile strength 448MPa (65,000 psi).

• Surface Finish:

Standard painted finishes in orange or RAL3000 red.

- ☐ Hot dip zinc galvanized (Option).
- ☐ Epoxy coatings in RAL3000 red or other colors (Option)

• Rubber Gasket:

To assure maximum life for the service intended, proper gasket selection and specification in ordering is essential. Failure to select the proper gasket compound may result in personal injury, property damage, joint leakage or joint failure.

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230°F (+110°C). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals. Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -30°F (-34°C) to +230°F (+110°C).

- ☐ (Option) **Grade "T" Nitrile** (Color code: Orange stripe) Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Also good for water services under +66 °C (+150 °F). Temperature range: -29 °C to +82 °C (-20 °F to +180 °F). **Do not use for HOT WATER above +66 °C (+150 °F) or HOT DRY AIR above +60 °C (+140 °F)**

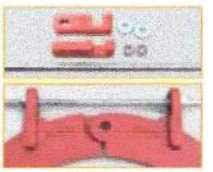
- ☐ Other options: Grade "O" Fluoroelastomer.
  Grade "L" Silicone.
  For additional details contact ***Shurjoint***.

• Standard Hex Bolts & Nuts:

Plated hex bolts conforming to ASTM A307 with hex nuts. (2 nuts and bolts are supplied). Bolts and nuts for the flange connection to be supplied by installer.

• Drawer Kit:

Screw Rod: Carbon Steel.
Assembly holders: Ductile Iron.
Bolts & Nuts: Commercial.



Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

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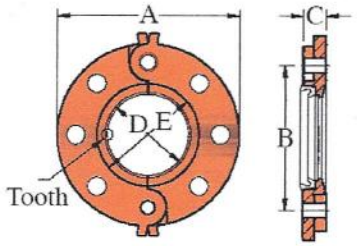
MODEL 7041 FLANGE ADAPTER - ANSI CLASS 125/150



2" - 12" (hinged)

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Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Enç.

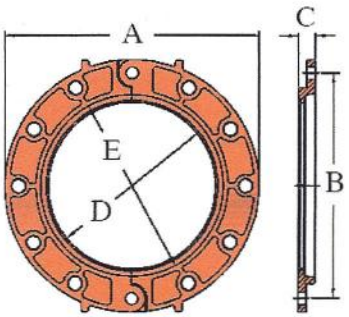
Date: 01/20/2011

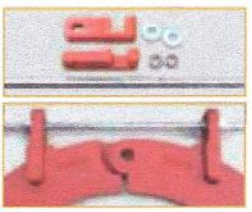
WILLIAMS ENGINEERING CANADA

Model 7041 Flange Adapter - ANSI Class 125/150

Nominal Size	Pipe OD	Max. Working Pressure	Max. End Load	Dimensions			Sealing Surface		Bolts		Weight
				A	B	C	D	E	Size	No.	
mm in	mm in	Bar PSI	KN Lbs	mm in	mm in	mm in	mm in	mm in	in		Kgs Lbs
50 2	60.3 2.375	20 300	5.7 1330	152 6.00	121 4.75	19 0.75	60 2.36	87 3.42	5/8	4	2.0 4.4
65 2.5	73.0 2.875	20 300	8.4 1950	178 7.00	140 5.50	22 0.87	73 2.87	102 4.00	5/8	4	2.5 5.5
80 3	88.9 3.500	20 300	12.3 2890	190 7.50	152 6.00	24 0.94	89 3.50	116 4.56	5/8	4	3.4 7.5
100 4	114.3 4.500	20 300	20.5 4770	229 9.00	191 7.50	24 0.94	114 4.50	141 5.56	5/8	8	4.0 8.8
125 5	141.3 5.563	20 300	31.3 7290	254 10.00	216 8.50	24 0.94	141 5.56	171 6.73	3/4	8	4.5 9.9
150 6	168.3 6.625	20 300	44.5 10340	279 11.00	241 9.50	25 1.00	168 6.62	198 7.79	3/4	8	5.5 12.1
200 8	219.1 8.625	20 300	75.3 17520	343 13.50	298 11.75	28 1.12	219 8.62	254 10.00	3/4	8	8.0 17.6
250 10	273.0 10.750	20 300	117.0 27210	406 16.00	362 14.25	30 1.18	273 10.75	308 12.12	7/8	12	13.8 30.4
300 12	323.9 12.750	20 300	164.7 38280	482 19.00	432 17.00	32 1.25	324 12.75	359 14.13	7/8	12	19.0 41.8

MODEL 7041N FLANGE ADAPTER - ANSI CLASS 125/150





14" ~ 24": Supplied with a drawer kit.

Model 7041N Flange Adapter - ANSI Class 125/150

Nominal Size	Pipe OD	Max. Working Pressure	Max. End Load	Dimensions			Sealing Surface		Bolts		Weight
				A	B	C	D	E	Size	No.	
mm in	mm in	Bar PSI	KN Lbs	mm in	mm in	mm in	mm in	mm in	in		Kgs Lbs
350 14	355.6 14.000	20 300	198.5 46160	533 21.00	476 18.75	36 1.42	382 15.04	351 13.82	1	12	30.2 66.5
400 16	406.4 16.000	20 300	259.2 60290	597 23.50	540 21.25	38 1.50	430 16.93	402 15.83	1	16	39.8 87.6
450 18	457.2 18.000	20 300	328.2 76300	635 25.00	578 22.75	40 1.56	486 19.14	452 17.80	1-1/8	16	42.8 94.2

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Model 7041N Flange Adapter - ANSI Class 125/150

Nominal Size	Pipe OD	Max. Working Pressure	Max. End Load	Dimensions			Sealing Surface		Bolts		Weight
				A	B	C	D	E	Size	No.	
mm in	mm in	Bar PSI	KN Lbs	mm in	mm in	mm in	mm in	mm in	in		Kgs Lbs
500 20	508.0 20.000	20 300	405.2 94200	699 27.50	635 25.00	43 1.60	537 21.15	504 19.83	1-1/8	20	50.6 111.4
550 22	559.0 22	20 300	507.0 113982	749 29.50	692 27.25	48 1.90	551 21.70	588 23.15	1-1/4	20	63.6 139.9
600 24	609.6 24.000	20 300	583.5 135650	813 32.00	749 29.50	48 1.89	635 25.0	602 23.70	1-1/4	20	71.8 157.9

MODEL 7041 NOTES

• Sealing Surface (D & E):

The sealing surface of the mating flange adapter, the area shown in the illustration between D & E shall be free from gouges, undulations or deformities of any type to assure optimum sealing.

• Gasket Insertion:

Make sure that the bottom of the gasket (the making side) is positioned and seated against the bottom of the flange recess.

• Sandwich plates:

The Model 7041 flange adapter requires a hard flat face for effective gasket sealing. A sandwich plate is required and should always be used when the mating surface is not adequate, as with the serrated faces of some valves or the rubber faced or rubber lined flange of a wafer valve.

• Inside teeth:

The Model 7041 Flange adapter have small triangular teeth inside the key shoulder to prevent rotating on the pipe. These teeth should be ground off prior to mating to rubber lined grooved end valve, plastic valve or light wall pipe (Sch. 5) because of possible damage to the surface coating or the integrity of the pipe strength.

• Caution:

The Model 7041 flange adapters shall not be used as anchor points for tie-rods across non-restrained joints. Do not use Model 7041 flange adapters within 90 degrees of one another on a standard fitting when the outside dimensions cause interference.

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

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H312 **Q-03**

MODEL H312 HDP FLANGE

The ***Shurjoint*** Model H312 HDP flanges provides for the direct transition from HDP pipe or fittings to ANSI class 125 or 150 flanged components. The H312 can be rotated for fast and easy bolt alignment prior to tightening. The gasket seals both on the outside of the pipe and to the flange face providing a leak-tight seal when secured in place.

Caution:
Shurjoint recommends the use of a silicone based lubricant for the HDP series. Do not use the ***Shurjoint*** standard lubricant, which is designed for steel pipe use. Do not use hydrocarbon based oils, grease or soap based solutions either.

MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).

• Surface Finish:

Orange color painted or red RAL3000 color painted.

- ☐ Hot dip galvanized (Option).
- ☐ Epoxy coated in red RAL3000 or other colors (Option)

• Rubber Gasket:

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230°F (+110°C). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals. Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -29°F (-34°C) to +230°F (+110°C)*
* For hot water application between 200°F - 230°F extreme caution should be used as the life of the gasket can be greatly reduced by incremental increases in temperature. Additional factors that affect gasket life and performance include temperature, fluid medium (air, water, air with water... etc.) and the continuous or intermittent use of the piping system. For specific applications over 200°F (93°C), please consult ***Shurjoint*** for recommendations.

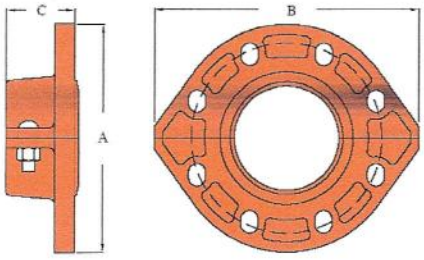
- ☐ **Grade "T" Nitrile** (Color code: Orange stripe) (Option) Recommended for petroleum products, vegetable oils, mineral oils and air with oil vapors. Temperature range: -29 °C to +82 °C (-20 °F to +180 °F). Also good for water services under +66 °C (+150 °F).
  Do not use for HOT WATER above +66 °C (+150 °F) or HOT DRY AIR above +60 °C (+140 °F)
- ☐ Other options: Grade "O" Fluoro-Elastomer, Grade "L" Silicone, etc. are also available upon request.

• Draw Bolts & Nuts (Factory supplied):

Heat treated carbon steel track bolts to ASTM A183 Gr. 2, zinc electroplated with heavy-duty hex nuts to ASTM A563.
(Flange bolts and nuts are to be prepared by installer.)

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

MODEL H312 HDP FLANGE



Model H312 HDP Flange

Nom. Size	Pipe OD Actual	Coupling Dimensions A	B	C	Flange Bolts* No.	Size	Approx. Weight
mm in	mm in	mm in	mm in	mm in		in	Kg Lbs
80 3	88.9 3.500	197 7.75	225 8.86	79 3.10	4	5/8	4.8 10.6
100 4	114.3 4.500	229 9.00	260 10.25	79 3.10	8	5/8	6.8 15.0
150 6	168.3 6.625	279 11.00	311 12.25	95 3.75	8	3/4	9.8 21.5
200 8	219.1 8.625	343 13.50	375 14.75	87 3.42	8	3/4	13.1 28.8
250 10	273.0 10.750	406 16.00	533 21.0	108 4.25	12	7/8	19.5 42.9
300 12	323.9 12.750	483 19.02	610 24.0	108 4.25	12	7/8	28.5 62.7

* Flange bolts and nuts are to be prepared by installer.
**Shurjoint* recommends the use of a silicone based lubricant for use with the HDP series

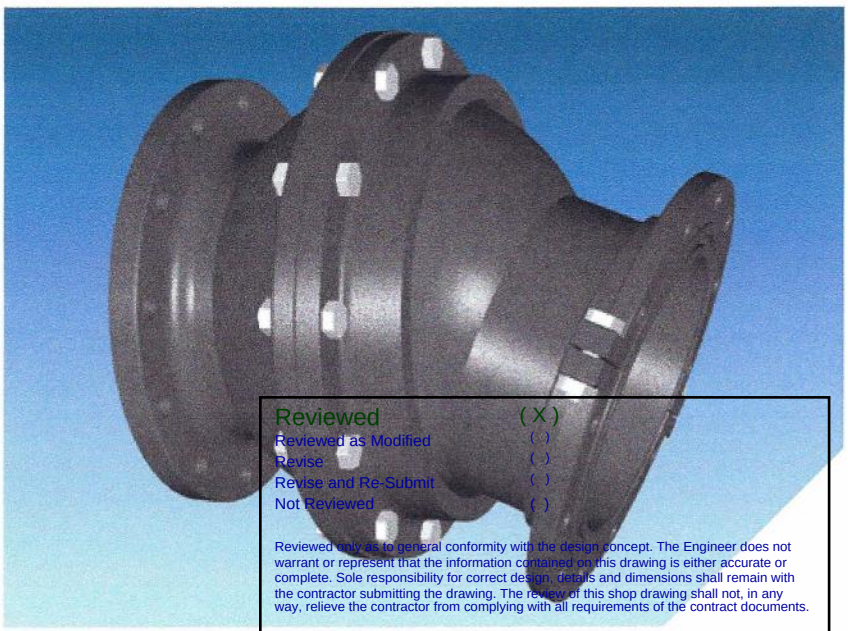
General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. For additional information contact ***Shurjoint***..
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

EBAA IRON INC
Your Connection to the Future™

FLEX-900®

Flexible Ball Joints for Water and Wastewater Pipelines



FLEX-912 (912FF0) for 12 inch Flanged fittings or pipe

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Revise and Re-Submit ( )
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WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir.
Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

Features and Applications:

- Sizes 3 inch through 48 inch
- Hydrostatically tested prior to shipment
- Rated 350 PSI working water pressure (Sizes 30 inch and above rated at 250 PSI)
- Constructed of A536 Ductile Iron
- 15 mils of Fusion Bonded Epoxy coating of all 'wetted' parts
- 15° to 20° of deflection depending upon size
- Seals conform to the applicable requirements of ANSI/AWWA C111/A21.11

For use on water or wastewater pipelines subject to hydrostatic pressure and tested in accordance with either AWWA C600 or ASTM D2774.

Nominal Pipe Size	Series Number: Flange by Flange	Series Number: Mechanical Joint by Restrained Plain End	Pressure Rating: Ductile Iron
3	903FF0	903MP0	350
4	904FF0	904MP0	350
6	906FF0	906MP0	350
8	908FF0	908MP0	350
10	910FF0	910MP0	350
12	912FF0	912MP0	350
14	914FF0	914MP0	350
16	916FF0	916MP0	350
18	918FF0	918MP0	350
20	920FF0	920MP0	350
24	924FF0	924MP0	350
30		Call for Availability	
36	936FF0	-	250
42		Call for Availability	
48		Call for Availability	

NOTE: For applications, end combinations, or pressures other than those shown, please contact EBAA for assistance.

Sample Specification

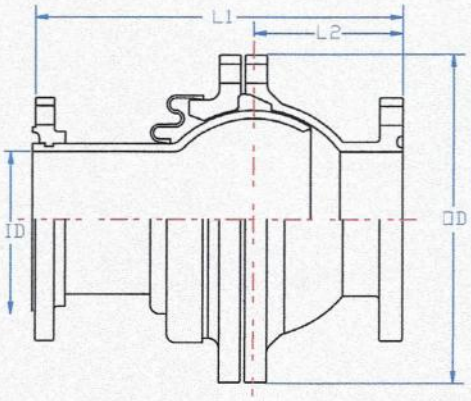
Flexible ball joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C153/A21.53. Flexible joints shall consist of a ball and socket type joint capable of 15° minimum deflection. Each flexible ball joint shall be pressure tested against its own restraint to a minimum of 350 PSI. MEGALUG® joint restraint shall be provided with each mechanical joint connection. All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating and gaskets shall meet ANSI/NSF-61. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16. All flexible ball joints shall be FLEX-900 as manufactured by EBAA Iron, Inc. or approved equal.

FLEX-900 Submittal Reference Drawing (3 inch - 12 inch)

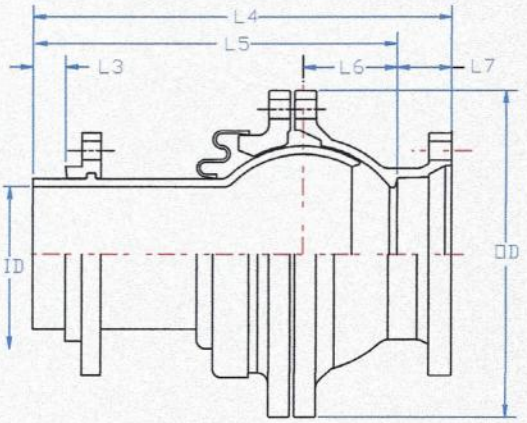
EBAA IRON

MADE IN USA

Flange x Flange



Restrained Plain End x Mechanical Joint

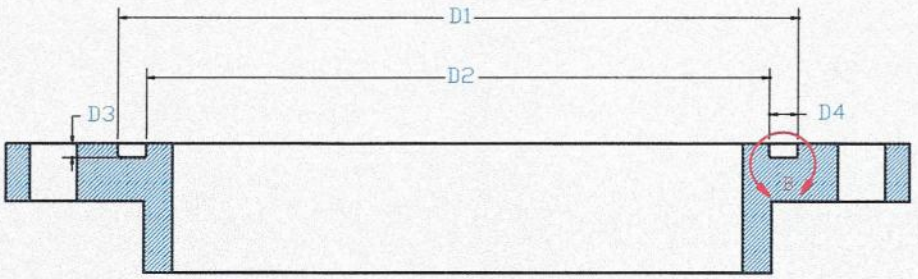


Dimensions for FLEX-900 (3 inch through 12 inch)

Nominal Pipe Size	L1	L2	L3	L4	L5	L6	L7	ID	OD
3	11.4	5.7	2	14.2	11.7	3.5	2.5	3.2	9.2
4	15.8	6.4	1.8	18.2	15.7	3.7	2.5	4.1	13.0
6	17.0	7.0	1.7	19.3	16.8	4.3	2.5	6.2	15.0
8	17.5	7.6	1.6	19.6	17.1	4.9	2.5	8.3	17.3
10	20.8	8.5	1.6	22.7	20.2	6.0	2.5	10.3	22.7
12	21.9	9.6	1.6	24.2	21.7	6.7	2.5	12.3	22.7

NOTE: Dimensions are in inches and are subject to change with out notice.

FLEX-900 Flange O-ring Groove



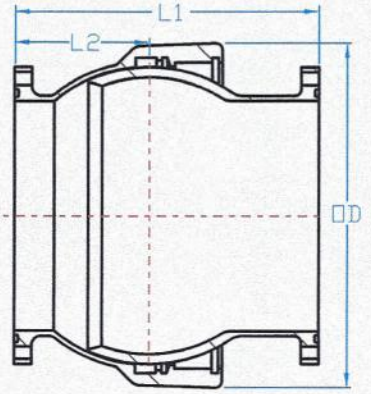
Size	D1	D2	D3	D4	D5	O-ring Diameter	O-ring Part Number	Cut Length
3	4.885	4.185	0.175	0.350	0.0625	0.25	983003	Molded
4	5.900	4.700	0.300	0.600	0.0625	0.5	983004	16.5
6	8.00	6.800	0.300	0.600	0.0625	0.5	983006	23
8	10.100	8.900	0.300	0.600	0.0625	0.5	983008	29.75
10	12.200	11.000	0.300	0.600	0.0625	0.5	983010	36.25
12	14.300	13.100	0.300	0.600	0.0625	0.5	983012	42.75
14	16.200	15.00	0.300	0.600	0.0625	0.5	983014	49.375
16	18.500	16.900	0.400	0.800	0.1250	0.625	983016	56.25
18	20.700	19.100	0.400	0.800	0.1250	0.625	983018	62.75
20	23.000	21.400	0.400	0.800	0.1250	0.625	983020	70
24	27.200	25.600	0.400	0.800	0.1250	0.625	983024	82.75
30	33.500	31.700	0.400	0.900	0.1250	0.75	983030	103
36	40.000	38.300	0.400	0.850	0.1250	0.75	983036	123.5
42	46.580	44.080	0.650	1.250	0.1250	N/A	983042	N/A
48	52.720	50.220	0.650	1.250	0.1250	1	983048	161

FLEX-900 Submittal Reference Drawing (14 inch - 48 inch)

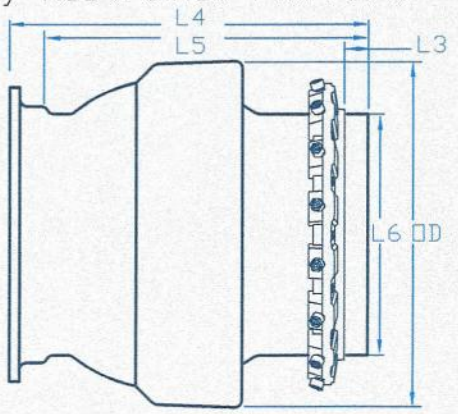
EBAA IRON

MADE IN USA

Flange by Flange



Mechanical Joint
by Restrained Plain End



Nominal Pipe Size	Dimensions for FLEX-900 (14 inch through 48 inch)							
	L1	L2	L3	L4	L5	L6	ID	OD
14	21.5	10.3	3.0	26.3	25.2	15.3	14.4	22.5
16	26.5	13.6	2.5	30.3	26.8	17.4	16.5	25.0
18	25.4	12.9	3.0	29.7	26.2	19.5	18.6	29.9
20	24.6	11.3	2.5	32.9	29.4	21.6	20.6	30.5
24	32.9	14.5	2.5	38.7	35.2	25.8	24.8	37.3
30				Call for Availability				
36	35.5	17.1	-	-	-	-	37.0	50.3
42				Call for Availability				
48				Call for Availability				

NOTE: Dimensions are in inches and are subject to change without notice.
Mechanical Joint by Restrained Plain End sizes are only available up to 24 inch.

Nominal Pipe Size	Weights (lbs) 900FF0 (FE x FE)	900MP0 (MJ x RPE)
3	57.89	41.95
4	103.40	99.38
6	149.78	153.54
8	202.41	196.27
10	277.46	271.88
12	374.98	349.16
14	554.70	621.77
16	596.46	523.01
18	895.46	916.82
20	817.92	966.58
24	1542.18	1652.18
30	2715.00	-
36	3801.00	-
42	Call	-
48	Call	-

Important Notes

In order for the FLEX-900 to protect pipeline connections, any load on the pipeline must be transferred to the FLEX-900 by restrained joints. Depending on the piping arrangement and expected movement of the pipeline, adjacent pipeline joints must be restrained to adequately transfer the loads to the FLEX-900.

The flanged outlets are dimensioned according to ANSI/AWWA C110/A21.10 with addition of the O-ring. An O-ring is provided with each flange to provide a proven water tight seal to a minimum of 350 PSI.

Mechanical joint connection conform to the dimensional requirements of either ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 depending on the size.

Installation Instructions

1. Remove protective end covers.
2. Remove polyethylene sleeve and other materials.
3. Check interior, remove dirt and foreign material from interior and end connections.
4. For buried applications install polyethylene sleeve per ANSI/AWWA C105/A21.5 recommendations.
5. Assembly of flange joint:
   a. Place O-ring in groove.
   b. Place FLEX-900 flange against adjoining flange, install and hand tighten bolts.
   c. Check O-ring for proper placement.
   d. Tighten flange bolts.
6. Install mechanical joint FLEX-900 end connections using the EBAA Iron MEGALUG® Mechanical Joint Restraint suitable for adjacent pipe material. MEGALUG 1100 should be used on ductile iron pipe. MEGALUG 2000PV is to be used on PVC pipe. Assembly instructions for each of these restraints products are included with the restraint device.
7. Assembly of restrained plain end:
   a. Lubricate and install EBAA-Seal™ Improved Mechanical Joint Gasket provided over plain end per ANSI/AWWA C600.
   b. Insert plain end into adjacent mechanical joint bell.
   c. Install and hand tighten T-bolts.
   d. Tighten T-bolts per AWWA recommendations.
8. Touch up exterior coating as necessary.

	Protection From			
FLEX-TEND® Family	Shear Plain	Bending Moments w/Expansion	Bending Moments No Expansion	Expansion (Axial)
FLEX-TEND Double Ball	Yes	Yes	Yes	Yes
FLEX-TEND Single Ball	No	Yes	Yes	Yes
FLEX-900	No	No	Yes	No
EX-TEND	No	No	No	Yes

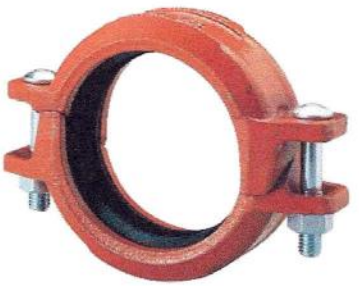
EBAA IRON Sales, Inc.
P.O. Box 857, Eastland, TX 76448
Tel: (254) 629-1731
Fax: (254) 629-8931
(800) 433-1716 within US and Canada
contact@ebaa.com
www.ebaa.com

Members of...
AMERICAN FOUNDRY SOCIETY

SHURJOINT®
www.shurjoint.com

Z07 **C-06**

MODEL Z07 STANDARD RIGID COUPLING
-Angle-Pad Design-



The ***Shurjoint*** Model Z07 is an angle-pad design standard rigid coupling for general piping applications where rigidity is required including valve connections, mechanical rooms, fire mains and long straight runs. The angle-pad design allows the coupling housings to slide along the bolt pads when tightened. The result is an offset clamping action which provides a rigid joint that resists flexural and torsional loads. Support and hanging requirements correspond to ANSI B31.1, B31.9 and NFPA 13.

The ***Shurjoint*** Model Z07 is available with a standard "C" shaped or ***GapSeal®*** gasket in a variety grades to meet your specific service requirements.

Sizes available: 32mm ~ 600mm / 1-1/4" ~ 24"
Working Pressure: Up to 52 bar / 750 psi

MODEL Z07 MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12, min. tensile strength 448MPa (65,000 psi).

• Surface Finish:

Standard painted finishes in orange or RAL3000 red.

- ☐ Hot dip zinc galvanized (Optional).
- ☐ Epoxy Coatings in RAL3000 red or other colors (Optional)

• Rubber Gasket:

To assure maximum life for the service intended, proper gasket selection and specification in ordering is essential. Failure to select the proper gasket compound may result in personal injury, property damage, joint leakage or joint failure.

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230°F (+110°C). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals. Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -30°F (-34°C) to +230°F (+110°C)

- ☐ (Option) **Grade "T" Nitrile** (Color code: Orange stripe) Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Also good for water services under +66°C (+150°F).
  Temperature range: -29 °C to +82 °C (-20 °F to +180 °F).
  Do not use for HOT WATER above +66 °C (+150 °F) or HOT DRY AIR above +60 °C (+140 °F).

- ☐ Other options: Grade "O" - Fluoroelastomer.
  Grade "L" - Silicone.

  For dry systems we recommends the use of the ***Shurjoint*** Gap Seal gasket.

  For additional details contact ***Shurjoint.***

• Bolts & Nuts:

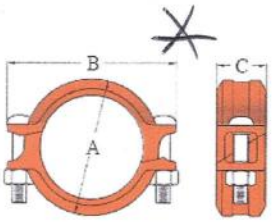
Heat treated carbon manganese steel track bolts to ASTM A449-83a (or A183 Gr. 2), minimum tensile strength 758 MPa (110,000 psi), Zinc electroplated, with heavy-duty hexagonal nuts to ASTM A563.

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

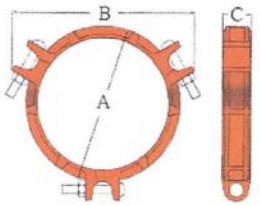
SHURJOINT®
www.shurjoint.com

Z07 **C-06**

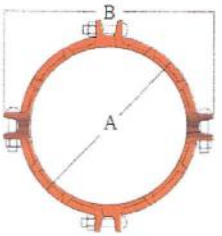
MODEL Z07 STANDARD RIGID COUPLING



1-1/4" ~ 12"



14" ~ 18"



20" ~ 24"

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documen

Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

Model Z07 Standard Rigid Coupling

Nominal Size	Pipe OD	Max. Working Pressure	Max End Load	Axial Displace-ment	Dimension			Bolt Size		Weight
					A	B	C			
mm in	mm in	Bar PSI	kN Lbs	mm in	mm in	mm in	mm in	No.	mm in	Kgs Lbs
32 1.25	42.2 1.660	52 750	7.21 1620	0~1.2 0 ~ 0.05	68 2.68	105 4.13	47 1.85	2	M10 x 55 3/8 x 2-1/8	0.7 1.6
40 1.5	48.3 1.900	52 750	9.48 2130	0~1.2 0 ~ 0.05	74 2.91	115 4.53	47 1.85	2	M10 x 55 3/8 x 2-1/8	0.9 2.0
50 2	60.3 2.375	52 750	14.78 3320	0~1.7 0 ~ 0.07	86 3.39	120 4.72	48 1.88	2	M10 x 70 3/8 x 2-3/4	1.1 2.4
65 2.5	73.0 2.875	52 750	21.71 4875	0~1.7 0 ~ 0.07	100 3.94	140 5.50	48 1.88	2	M10 x 70 3/8 x 2-3/4	1.1 2.4
65 2.5	76.1 3.000	52 750	23.60 5300	0~1.7 0 ~ 0.07	102 4.00	146 5.75	48 1.88	2	M10 x 70 3/8 x 2-3/4	1.2 2.6
80 3	88.9 3.500	52 750	32.14 7215	0~1.7 0 ~ 0.07	115 4.53	157 6.18	48 1.88	2	M12 x 75 1/2 x 3	1.4 3.1
100 4	114.3 4.500	52 750	53.11 11925	0~4.1 0 ~ 0.16	147 5.78	199 7.83	54 2.13	2	M12 x 75 1/2 x 3	2.0 4.4
125 5	139.7 5.500	52 750	74.05 16625	0~4.1 0 ~ 0.16	175 6.88	235 9.25	54 2.13	2	M16 x 90 5/8 x 3-1/2	3.0 6.6
125 5	141.3 5.563	52 750	81.17 18225	0~4.1 0 ~ 0.16	177 6.97	235 9.25	54 2.13	2	M16 x 90 5/8 x 3-1/2	3.0 6.6
150 6	165.1 6.500	48 700	103.44 23225	0~4.1 0 ~ 0.16	200 7.87	259 10.20	54 2.13	2	M16 x 90 5/8 x 3-1/2	3.2 7.1
150 6	168.3 6.625	48 700	107.48 24130	0~4.1 0 ~ 0.16	203 8.00	263 10.35	54 2.13	2	M16 x 90 5/8 x 3-1/2	3.2 7.1
200 JIS 8	216.3 8.516	42 600	154.25 34158	0~3.2 0 ~ 0.13	264 10.39	340 13.39	64 2.50	2	M20 x 120 3/4 x 4-3/4	6.9 15.20
200 8	219.1 8.625	42 600	155.89 35000	0~4.8 0 ~ 0.19	268 10.55	342 13.46	64 2.52	2	M20 x 120 3/4 x 4-3/4	7.1 15.7
250 JIS 10	267.4 10.528	35 500	196.45 43504	0~3.2 0 ~ 0.13	321 12.63	397 15.63	65 2.56	2	--- 7/8 x 6-1/2	11.0 24.2
250 10	273.0 10.750	35 500	202.21 45400	0~3.2 0 ~ 0.13	327 12.86	431 16.98	65 2.56	2	--- 7/8 x 6-1/2	10.3 22.9
300 JIS 12	318.5 12.539	28 400	222.97 49369	0~3.2 0 ~ 0.13	372 14.65	452 17.80	65 2.56	2	--- 7/8 x 6-1/2	12.0 26.4
300 12	323.9 12.750	28 400	227.15 51000	0~3.2 0 ~ 0.13	377 14.86	480 18.88	65 2.56	2	--- 7/8 x 6-1/2	11.8 26.0
350 14	355.6 14.000	17 250	171.2 38485	0~3.2 0 ~ 0.13	408 16.06	505 19.89	75 2.95	3	--- 7/8 x 5-1/2	14.9 32.8
400 16	406.4 16.000	17 250	223.6 50265	0~3.2 0 ~ 0.13	467 18.39	554 21.84	75 2.95	3	--- 7/8 x 5-1/2	18.7 41.2
450 18	457.2 18.000	17 250	283.0 63615	0~3.2 0 ~ 0.13	525 20.68	607 23.89	79 3.11	3	--- 7/8 x 5-1/2	24.6 54.2
500 20	508.0 20.000	17 250	349.3 78540	0~3.2 0 ~ 0.13	582 22.93	698 27.47	76 3.00	4	--- 1 x 3-1/2	30.5 67.2
600 24	609.6 24.000	17 250	503.3 113000	0~3.2 0 ~ 0.13	687 27.05	803 31.61	78 3.06	4	--- 1 x 3-1/2	34.6 46.2

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***..
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

SHURJOINT®
www.shurjoint.com

MODELS 7120 TEE
7135 CROSS
7130 45° LATERAL

Shurjoint grooved end fittings are designed to meet the ASTM F1548-01 and all groove dimensions conform to ANSI / AWWA C606-04 and or ISO/FDIS 6182-12. For dimensional tolerances of cast fittings, refer to ISO/FDIS 6182-12 Table 3. ***Shurjoint*** grooved fittings are cast of ductile iron except where indicated (SW).

Model 7120

Model 7135

Model 7130

MATERIAL SPECIFICATIONS

- Fitting body:

  Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).
  - ☐ Carbon steel Sch. 40 pipe to ASTM A53 or 9.5mm (0.375") wall pipe of ASTM A234 Gr. WPB.

- Surface Finish:

  Orange color painted or red RAL3000 color painted.
  - ☐ Hot dip galvanized (Option).
  - ☐ Epoxy coated in red RAL3000 or other colors (Option)

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

__Shurjoint__ product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact __Shurjoint__ Technical Service. __Shurjoint__ reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on __Shurjoint__ products previously subsequently sold.

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Grooved-End Fittings E-05

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

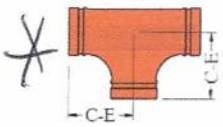


Fig. 7120 Tee

Fig. 7135 Cross

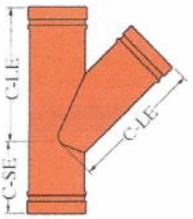


Fig. 7130
45° Lateral

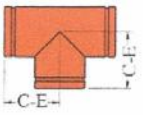


Fig. 7120
Tee (Welded)

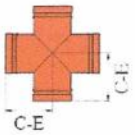


Fig. 7135
Cross (Welded)

Model 7120 TEE / 7135 CROSS / 7130 45° LATERAL

Nominal Pipe Size	Pipe O.D.	#7120 Tee		#7135 Cross			#7130 45° Lateral	
mm in	mm in	C-E	Kgs Lbs	C-E	Kgs Lbs	C-LE	C-SE	Kgs Lbs
25 1	33.4 1.315	57 2.25	0.4 0.9	57 SW 2.25	0.6 1.3	—	—	—
32 1.25	42.2 1.660	70 2.75	0.7 1.5	70 SW 2.75	1.0 2.2	146 SW 5.75	64 2.50	1.1 2.4
40 1.5	48.3 1.900	70 2.75	0.9 2.0	70 SW 2.75	1.1 2.5	159 SW 6.25	70 2.75	1.6 3.5
50 2	60.3 2.375	83 3.25	1.3 2.9	83 3.25	1.7 3.8	178 7.00	70 2.75	2.3 5.1
65 2.5	73.0 2.875	95 3.75	2.2 4.8	95 3.75	2.8 6.2	197 7.75	76 3.00	2.8 6.2
65 2.5	76.1 3.000	95 3.75	2.3 5.1	95 3.75	2.8 6.2	197 7.75	76 3.00	2.8 6.2
80 3	88.9 3.500	108 4.25	3.1 6.8	108 4.25	4.8 10.6	216 8.50	83 3.25	4.2 9.2
100 4	114.3 4.500	127 5.00	4.6 10.1	127 5.00	7.2 15.9	267 10.50	95 3.75	8.0 17.6
100 4	108.0 4.250	127 5.00	4.1 9.0	— —	— —	— —	— —	— —
125 5	141.3 5.563	140 5.50	6.5 14.3	140 5.50	9.1 20.0	318 12.50	102 4.00	12.5 27.5
125 5	133.0 5.250	140 5.50	6.0 13.2	— —	— —	— —	— —	— —
125 5	139.7 5.500	140 5.50	6.5 14.3	140 5.50	9.0 19.8	318 12.50	102 4.00	12.5 27.5
150 6	168.3 6.625	165 6.50	10.0 22.0	165 6.50	12.7 27.9	356 14.00	114 4.50	18.5 40.7
150 6	159.0 6.250	165 6.50	8.6 18.9	— —	— —	— —	— —	— —
150 6	165.1 6.500	165 6.50	8.5 18.7	165 6.50	12.0 26.4	356 14.00	114 4.50	18.5 40.7
200 8	219.1 8.625	197 7.75	20.0 44.0	197 7.75	22.0 48.4	457 18.00	152 6.00	32.0 70.4
200A 8	216.3 8.516	197 7.75	20.0 44.0	197 7.75	21.0 46.2	457 18.00	152 6.00	32.0 70.4
250 10	273.0 10.750	229 9.00	31.0 68.2	229 SW 9.00	32.0 70.4	521 20.50	165 6.50	47.6 104.7
250A 10	267.4 10.528	229 9.00	31.0 68.2	229 SW 9.00	32.0 70.4	521 20.50	165 6.50	47.6 104.7
300 12	323.9 12.750	254 10.00	45.0 99.0	254 SW 10.00	50.0 110.0	584 23.00	178 7.00	75.0 165.0
300A 12	318.5 12.539	254 10.00	45.0 99.0	254 SW 10.00	50.0 110.0	584 23.00	178 7.00	75.0 165.0
350 14	355.6 14.000	280 11.00	54.0 118.8	280 SW 11.00	91.0 200.2	673 SW 26.50	191 7.50	125.0 275.0
400 16	406.4 16.000	305 12.00	66.0 145.2	305 SW 12.00	113.8 250.4	737 SW 29.00	203 8.00	156.0 343.2
450 18	457.2 18.000	394 SW 15.50	124.3 273.5	394 SW 15.50	165.7 364.5	813 SW 32.00	216 8.50	195.0 429.0
500 20	508.0 20.000	438 SW 17.25	153.9 338.6	438 SW 17.25	205.2 451.4	889 SW 35.00	229 9.00	227.0 499.4
550 22	558.8 22.000	483 SW 19.00	150.0 330.0	483 SW 19.00	242.8 534.2	965 SW 38.00	241 9.50	280.0 616.0
600 24	609.6 24.000	508 SW 20.00	215.1 473.2	508 SW 20.00	286.8 631.0	1016 SW 40.00	254 10.00	324.0 712.8

SW: Segment welded steel.

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***..
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

MODELS 7160 END CAP
7160P END CAP WITH PLUG
7160H DOMED END CAP

Shurjoint grooved end fittings are designed to meet the ASTM F1548-01 and all groove dimensions conform to ANSI / AWWA C606-04 and or ISO/FDIS 6182-12. For dimensional tolerances of cast fittings, refer to ISO/FDIS 6182-12 Table 3. Shurjoint grooved fittings are cast of ductile iron.

Model 7160

Model 7160P

Model 7160H

MATERIAL SPECIFICATIONS

- Fitting body:

  Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).

- Surface Finish:

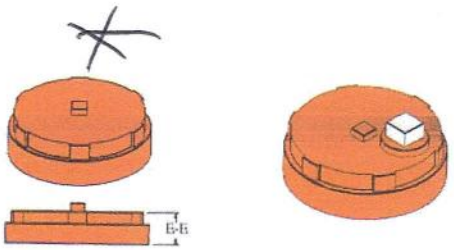
  Orange color painted or red RAL3000 color painted.
  - ☐ Hot dip galvanized (Option).
  - ☐ Epoxy coated in red RAL3000 or other colors. (Option)

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

__Shurjoint__ product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact __Shurjoint__ Technical Service. __Shurjoint__ reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on __Shurjoint__ products previously subsequently sold.

SHURJOINT®
www.shurjoint.com

MODELS 7160 END CAP
7160P END CAP WITH PLUG



1-1/4" ~ 12"

Models 7160 End Cap / 7160P End Cap with Plug

Nominal Pipe Size	Pipe O.D.	7160 End Cap		7160P Plug Size
mm in	mm in	E-E mm / in	Kgs Lbs	mm in
25 1	33.4 1.315	22 0.87	0.1 0.2	— —
32 1.25	42.2 1.660	25 1.00	0.2 0.4	— —
40 1.5	48.3 1.900	25 1.00	0.2 0.4	— —
50 2	60.3 2.375	25 1.00	0.3 0.7	15 0.5
65 2.5	73.0 2.875	25 1.00	0.4 0.9	15 0.5
65 2.5	76.1 3.000	25 1.00	0.4 0.9	15 0.5
80 3	88.9 3.500	25 1.00	0.7 1.5	15 0.5
100 4	114.3 4.500	25 1.00	1.0 2.2	25 1
100 4	108.0 4.250	25 1.00	1.1 2.4	— —
125 5	141.3 5.563	25 1.00	1.7 3.7	25 1
125 5	133.0 5.250	25 1.00	1.7 3.7	— —
125 5	139.7 5.500	25 1.00	1.7 3.7	25 1
150 6	168.3 6.625	25 1.0	3.0 6.6	25 1
150 6	159.0 6.250	25 1.00	2.3 5.1	— —
150 6	165.1 6.500	25 1.00	3.0 6.6	25 1
200 8	219.1 8.625	30 1.18	5.5 12.1	40 1.5
200JIS 8	216.3 8.516	30 1.18	4.6 10.1	— —
250 10	273.0 10.750	32 1.25	7.0 15.4	40 1.5
250JIS 10	267.4 10.528	32 1.25	7.0 15.4	— —
300 12	323.9 12.750	32 1.25	10.0 22.0	40 1.5
300JIS 12	318.5 12.538	32 1.25	10.0 22.0	— —

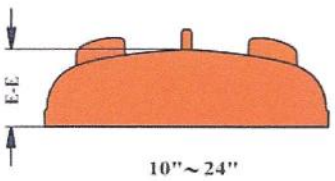
Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray, E.I.T. Williams Eng.
Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

MODEL 7160H DOMED END CAP



Model 7160H Domed End Cap

Nominal Pipe Size	Pipe O.D.	#7160H Domed End Cap	
mm in	mm in	E-E mm / in	Kgs Lbs
250 10	273.0 10.750	76.1 3.00	5.5 12.1
300 12	323.90 12.750	76.1 3.00	7.4 16.3
350 14	355.6 14.000	102 4.00	11.6 25.5
400 16	406.4 16.000	102 4.00	14.6 32.1
450 18	457.2 18.000	127 5.00	20.5 45.1
500 20	508.0 20.000	152 6.00	24.5 53.9
550 22	558.8 22.000	152 6.00	44.0 97.0
600 24	609.6 24.000	152 6.00	34.5 75.9

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***..
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

MODELS 7150 CONCENTRIC REDUCER
7151 ECCENTRIC REDUCER

The ***Shurjoint*** concentric reducers and eccentric reducers are all cast using ductile iron except where indicated (SW). The end-to-end dimensions of these reducers are less than that of fabricated reducers of the same size.

All groove dimensions conform to ANSI / AWWA C606-04 and or ISO/FDIS 6182-12. For dimensional tolerances of cast fittings, refer to ISO/FDIS 6182-12 Table 3.

MATERIAL SPECIFICATIONS

- Fitting body:
  Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).

- Surface Finish:
  Orange color painted or red RAL3000 color painted.
  - ☐ Hot dip galvanized (Option).
  - ☐ Epoxy coated in red RAL3000 or other colors (Option)

Job Name:	**System No.**	**Location:**	
Contractor:		**Approved:**	**Date:**
Engineer:		**Approved:**	**Date:**

MODELS 7150 CONCENTRIC REDUCER
7151 ECCENTRIC REDUCER

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

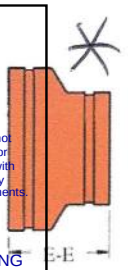


Fig. 7150 Conc. Reducer

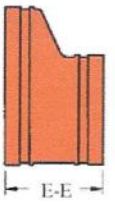


Fig. 7151 Ecc. Reducer

Fig. 7150 Conc. Reducer (Welded)

Fig. 7151 Ecc. Reducer (Welded)

Models 7150 Concentric Reducer / 7151 Eccentric Reducer

Nominal Pipe Size	Pipe OD	7150 Concentric Reducer		7151 Eccentric Reducer	
		E-E	Weight	E-E	Weight
mm / in	mm / in	mm / in	Kgs / Lbs	mm / in	Kgs / Lbs
32 x 25 1.25 x 1	42.2 x 33.4 1.660 x 1.315	64 2.50	0.3 0.7	— —	— —
40 x 25 1.5 x 1	48.3 x 33.4 1.900 x 1.315	64 2.50	0.4 0.9	— —	— —
40 x 32 1.5 x 1.25	48.3 x 42.2 1.900 x 1.660	64 2.50	0.4 0.9	— —	— —
50 x 25 2 x 1	60.3 x 33.4 2.375 x 1.315	64 2.50	0.4 0.9	— —	— —
50 x 32 2 x 1.25	60.3 x 42.2 2.375 x 1.660	64 2.50	0.4 0.9	— —	— —
50 x 40 2 x 1.5	60.3 x 48.3 2.375 x 1.900	64 2.50	0.4 0.9	— —	— —
65 x 50 2.5 x 2	73.0 x 60.3 2.875 x 2.375	64 2.50	0.5 1.1	89 3.50	0.7 1.5
65 x 50 2.5 x 2	76.1 x 60.3 3.000 x 2.375	64 2.50	0.5 1.1	89 3.50	0.7 1.5
80 x 25 3 x 1	88.9 x 33.4 3.500 x 1.315	64 2.50	0.8 1.8	— —	— —
80 x 32 3 x 1.25	88.9 x 42.2 3.500 x 1.660	64 2.50	0.6 1.3	— —	— —
80 x 40 3 x 1.5	88.9 x 48.3 3.500 x 1.900	64 2.50	0.7 1.5	— —	— —
80 x 50 3 x 2	88.9 x 60.3 3.500 x 2.375	64 2.50	0.6 1.3	89 3.50	1.0 2.2
80 x 65 3 x 2.5	88.9 x 73.0 3.500 x 2.875	64 2.50	0.6 1.3	89 3.50	1.0 2.2
80 x 65 3 x 2.5	88.9 x 76.1 3.500 x 3.000	64 2.50	0.6 1.3	89 3.50	1.0 2.2
100 x 50 4 x 2	114.3 x 60.3 4.500 x 2.375	76 3.00	1.1 2.2	102 4.00	1.4 3.1
100 x 65 4 x 2.5	114.3 x 73.0 4.500 x 2.875	76 3.00	1.0 2.2	102 4.00	1.5 3.3
100 x 65 4 x 2.5	114.3 x 76.1 4.500 x 3.000	76 3.00	1.0 2.2	102 4.00	1.5 3.3
100 x 80 4 x 3	114.3 x 88.9 4.500 x 3.500	76 3.00	1.0 2.2	102 4.00	1.6 3.5
125 x 100 5 x 4	141.3 x 114.3 5.563 x 4.500	89 3.50	2.0 4.4	102 4.00	2.7 6.0
150 x 50 6 x 2	168.3 x 60.3 6.625 x 2.375	102 4.00	1.9 4.2	102 4.00	3.1 6.9
150 x 50 6 x 2	168.3 x 60.3 6.625 x 2.375	102 4.00	1.9 4.2	102 4.00	3.1 6.9
150 x 65 6 x 2.5	168.3 x 73.0 6.625 x 2.875	102 4.00	1.9 4.2	— —	— —
150 x 80 6 x 3	168.3 x 88.9 6.625 x 3.500	102 4.00	2.0 4.4	102 4.00	3.5 7.7

Models 7150 Concentric Reducer / 7151 Eccentric Reducer

Nominal Pipe Size	Pipe OD	7150 Concentric Reducer		7151 Eccentric Reducer	
		E-E	Weight	E-E	Weight
mm / in	mm / in	mm / in	Kgs / Lbs	mm / in	Kgs / Lbs
150 x 100	168.3 x 114.3	102	2.1	102	3.8
6 x 4	6.625 x 4.500	4.00	4.6	4.00	8.4
150 x 125	168.3 x 141.3	102	2.5	102	4.5
6 x 5	6.625 x 5.563	4.00	5.5	4.00	9.9
150 x 50	165.1 x 60.3	102	1.9	102	3.1
6 x 2	6.500 x 2.375	4.00	4.2	4.00	6.9
150 x 65	165.3 x 76.1	102	1.9	—	—
6 x 2.5	6.500 x 3.000	4.00	4.2	---	---
150 x 80	165.1 x 88.9	102	2.0	102	3.5
6 x 3	6.500 x 3.500	4.00	4.4	4.00	7.7
150 x 100	165.1 x 114.3	102	2.1	102	3.8
6 x 4	6.500 x 4.500	4.00	4.6	4.00	8.4
150 x 125	165.1 x 139.7	102	2.5	102	4.5
6 x 5	6.500 x 5.500	4.00	5.5	4.00	9.9
200 x 80	219.1 x 88.9	127	5.0	—	—
8 x 3	8.625 x 3.500	5.00	11.0	---	---
200 x 100	219.1 x 114.3	127	5.1	127	5.4
8 x 4	8.625 x 4.500	5.00	11.2	5.00	11.9
200 x 150	219.1 x 168.3	127	5.2	127	8.0
8 x 6	8.625 x 6.625	5.00	11.4	5.00	17.6
250 x 100	273.0 x 114.3	152	9.0	152	12.0
10 x 4	10.750 x 4.500	6.00	19.8	6.00	26.4
250 x 150	273.0 x 168.3	152	9.0	152	11.5
10 x 6	10.750 x6.625	6.00	19.8	6.00	25.3
250 x 200	273.0 x 219.1	152	9.5	178	12.0
10 x 8	10.750 x 8.625	6.00	20.9	7.00SW	26.4
300x150	323.9 x 168.3	178	12.0	178	18.0
12 x 6	12.750 x 6.625	7.00	26.4	7.00	39.6
300 x 200	323.9 x 219.1	178	14.0	178	29.3
12 x 8	12.750 x 8.625	7.00	30.8	7.00	53.5
300 x 250	323.9 x 273.0	178	15.0	178	20.2
12 x 10	12.750 x 10.750	7.00	33.0	7.00	44.0
350 x 150	355.6 x 168.3	318	19.5	318	28.0
14 x 6	14.000 x 6.625	12.50SW	42.9	12.50SW	62.0
350 x 200	355.6 x 219.1	203	19.0	318	28.0
14 x 8	14.000 x 8.625	8.00	41.8	12.50SW	62.0
350 x 250	355.6 x 273.0	203	32.5	318	28.0
14 x 10	14.000 x 10.750	8.00	71.5	12.5SW	62.0
350 x 300	355.6 x 323.9	203	23.0	318	28.0
14 x 12	14.000 x 12.750	8.00	50.6	12.5SW	62.0
400 x 150	406.4 x 168.3	336	29.7	318	29.7
16 x 6	16.000 x 6.625	13.22SW	65.4	12.50SW	65.4
400 x 200	406.4 x 219.1	356	32.0	318	35.0
16 x 8	16.000 x 8.625	14.00	70.4	12.50SW	77.0
400 x 250	406.4 x 273.0	318	29.5	318	35.0
16 x 10	16.000 x 10.750	12.50SW	64.9	12.50SW	77.0
400 x 300	406.4 x 323.9	229	30.0	229	31.0
16 x 12	16.000 x 12.750	9.00	66.0	9.00	68.2
400 x 350	406.4 x 355.6	229	29.0	229	35.0
16 x 14	16.000 x 14.000	9.00	63.8	9.00	77.0
450 x 250	457.2 x 273.0	330	36.0	330	45.0
18 x 10	18.000 x 10.750	13.00SW	79.2	13.00SW	99.0
450 x 300	457.2 x 323.9	241	35.5	330	45.0
18 x 12	18.000 x 12.750	9.50	78.1	13.00SW	99.0
450 x 350	457.2 x 355.6	330	36.0	330	45.0
18 x 14	18.000 x 14.000	13.00SW	79.2	13.00SW	99.0
450 x 400	457.2 x 406.4	330	36.0	330	45.0
18 x 16	18.000 x 16.000	13.00SW	79.2	13.00SW	99.0
500 x 300	508.0 x 323.9	254	43.0	356	68.0
20 x 12	20.000 x 12.750	10.00	94.6	14.00SW	149.6
500 x 350	508.0 x 355.6	356	44.8	356	68.0
20 x 14	20.000 x 14.000	14.00SW	98.6	14.00SW	149.6
500 x 400	508.0 x 406.4	254	46.0	356	68.0
20 x 16	20.000 x 16.000	10.00	101.2	14.00SW	149.6
500 x 450	508.0 x 457.2	356	58.0	356	68.0
20 x 18	20.000 x18.000	14.00SW	127.6	14.00SW	149.6
600 x 250	609.6 x 273.0	305	36.0	381	42.0
24 x 10	24.000 x 10.750	12.00	79.2	15.00SW	92.4

Models 7150 Concentric Reducer / 7151 Eccentric Reducer

Nominal Pipe Size	Pipe OD	7150 Concentric Reducer		7151 Eccentric Reducer	
		E-E	Weight	E-E	Weight
mm / in	mm / in	mm / in	Kgs / Lbs	mm / in	Kgs / Lbs
600 x 300	609.6 x 323.9	305	70.0	381	79.0
24 x 12	24.000 x 12.750	12.00	154.0	15.00SW	173.8
600 x 350	609.6 x 355.6	381	70.0	381	79.0
24 x 14	24.000x14.000	15.00SW	154.0	15.00SW	173.8
600 x 400	609.6 x 406.4	305	70.0	381	79.0
24 x 16	24.000 x 16.000	12.00	154.0	15.00SW	173.8
600 x 450	609.6 x 457.2	381	70.0	381	79.0
24 x 18	24.000x18.000	15.00SW	154.0	15.00SW	173.8
600 x 500	609.6 x 508.0	305	71.0	381	79.0
24 x 20	24.000 x 20.000	12.00	156.2	15.00SW	173.8

SW: Segment welded steel.

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

MODELS 7110 90° ELBOW, REGULAR RADIUS
7111 45° ELBOW, REGULAR RADIUS
7112 22-1/2° ELBOW
7113 11-1/4° ELBOW

Shurjoint grooved end fittings are designed to meet the ASTM F1548-01 and all groove dimensions conform to ANSI / AWWA C606-04 and or ISO/FDIS 6182-12. For dimensional tolerances of cast fittings, refer to ISO/FDIS 6182-12 Table 3. ***Shurjoint*** grooved fittings are cast of ductile iron except where indicated (SW).

Fig. 7110

Fig. 7111

Fig. 7112

Fig. 7113

MATERIAL SPECIFICATIONS

- Fitting body:

  Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).

  ☐ Carbon steel Sch. 40 pipe to ASTM A53 or 9.5mm (0.375") wall pipe of ASTM A234 Gr. WPB.

- Surface Finish:

  Orange color painted or red RAL3000 color painted.

  ☐ Hot dip galvanized (Option).

  ☐ Epoxy coated in red RAL3000 or other colors (Option)

Job Name:	System No.	Location:
Contractor:	Approved:	Date:
Engineer:	Approved:	Date:

__Shurjoint__ product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact __Shurjoint__ Technical Service. __Shurjoint__ reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on __Shurjoint__ products previously subsequently sold.

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Grooved-End Fittings E-02

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Not Reviewed	( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

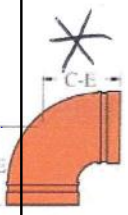


Fig. 7110
90° Elbow

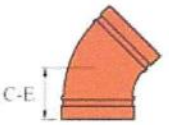


Fig. 7111
45° Elbow

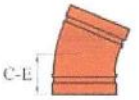


Fig. 7112
22-1/2° Elbow

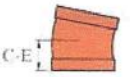


Fig. 7113
11-1/4° Elbow

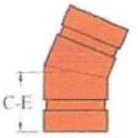


Fig. 7112
22-1/2° Elbow
(Welded)

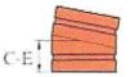


Fig. 7113
11-1/4° Elbow (Weld

Models 7110 / 7111 / 7112 / 7113 Elbows

Nominal Pipe Size	Pipe O.D.	#7110 90° Elbows C-E	#7110 90° Elbows Weight	#7111 45° Elbows C-E	#7111 45° Elbows Weight	7112 22-1/2° Elbows C-E	7112 22-1/2° Elbows Weight	#7113 11-1/4° Elbows C-E	#7113 11-1/4° Elbows Weight
mm in	mm in	mm in	Kgs Lbs	mm in	Kgs Lbs	mm in	Kgs Lbs	mm in	Kgs Lbs
25 1	33.4 1.315	57 2.25	0.3 0.7	45 1.75	0.2 0.4	—	—	—	—
32 1.25	42.2 1.660	70 2.75	0.5 1.1	45 1.75	0.3 0.7	45 1.75SW	0.3 0.7	35 1.38SW	0.2 0.4
40 1.5	48.3 1.900	70 2.75	0.7 1.5	45 1.75	0.4 0.9	45 1.75	0.6 1.3	35 1.38SW	0.3 0.7
50 2	60.3 2.375	83 3.25	0.9 2.0	51 2.00	0.7 1.5	48 1.88	0.8 1.8	35 1.38	0.8 1.8
65 2.5	73.0 2.875	95 3.75	1.2 2.6	57 2.25	0.9 2.0	51 2.01	1.0 2.2	38 1.50	1.0 2.2
65 2.5	76.1 3.000	95 3.75	1.4 3.1	57 2.25	1.0 2.2	51 2.01	1.0 2.2	38 1.50	1.0 2.2
80 3	88.9 3.500	108 4.25	2.1 4.6	64 2.50	1.3 2.9	57 2.25	1.4 3.1	38 1.50	1.1 2.4
90 3.5	101.6 4.000	114 4.50	2.5 5.6	—	—	—	—	—	—
100 4	114.3 4.500	127 5.00	2.8 6.2	76 3.00	2.0 4.4	73 2.88	2.0 4.4	45 1.75	1.5 3.3
100 4	108.0 4.250	127 5.00	3.5 7.7	76 3.00	2.0 4.4	—	—	—	—
125 5	141.3 5.563	140 5.50	5.0 11.0	83 3.25	3.5 7.7	73 2.88	3.3 7.3	51 2.00SW	2.7 5.9
125 5	133.0 5.250	140 5.50	4.1 9.0	83 3.25	2.7 5.9	—	—	—	—
125 5	139.7 5.500	140 5.50	5.0 11.0	83 3.25	3.5 7.7	73 2.88	3.3 7.3	51 2.00SW	2.7 5.9
150 6	168.3 6.625	165 6.50	6.4 14.1	89 3.50	4.4 9.7	79 3.12	5.0 11.0	51 2.00	3.4 7.5
150 6	159.0 6.250	165 6.50	6.0 13.2	89 3.50	3.8 8.4	—	—	—	—
150 6	165.1 6.500	165 6.50	5.7 12.5	89 3.50	4.4 9.7	79 3.12	5.0 11.0	51 2.00	3.4 7.5
200 8	219.1 8.625	197 7.75	12.5 27.5	108 4.25	9.0 19.8	98 3.88	10.0 22.0	51 2.00	5.5 12.1
200JIS 8	216.3 8.516	197 7.75	12.5 27.5	108 4.25	9.0 19.8	98 3.88	10.0 22.0	—	—
250 10	273.0 10.750	229 9.00	24.0 52.8	121 4.75	17.0 37.4	111 4.38	13.6 29.9	54 2.13	6.6 14.5
250JIS 10	267.4 10.528	229 9.00	24.0 52.8	121 4.75	17.0 37.4	111 4.38	13.6 29.9	54 2.13	6.6 14.5
300 12	323.9 12.750	254 10.00	35.0 77.0	133 5.25	22.5 49.5	124 4.88SW	18.3 40.3	57 2.25	8.5 18.7
300JIS 12	318.5 12.539	254 10.00	35.0 77.0	133 5.25	22.5 49.5	124 4.88SW	18.3 40.3	57 2.25	8.5 18.7
350 14	355.6 14.000	280 11.00	35.0 77.0	152 6.00	22.0 48.4	127 5.00SW	21.0 46.2	89 3.50SW	14.6 32.1
400 16	406.4 16.000	305 12.00	43.0 94.6	184 7.25	44.0 96.8	127 5.00SW	24.0 52.8	102 4.00SW	19.0 41.8
450 18	457.2 18.000	394 15.50	75.0 165.0	203 8.00	46.6 102.5	140 5.50SW	30.0 66.0	114 4.50SW	24.0 52.8

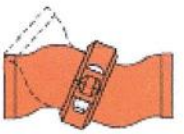
Models 7110 / 7111 / 7112 / 7113 Elbows

Nominal Pipe Size	Pipe O.D.	#7110 90° Elbows C-E	#7110 90° Elbows Weight	#7111 45° Elbows C-E	#7111 45° Elbows Weight	7112 22-1/2° Elbows C-E	7112 22-1/2° Elbows Weight	#7113 11-1/4° Elbows C-E	#7113 11-1/4° Elbows Weight
mm in	mm in	mm in	Kgs Lbs	mm in	Kgs Lbs	mm in	Kgs Lbs	mm in	Kgs Lbs
500 20	508.0 20.000	438 17.25	92.0 202.4	229 9.00	47.6 104.7	152 6.00SW	36.3 79.9	127 5.00SW	30.0 66.0
550 22	558.8 22.000	508 20.00SW	129.0 283.8	280 11.00SW	80.0 176.0	178 7.00SW	51.0 112.2	152 6.00SW	46.0 101.2
600 24	609.6 24.000	508 20.00	129.0 283.8	280 11.00	80.0 176.0	178 7.00SW	51.0 112.2	152 6.00 SW	46.0 101.2

SW: Segment-welded steel.

MODEL 7112G 22-1/2° ELBOW, Goose Neck Design

The use of two 22-1/2° goose neck elbows and a coupling works as a universal joint and is ideal for instances where a pipe line and or system is in indeed of a slight adjustment



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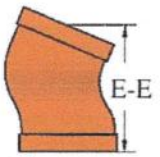

Fig. 7112
22-1/2° Elbow

Model 7112G 22-1/2° Elbow, Goose Neck

Nominal Pipe Size	Pipe O.D.	7112 22-1/2° Elbows E-E	7112 22-1/2° Elbows Weight
mm in	mm in	mm in	Kgs Lbs
40 1.5	48.3 1.900	95 G 3.75	0.6 1.3
50 2	60.3 2.375	95 G 3.75	0.8 1.3
65 2.5	73.0 2.875	102 G 4.00	1.0 2.2
65 2.5	76.1 3.000	102 G 4.00	1.0 2.2
80 3	88.9 3.500	114 G 4.50	1.4 3.1
100 4	114.3 4.500	127 G 5.00	2.0 4.4
125 5	141.3 5.563	127 G 5.00	3.3 7.3
125 5.5	139.7 5.500	127 G 5.00	3.3 7.3
150 6	168.3 6.625	159 G 6.25	5.0 11.0
150 6	165.1 6.500	159 G 6.25	5.0 11.0
200 8	219.1 8.625	197 G 7.75	10.0 22.0
200JIS 8	216.3 8.516	197 G 7.75	10.0 22.0

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

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Grooved-End Fittings E-04

c UL us LISTED FM APPROVED

MODEL 7110LR 1.5D LONG RADIUS 90° ELBOW
7111LR 1.5D LONG RADIUS 45° ELBOW
7137 TRUE-Y

All groove dimensions conform to ANSI / AWWA C606-04 and or ISO/FDIS 6182-12. For dimensional tolerances of cast fittings, refer to ISO/FDIS 6182-12 Table 3.

Reviewed
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray, E.I.T. Williams Eng.
Date: 01/20/2011

WILLIAMS ENGINEERING CANADA



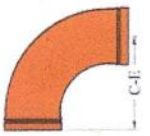



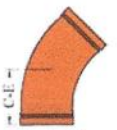
Fig. 7110LR
L/R 90° Elbow, 1-1/2D


Fig. 7111LR
L/R 45° Elbow, 1-1/2D


Fig. 7137
True-Y

Model 7110LR / 7111LR / 7137

Nominal Pipe Size	Pipe O.D.	#7110LR 1.5D LR 90° Elbows		#7111LR 1.5D LR 45° Elbows		#7137 True-Y		
mm in	mm in	C-E	Kgs Lbs	C-E	Kgs Lbs	C-LE	C-SE	Kgs Lbs
50 2	60.3 2.375	111 4.38	1.1 2.4	70 2.75	0.8 1.8	83 3.25	70 2.75	1.1 2.5
65 2.5	73.0 2.875	127 5.0	1.8 4.0	76 3.00	1.3 2.9	95 3.75	76 3.00	2.0 4.3
65 2.5	76.1 3.000	127 5.0	1.8 4.0	76 3.00	1.3 2.9	95 3.75	76 3.00	2.0 4.3
80 3	88.9 3.500	149 5.88	2.5 5.5	86 3.38	2.2 4.9	108 4.25	83 3.25	2.8 6.1
100 4	114.3 4.500	191 7.50	4.7 10.3	102 4.00	3.5 7.7	127 5.00	95 3.75	4.5 10.0
125 5	141.3 5.563	241 9.50	8.3 18.3	127 5.0	6.7 14.7	140 5.50	102 4.00	6.8 15.0
125 5	139.7 5.500	241 9.50	8.3 18.3	127 5.0	6.7 14.7	140 5.50	102 4.00	6.8 15.0
150 6	168.3 6.625	273 10.75	11.5 25.3	140 5.50	8.2 18.0	165 6.50	114 4.50	10.1 22.3
150 6	165.1 6.500	273 10.75	11.5 25.3	140 5.50	8.2 18.0	165 6.50	114 4.50	10.1 22.3
200 8	219.1 8.625	362 14.25	22.0 48.4	184 7.25	16.3 36.0	197 7.75	152 6.00	16.3 36.0
250 10	273.0 10.750	438 17.25	48.5 107.0	216 8.50	25.9 57.0	229 9.00	165 6.50	30.8 70.0
300 12	323.9 12.750	521 20.50	71.5 157.3	254 10.00	40.8 90.0	254 10.00	178 7.00	36.3 80.0

MATERIAL SPECIFICATIONS

- **Fitting body:**
  Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).

- **Surface Finish:**
  Orange color painted or red RAL3000 color painted.
  - ☐ Hot dip galvanized (Option).
  - ☐ Epoxy coated in red RAL3000 or other colors (Option)

Job Name:	System No.	Location:
Contractor:	Approved:	Date:
Engineer:	Approved:	Date:

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General Notes:

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- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

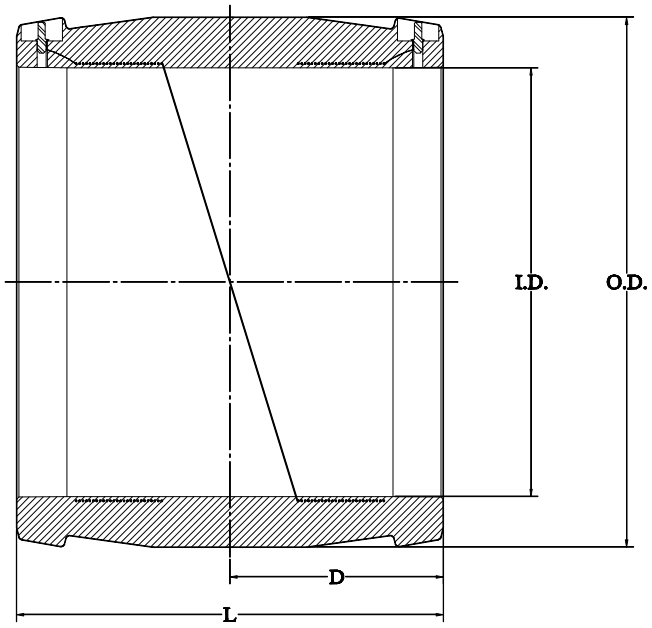
FULL COUPLINGS

ELECTROFUSION FITTINGS

LARGE DIAMETER IPS SDR 17

FOR REFERENCE ONLY

PLOW-IN STYLE SINGLE COIL



NOMINAL SIZE	INSIDE DIA. (MAXIMUM) I.D.	INSIDE DIA. (MINIMUM) I.D.	OUTSIDE DIA. (NOMINAL) O.D.	STAB DEPTH (NOMINAL) D	OVERALL LENGTH (NOMINAL) L
14"IPS	14.010	13.980	16.22	6.42	12.84
	355.85 mm	355.09 mm	412.0 mm	163.1 mm	326.1 mm

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 04/05/2011

WILLIAMS ENGINEERING CANADA

FALCON

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray EIT, Williams Engir

Date: 04/05/2011

W Series

Medium Duty, Grade 2 Cylindrical Lever and Knob Locks

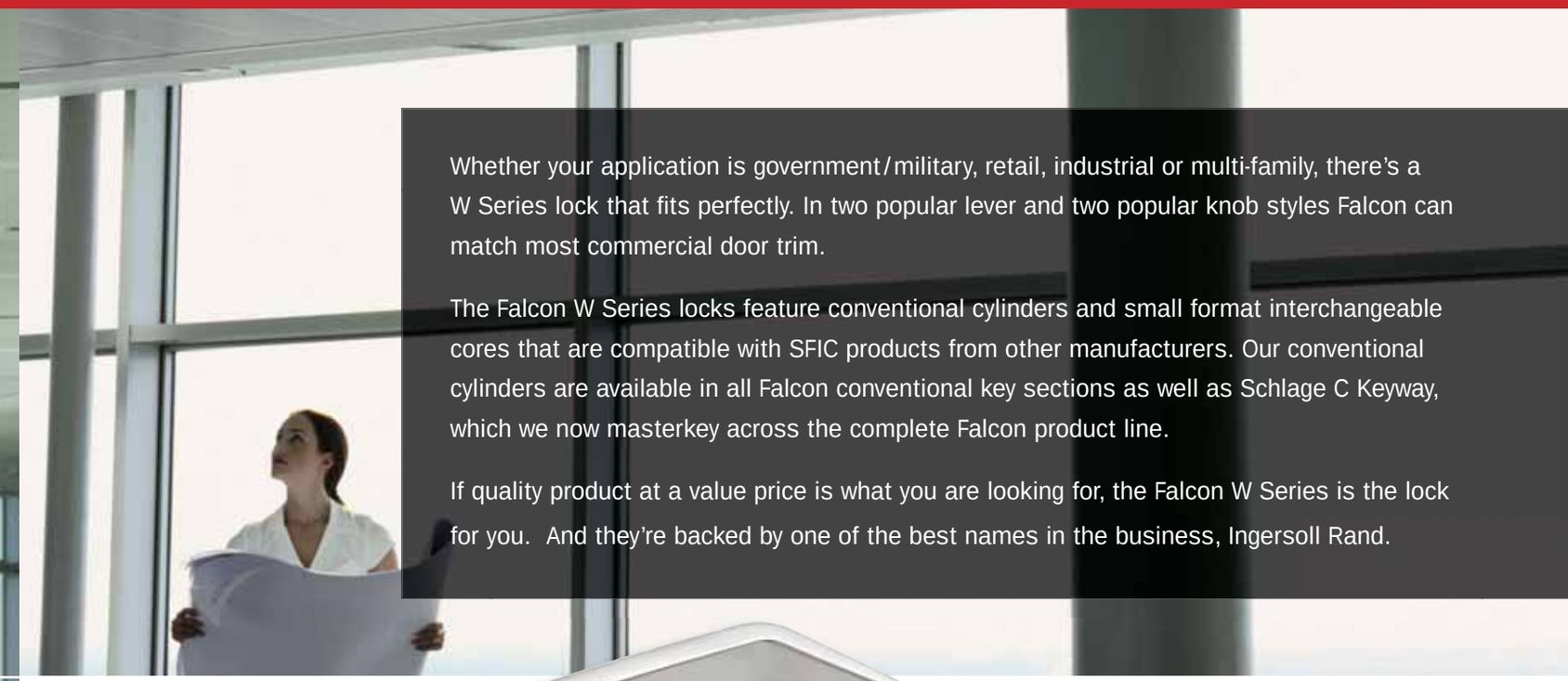
THE FALCON DIFFERENCE

SECURITY AND UNCOMPROMISING VALUE

At Falcon, we know that every product you specify not only has to meet local building codes, but also your expectations for performance and quality. We take your expectations seriously, and that's why we build our locks to deliver durability, convenience and unmatched value.

After all, we've built our reputation on the same standards that you have – providing quality products at a reasonable price delivered on time. It's the way we do business and it's what makes Falcon locks a powerful choice no matter what your project.

FALCON W SERIES



Whether your application is government/military, retail, industrial or multi-family, there's a W Series lock that fits perfectly. In two popular lever and two popular knob styles Falcon can match most commercial door trim.

The Falcon W Series locks feature conventional cylinders and small format interchangeable cores that are compatible with SFIC products from other manufacturers. Our conventional cylinders are available in all Falcon conventional key sections as well as Schlage C Keyway, which we now masterkey across the complete Falcon product line.

If quality product at a value price is what you are looking for, the Falcon W Series is the lock for you. And they're backed by one of the best names in the business, Ingersoll Rand.

FEATURES

- **Stainless steel latch bolt**
- **UL listed latch standard**
- **Wrought brass or bronze roses over steel through-bolted rose inserts**
- **Conventional cylinders or interchangeable core keying compatible with SFIC products from Falcon or other manufacturers**
- **Non-handed levers for easy field installation**
- **Solid, pressure-cast zinc levers**

LEVERS

Levers are solid pressure-cast zinc, finished to match mating parts. Roses are wrought brass or bronze installed over steel through-bolted rose inserts. A spring-loaded retainer secures levers. Secure side retainer cannot be depressed without a key that operates the lock.

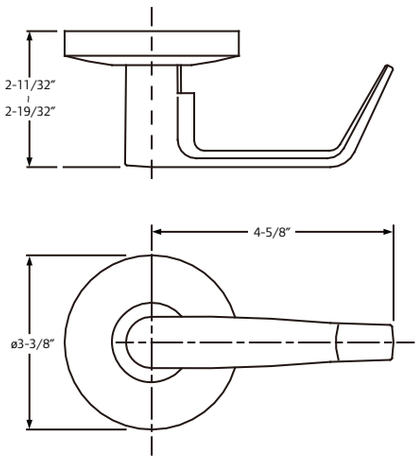
Small Format Interchangeable Core (SFIC)
Dane shown

Thumbturn (interior)
Quantum shown

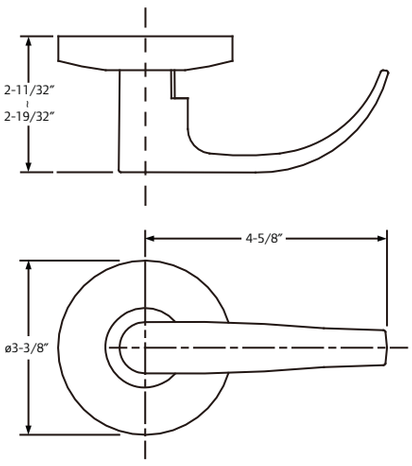
Plain
Dane shown

Conventional Cylinder
Quantum shown

Dane



Quantum



Abrasive Lever Options

All levers are available with an abrasive strip along the length of the lever to identify entrances to areas hazardous to the disabled. To order add 6 (for example, 6DA for Dane lever or 6QU for Quantum lever) to the order number.

Catalog Number		Description	ANSI Number and Grade
W101		**Passage Latchset** Latch bolt by levers at all times.	F75
W161		**Communicating/Exit Latch** Deadlocking latch bolt by inside lever. Non-removable blank plate outside. Inside lever is always free.	
W201		**Patio Lock** Deadlocking latch bolt by levers. Outside lever is locked by push button from inside. Rotating inside lever or closing door releases button and unlocks outside lever.	F77
W301		**Privacy Lock** Latch bolt by levers. Outside lever is locked by push button on inside lever. Rotating inside lever or closing door releases push button and frees outside lever. Inside lever is always free. Emergency release in outside lever unlocks door.	F76
W501		**Entry Lock** Push button locking. Button on inside locks outside lever until unlocked by key or by rotating inside lever. Closing door release push button and unlocks door. Inside lever always free. Deadlock latchbolt.	F82
W511		**Entry/Office Lock** Deadlocking latch bolt by levers. Turn/push button locking. Pushing and turning button locks outside lever, requiring use of a key for unlocking the door until button is manually unlocked. Pushing button locks outside lever until unlocked by key or by rotating inside lever. Inside lever is always free.	F109
W561		**Classroom Lock** Deadlocking latch bolt by levers. Outside lever is locked by key in outside lever. Inside lever is always free.	F84
W581		**Storeroom Lock** Deadlocking latch bolt by lever inside or key outside. Outside lever is always locked. Inside lever is always free.	F86
W711		**Apartment Entrance Lock** Deadlocking latch bolt by levers. Turn/push button locking. Pushing and turning button locks outside lever, requiring use of a key for unlocking the door until button is manually unlocked. Pushing button locks outside lever until unlocked by key, by rotating inside lever, or by closing the door. Inside lever is always free.	
W12		**Single Dummy Trim** Single trim, surface-mounted rigid lever.	

KNOBS

Knobs are constructed of brass or cold-formed steel and are zinc-plated and dichromated for rust resistance. Springs are stainless steel. Roses are heavy-wrought brass or bronze, installed over wrought steel reinforcing plates. Knobs are brass or bronze, secured by a steel knob retainer, which cannot be depressed when lock has been locked.

Cointurn
Elite shown

Cylinder
Elite shown

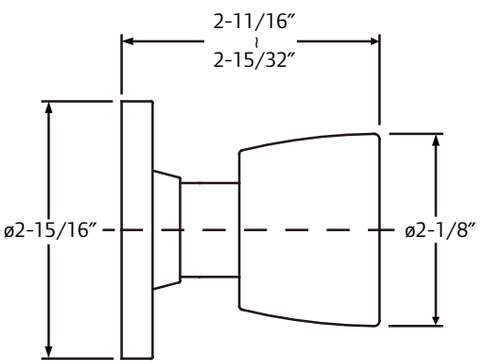
Interchangeable Core
Elite shown

Plain
Hana shown

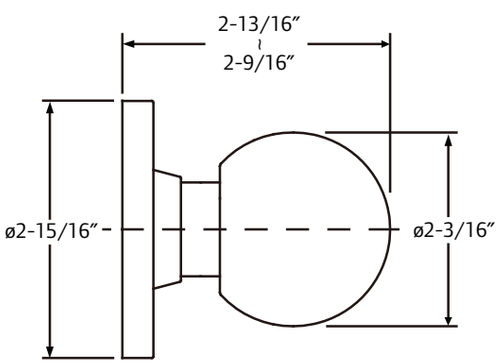
Pushbutton (interior)
Hana shown

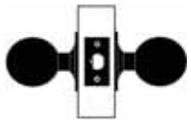
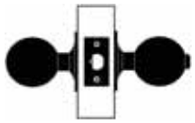
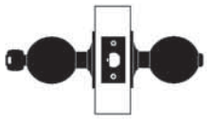
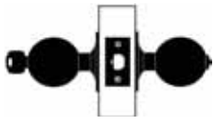
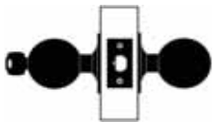
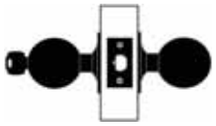
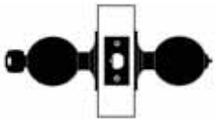
Thumbturn (interior)
Hana shown

Elite



Hana



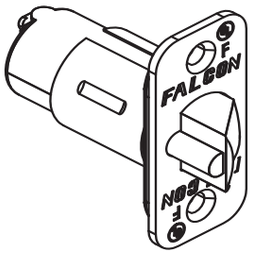
Catalog Number		Description	ANSI Number and Grade
W101		**Passage Latchset** Latch bolt by knob at all times.	F75
W301		**Privacy Lock** Latch bolt by knobs. Outside knob is locked by push button on inside knob. Rotating inside knob or closing door releases push button and frees outside knob. Inside knob is always free. Emergency release in outside knob unlocks door.	F76
W501		**Entry Lock** Push button locking. Button on inside locks outside knob until unlocked by key or by rotating inside knob.	F82
W511		**Entry/Office Lock** Deadlocking latch bolt by knobs. Turn/push button locking. Pushing and turning button locks outside knob, requiring use of a key for unlocking the door until the button is manually unlocked. Pushing button locks outside knob until unlocked by key or by rotating inside knob. Inside knob is always free.	F109
W561		**Classroom Lock** Deadlocking latch bolt by knobs. Outside knob is locked by key in outside knob. Inside knob is always free.	F84
W581		**Storeroom Lock** Deadlocking latch bolt by knobs. Outside knob is always locked. Inside knob is always free.	F86
W711		**Apartment Entrance Lock** Deadlocking latch bolt by knobs. Turn/push button locking. Pushing and turning button locks outside knob, requiring use of a key for unlocking the door until the button is manually unlocked. Pushing button locks outside knob until unlocked by key, by rotating inside knob, or by closing the door. Inside knob is always free.	
W12		**Single Dummy Trim** Single trim, surface-mounted rigid knob.	

LATCHES AND STRIKES

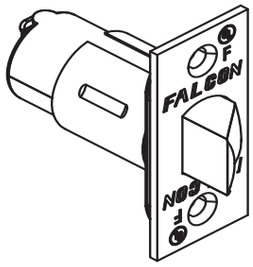
LATCHES

” Projection, UL Listed, Stainless Steel Bolt

- Latches for W Series locks are 3-hour UL listed.
- 2-3/4” backset standard.
- 2-3/8” backset optional.
- Unless otherwise specified we furnish a 1” x 2-1/4” square corner faceplate on 2-3/8” backset latches, and a 1-1/8” x 2-1/4” square corner faceplate on 2-3/4” backset latches.



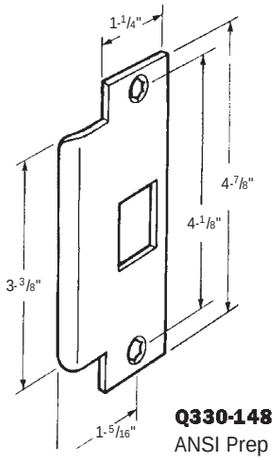
1/4” Radius Corner
1/2” Projection



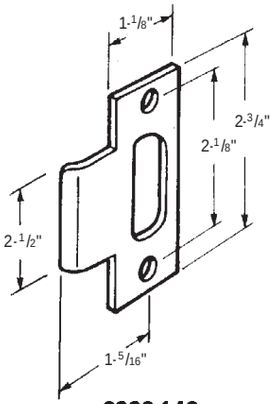
Square Corner
1/2” Projection

Catalog Number	Description (functions)	Faceplate Size	Corner
Q330-192	2-3/4” Backset Dead Locking (201, 711, 501)	1” x 2-1/4”	Square
Q330-193	2-3/4” Backset Dead Locking (201, 711, 501)	1” x 2-1/4”	Radius
Q330-194	2-3/4” Backset Dead Locking (201, 711, 501)	1-1/8” x 2-1/4”	Square
Q330-195	2-3/4” Backset Dead Locking	1” x 2-1/4”	Square
Q330-196	2-3/4” Backset Dead Locking	1” x 2-1/4”	Radius
Q330-197	2-3/4” Backset Dead Locking	1-1/8” x 2-1/4”	Square
Q330-198	2-3/8” Backset Dead Locking (201, 711, 501)	1” x 2-1/4”	Square
Q330-199	2-3/8” Backset Dead Locking (201, 711, 501)	1” x 2-1/4”	Radius
Q330-200	2-3/8” Backset Dead Locking (201, 711, 501)	1-1/8” x 2-1/4”	Square
Q330-201	2-3/8” Backset Dead Locking	1” x 2-1/4”	Square
Q330-202	2-3/8” Backset Dead Locking	1” x 2-1/4”	Radius
Q330-203	2-3/8” Backset Dead Locking	1-1/8” x 2-1/4”	Square
Q330-204	2-3/4” Backset Spring Latch	1” x 2-1/4”	Square
Q330-205	2-3/4” Backset Spring Latch	1” x 2-1/4”	Radius
Q330-206	2-3/4” Backset Spring Latch	1-1/8” x 2-1/4”	Square
Q330-207	2-3/8” Backset Spring Latch	1” x 2-1/4”	Square
Q330-208	2-3/8” Backset Spring Latch	1” x 2-1/4”	Radius
Q330-209	2-3/8” Backset Spring Latch	1-1/8” x 2-1/4”	Square

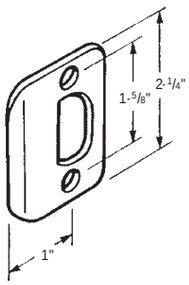
STRIKES



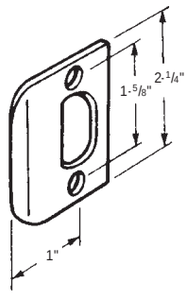
Q330-148
ANSI Prep
A115.2



Q330-149
T Strike
Square Corner



Q330-150
Full Lip, 1/4”
Radius Corner



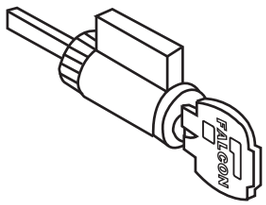
Q330-151
Full Lip,
Square Corner

CYLINDERS AND ACCESSORIES

FALCON STANDARD CYLINDERS

6-Pin

Catalog Number	Description
Q330-154	Falcon (specify keyway)
Q330-155	Falcon (for W561)



Standard Cylinder

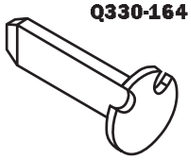
Specify finish: 606 or 626
Specify keyway: G (standard), H, K, L, N, P

STANDARD CYLINDERS WITH OTHER KEYWAYS

6-Pin

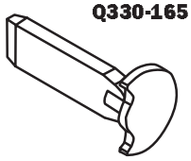
Catalog Number	Description
Q330-152	Schlage C
Q330-153	Schlage C for W561
Q330-166	Corbin 60 (0 bit or KD only)
Q330-167	Corbin 60 (0 or KD only) for W561
Q330-210	Russwin D1 (0 bit or KD only)
Q330-211	Russwin D1 (0 bit or KD only) for W561
Q330-158	Cor/Russ L4 (0 bit or KD only)
Q330-159	Cor/Russ L4 (0 bit or KD only) for W561
Q330-160	Sargent LA (0 bit or KD only)
Q330-161	Sargent LA (0 bit or KD only) for W561
Q330-164	Tailpiece for Q330-154 Falcon and Schlage cylinders (All other functions)
Q330-165	Tailpiece for Q330-155 Falcon and Schlage cylinders (W 561 function only)
Q330-168	Tailpiece for SFIC (All functions)
Q330-156	Yale 8 (0 bit or KD only)
Q330-169	Tailpiece for W Lock knobs — SFIC

Q330-164



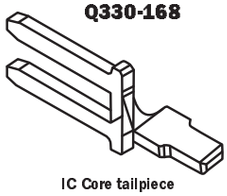
Conventional cylinder tailpiece

Q330-165



Conventional cylinder tailpiece W561

Q330-168

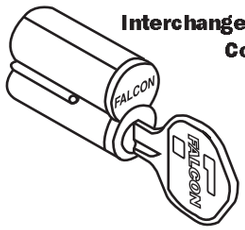


IC Core tailpiece

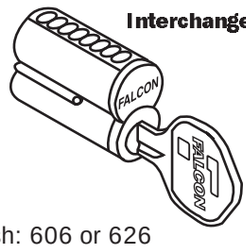
FALCON INTERCHANGEABLE CORE

Catalog Number	Description
C606 (6-pin), C607 (7-pin)	For use in all I/C keyed locks (cover style)
CB806 (6-pin), CB807 (7-pin)	For use in all I/C keyed locks (cap style)

Interchangeable Core Cover Style



Interchangeable Core Cap Style



Specify finish: 606 or 626
Specify keyway: A (standard) or other keyway

CONVERSION CHART

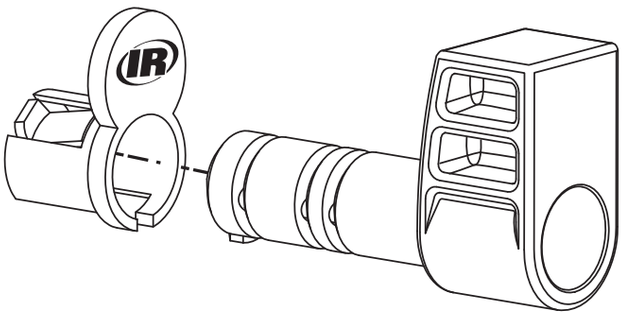
W Series Grade 2 Cylindrical Key-in-Lever

ANSI	Function	FALCON	Arrow	Cal-Royal	Corbin/ Russwin	Dorma	Hager	Marks	Best
C75	Passage	W101	RL01	SL-30	CL3810	CL710	3510	N	7KN
	Comm/Exit	W161	RL03	SL-50	-	CL725	3525	DC	-
F77	Patio	W201	RL04	-	CL3840	CL730	-	P	-
F76	Privacy	W301	RL02	SL-20	CL3820	CL740	3540	L	7KL
F109	Entry/Office	W511	RL11		CL3851	CL753	3553	AB	7KAB
F84	Classroom	W561	RL17	SL-03	CL3855	CL770	3570	S	7KR
F86	Storeroom	W581	RL12	SL-05	CL3851	CL780	3580	F	7KD
	Apt. Entry	W711	-	-	-	-	-	-	-
	Dummy Single	W12	RL08	SL-40	CL3850	CL701	3517	DO	7KIOT
F82	Entry	W501	-	SL-00	CL3861	CL750	-	B	

Trim Syles	FALCON	Arrow	Cal-Royal	Corbin/ Russwin	Dorma	Hager	Marks	S. Parker
	DANe	SR	SL	N2D	LR	Withnell	170	SL
	QUAntum	BRR	RL	PZD	LC	Archer	270	-

CONSTRUCTION KEYING

Falcon offers two different construction key systems depending on the size of and application within the project. Both systems permit the installation and use of regular door locks during construction, yet completely preserve the security of the keying system for the building owner. The Master, Grand Master and change keys are never with the locks during the construction phase of a building. Only the "construction" keys are sent to the jobsite. Where the job permits we will use the "Lost Pin" system as our standard system for construction keying. Larger or more complicated jobs may require use of the "Blockokey® System" for construction keying.



"DISPOSABLE CONSTRUCTION" INTERCHANGEABLE CORES

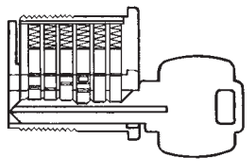
The disposable construction core (1408) is an inexpensive alternative to interior keyed construction cores. This core should be used on interior door applications or where security on a site is not a concern. No keys need to be issued. The disposable core is inserted in the lever or knob, and is operated by a thumbturn, which retracts the latch bolt. Use either brass or permanent construction cores on exterior doors or secured areas when security is needed.

LOCKS WITH THE "LOST PIN" SYSTEM

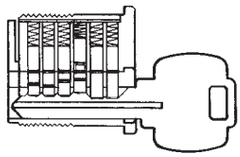
Our "lost pin" construction system consists of one construction pin and a shallow hole in the side of the plug.

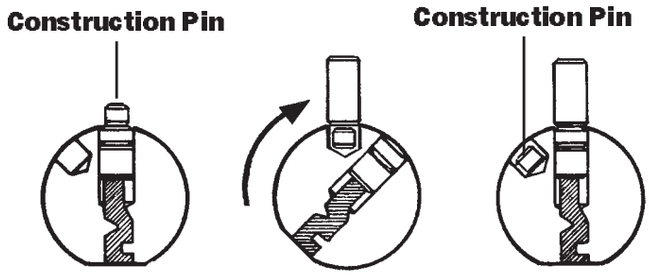
All lock cylinders on a specific project are operable by a special "project key." The building contractor may assign all duplicates of this key to workers and subcontractors as required. No regular change keys or master keys are needed on the job, eliminating the possibility of subsequent exposure from lost or stolen keys.

Construction Key – KB566
With the construction key in use the construction pin is always in the cylinder plug, sitting on top of the bottom pin.



Master Key – KB578
With the master key inserted the construction pin is pushed up into the cylinder housing. Rotating the master key to the right drops the construction pin into the hole in the plug, eliminating any future use of the construction key.

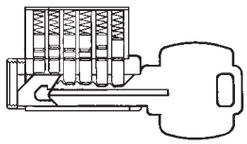




HOW BLOCKOKEY CYLINDERS ARE USED

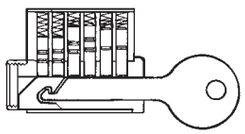
1. Project Key – KB531

Operation of the lock cylinder is by the special “project key.” The last two pins in the cylinder are inoperative because of the “key block” mechanism.



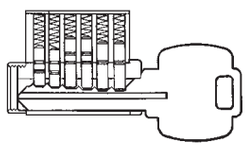
2. Removal Tool – KB536

The “project key” no longer operates the cylinder when the “key block” mechanism is removed. A key block removal tool comes with the master keys for the locks. Push the removal tool into the keyway and then withdraw it to remove the block. Thereafter the project key will no longer operate the lock cylinder.



3. Change or Master Keys – KB578

Cylinder is now only operable by the regular change key or master key.



HOW TO ORDER LOCKS WITH BLOCKOKEY SYSTEM

Blockokey locksets are ordered by adding the word “Blockokey” after the balance of the ordering information and are only available in Falcon keyways.

For example: 72 W511PD DAN 626 RH 30-209 30-149 1AA-72AA (Blockokey)

FEATURES AND SPECIFICATIONS

Door Thickness: 1-3/8" to 1-3/4" standard.

Backset: 2-3/4" standard; 2-3/8" also available.

Mechanism: Parts constructed of brass or cold-formed steel, zinc plated and dichromated for rust resistance. Springs are stainless steel.

Attachment: Lock chassis secured to door by two screws which pass through a steel rose insert inside and thread directly into the outer rose-mounting assembly, and two screws that screw into the chassis assembly.

Handing: Locks are non-handed.

Cylinder: Pinning in six chambers. Cylinder assemblies removable to re-key. Also available with 6- or 7-pin interchangeable core cylinders. Cylinder housings and plugs machined from solid brass. Springs are stainless steel. Two nickel silver keys furnished standard.

Competitor Cylinder: The W Series accepts standard 6-pin cylinders available from Falcon, as well as Schlage, Corbin-Russwin, Yale and Sargent.

Keyways: "G" keyway standard on Falcon standard cylinders. "A" keyway standard on I/C core cylinders. Also available with some optional keyways. Schlage "C" keyway also available on standard cylinders, includes master key. Master keying available on all Falcon and Schlage "C" keyways.

Trim: Roses are heavy wrought brass or bronze, installed over steel rose inserts which are through-bolted through door. Levers are pressure-cast zinc (solid levers-no-inserts) finished to match mating parts.

Latches: 1/2" bolt projection made of stainless steel and UL listed for 3-hour door assemblies. Latches have self-adjusting fronts to accommodate beveled or flat doors. 2-3/8" backset with 1" x 2-1/4" latch faces or 2-3/4" backset with 1-1/8" x 2-1/4" latch faces.

Strikes: 4-7/8" x 1-1/4" ANSI strike with curved lip to meet ANSI A115.2 door frame preparation standard. Consult Options and Accessories section for other available strikes, sizes and configurations.

Screws: Furnished with combination screws for use in wood or metal doors and frames.

ANSI/BHMA: Meets ANSI/BHMA A156.2, Series 4000, Grade 2.

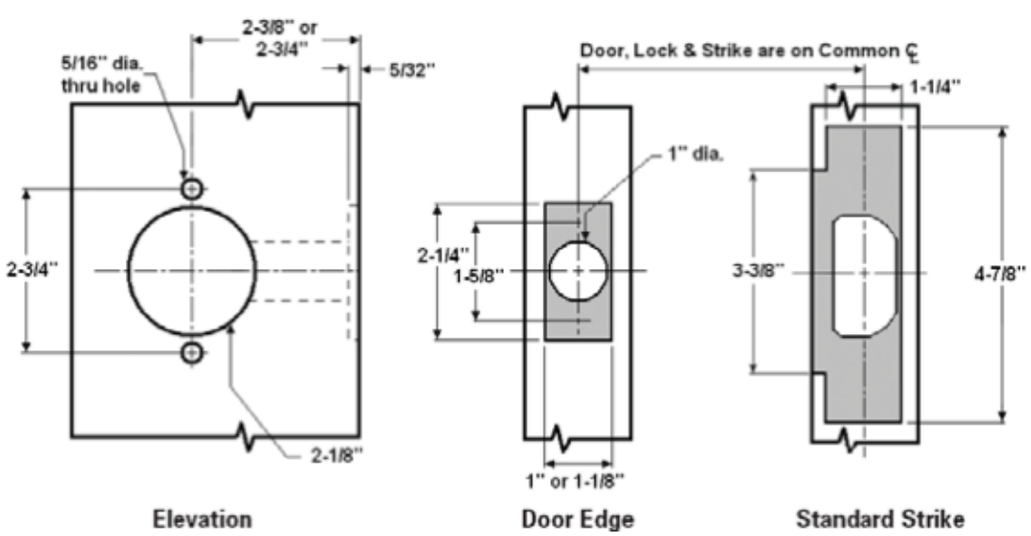
UL: 3-hour A label.

SPECIFICATIONS

Key-in-lever cylindrical locksets shall be Falcon W Series or equal, and meet the following requirements:

- All locks shall meet ANSI/BHMA A156.2, Series 4000, Grade 2 test requirements for key-in-lever locksets.
- Locksets shall be UL listed 3 hour A Label.
- Lever trim shall have individual heavy-duty springs for lever return and to prevent lever sag. Trim shall be through-bolted.
- All lever designs shall be solid (no inserts) and meet the federal ADA and state disability requirements.
- Locksets shall adjust to fit door thickness from 1-3/8" to 1-3/4".
- All locksets shall be non-handed and shall not require field disassembly for re-handing.
- Preparation for door must be non-handed.
- Acceptable manufacturer: Falcon Lock

DOOR TEMPLATING



HOW TO ORDER

For correct ordering and to ensure no delays in shipment of your order, the following descriptive data must be listed in the sequence shown. Necessary information can be found in other parts of this catalog. The example to the right shows an order for 12 each W locksets in the 581 storeroom function, QUA (Quantum) trim design in a 626 (satin chrome) finish, with a 2-3/4" backset latch, to accommodate doors 1-3/4" thick.

Quantity: Indicate the quantity required.

Catalog number: Select function number, cylinder type and latch style from tables in this section.

Trim design: Indicate letter of lever design. DAN = Dane; QUA = Quantum; ELI = Elite; HAN = Hana. Outside design always proceeds inside design on split designs. If adding an abrasive lever option, add 6 to design code (example 6DAN).

Finish: When the finish is the same for the outside and inside trim it is shown once (ex.: 626). Outside finish always precedes inside finish on split finishes (ex.: 605 x 625).

Latches: 2-3/4" backset standard. 2-3/8" backset available. All latches are UL listed 3-hour A label.

Strikes: 4-7/8" x 1-1/4" ANSI strike standard. Optional T strike or Full Lip strikes available. See page 8.

Cylinder type: 6-pin.

Keying Detail: We suggest using standard terms developed by DHI (Door & Hardware Institute) or ALOA (Associated Locksmiths of America). Example: AA1-Grand Master keyed, Master keyed, change key 1.

Interchangeable core: To order product capable of accepting an interchangeable core, add suffices from the keying table to the function number, preceding the latch style. Example: W511HD will be supplied with SFIC keyed construction core.

Keyways: "G" is standard on regular cylinders. "A" is standard on interchangeable cores. Other keyways available. See page 9.

Additional keys: Note the total number of keys required.
Large bow keys: Add "with large bow keys" under additional details.

SAMPLE ORDER

Line Item	QTY	Product	Outside		Inside		Hand	Latch	Strike	Door Thickness	EXT	DIM	Additional Details/Keying
			DES	FIN	DES	FIN							
1	12	W581D	QUA	626			RHR	30-197	30-149	13/4			

EXAMPLE: Twelve W Series storeroom function locks with a Quantum lever in 626, 2-¾" backset latch, T-strike, to accommodate doors 1-¾" thick.

FINISHES

* All finishes available in all trim.

Bright Brass
605

Satin Brass
606

Oil Rubbed
Bronze
613

Bright Chrome
625

Satin Chrome
626

Although we apply the finest available protective plating and/or clear coating to the surface of our products, these finishes have limitations and, in time, may deteriorate from exposure to weather, pollution, perspiration, extremes of climate, frequency of use or other factors. Deterioration of finishes is, therefore, not a defect, but a normal process that is unavoidable. Falcon Lock cannot accept responsibility for finish deterioration under these circumstances; therefore, finishes cannot be guaranteed. These products will not be refinished or replaced under our warranty should deterioration of finish occur.

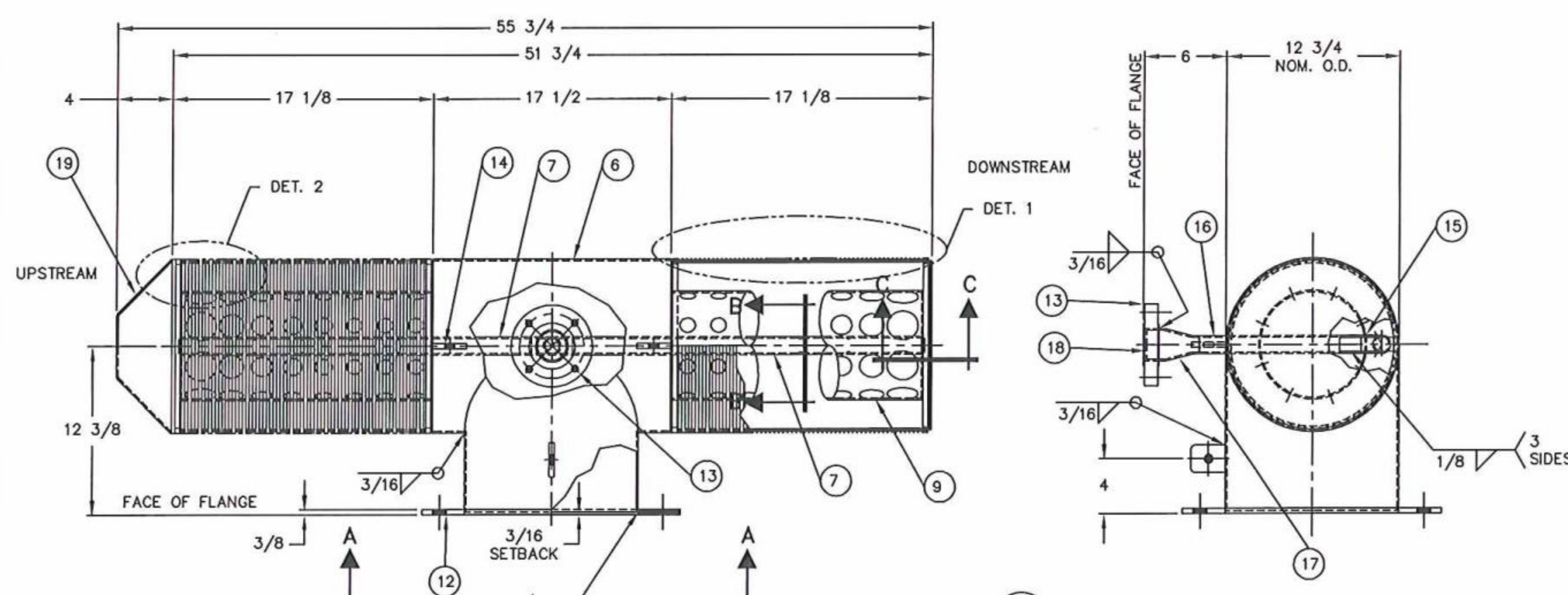
Ingersoll Rand
Security Technologies

Ingersoll Rand's Security Technologies Sector is a leading global provider of products and services that make environments safe, secure and productive. The sector's market-leading products include electronic and biometric access-control systems; time-and-attendance and personnel scheduling systems; mechanical locks; portable security; door closers, exit devices, architectural hardware, and steel doors and frames; and other technologies and services for global security markets.

800-266-4456 www.falcon.ingersollrand.com www.ingersollrand.com

BILL OF MATERIAL

ITEM	QTY.	DESCRIPTION	MAT'L.	REMARKS
001	2	T-INTAKE SCREEN ASSEMBLY (EA. CONSISTING OF)		
1	AS REQ'D.	HENDRICK WIRE #69S	316 SS	
2	72	HOUSE SUPPORT #130Q X LGTH. CUT TO FIT		
3	4	WELD RING 3/8 SQ. X 12.587 O.D.		
4	2	END PLATE 1/4 X 12 3/8 DIA.		
5	2	DIST. PLATE 1/8 X 7 3/4 I.D. X 12 15/32 O.D.		
6	ONE	TEE 12.587 O.D. X 17 1/2 RUN X 12 3/4 O.D. BRANCH X 1/4 WALL THICKNESS		10-176-3
7	2	AIR BURST PIPE 1" NOM. DIA. SCH10S		
8	2	END CAP 1/4 X 1 5/16 DIA.		
9	2	CORE TUBE 8 O.D. X 1/8 WALL THICKNESS		10-176-2
10	2	END CAP 1/4 X 7 3/4 DIA.		
11	ONE	BAR 1/8 X 1 X 4 LG.		
12	ONE	PLATE FLANGE AWWA BOLT PATTERN 3/8 THK.		
13	ONE	FLANGE RFSO 2" NOM. PIPE DIA. ANSI 150#		
14	3	LIFTING LUG 3/8 X 2 X 2 1/2		01-30-1
15	ONE	TEE 1" NOM. DIA. SCH 10S		
16	AS REQ'D.	PIPE 1" NOM. DIA. X LGHT. AS REQ'D. SCH 10S		
17	ONE	REDUCER 2 X 1" SCH 10S		
18	AS REQ'D.	PIPE 2" NOM. DIA. X LGHT. AS REQ'D. SCH 10S		
19	ONE	DEBRIS DEFLECTOR	316 SS	DWG. 01-95-4



(001) T-INTAKE SCREEN ASSEMBLY – 2 REQ'D.

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

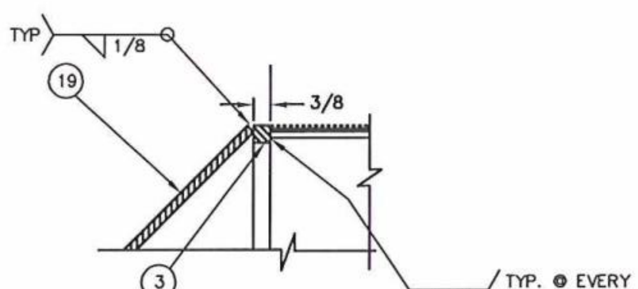
Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray EIT, Williams Engir

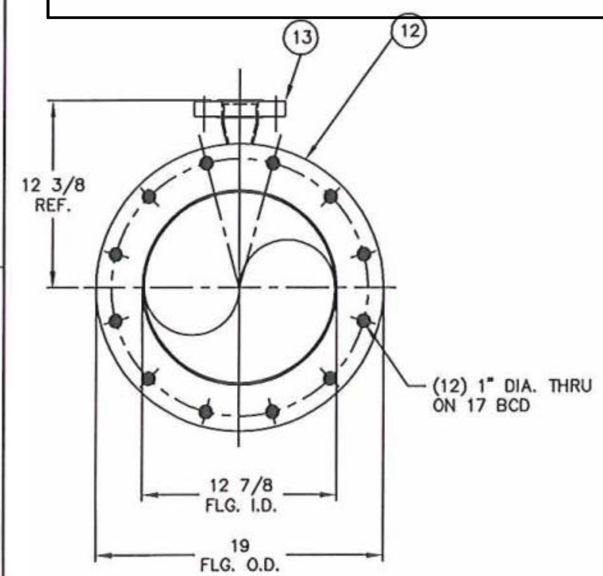
Date: 04/11/2010



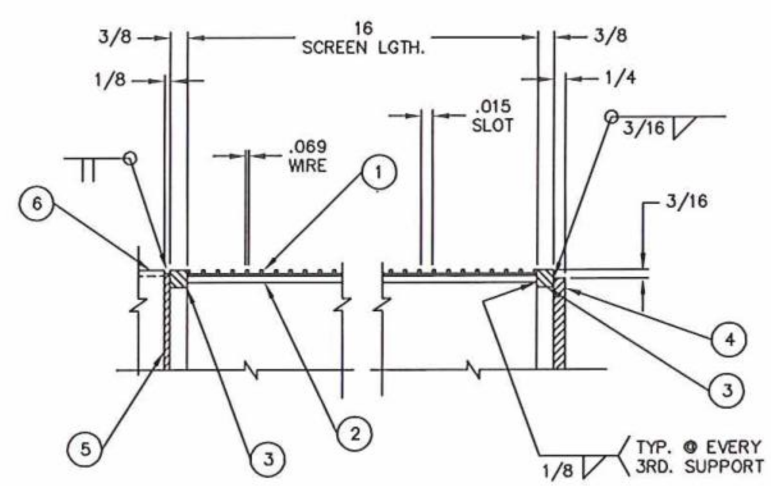
DET. 2

NOTE:

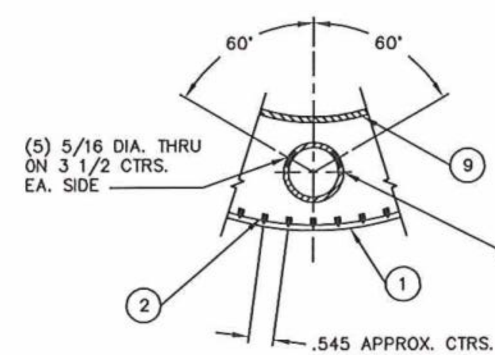
1. REMOVE ALL BURRS AND SHARP EDGES.
2. OPEN AREA = 18 %
3. DESIGN PRESSURE = 10 PSI OR 23 FT. WATER
4. FLOW = 220 GPM
5. EST. WT. 175#



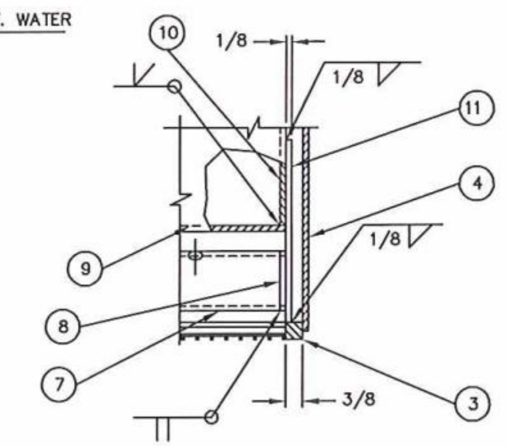
VIEW A–A



DET. 1



SECT. B–B



SECT. C–C

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

DRAWING STATUS

FOR APPROVAL ONLY

HENDRICK SHOP ORDER # 05596

DIMENSIONAL TOLERANCES (FLAT & CURVED PANELS) — FRACTIONAL: UNDER 60" +OR- 1/8", 60" TO 120" +OR- 3/16", OVER 120" +OR- 1/4"; DECIMAL: 2 PLACES +OR- .000", 3 PLACES +OR- .010"; DIAGONAL: SHALL BE EQUAL WITHIN 1/8" UP TO 36", 3/16" OVER 36" THRU 72", 1/4" OVER 72"; FLATNESS: SCREENS TO BE FLAT WITHIN 1/8" ALL PLANES

DIMENSIONAL TOLERANCES (CYLINDERS) — FRACTIONAL: UNDER 60" +OR- 1/8", 60" TO 120" +OR- 3/16", OVER 120" +OR- 1/4"; DECIMAL: 2 PLACES +OR- .000", 3 PLACES +OR- .010"; DIAMETER: 24" AND UNDER +OR- 1/8", OVER 24" TO 48" +OR- 1/4", OVER 48" +OR- 3/8"; CYLINDER ENDS SHALL BE CUT SQUARE WITHIN 1/8"

ZONE	REV	DESCRIPTION	BY/DATE	APPV'D
		REVISIONS		

DRAWN BY: DTB	DATE: 09/27/10	HENDRICK SCREEN	OWENSBORO, KENTUCKY
APP'D.: JW	DATE: 9/29/10	TITLE: B. A. ROBINSON Co. LTD T-INTAKE SCREEN 12 O.D. ASSEMBLY & DETAILS	
MATERIAL: 316 S.S.			
DESIGN No.			
SCALE: NTS		DRAWING No.: 10-176-1	SHT. 1 OF 1 REV. 0

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES					APPROX. SHIP WT.
					A	B	C	D	E	
150S20-1	A	2	4"	3" NPT	27.3	13.6	13.7	3.75	5.2	55
150S50-2	A	5	4"	3" NPT	41.1	23.6	17.5	3.75	5.2	75
150S75-3	A	7 1/2	4"	3" NPT	50.9	29.6	21.3	3.75	5.2	92
150S75-4	A	7 1/2	4"	3" NPT	54.7	29.6	25.1	3.75	5.2	97
150S100-5	A	10	4"	3" NPT	72.8	43.9	28.9	3.75	5.2	151
150S75-4	A	7 1/2	6"	3" NPT	49.9	24.2	25.7	5.38	5.6	135
150S100-5	A	10	6"	3" NPT	54.9	25.4	29.5	5.38	5.6	148
150S150-6	A	15	6"	3" NPT	61.3	28.0	33.3	5.38	5.6	167
150S150-7	A	15	6"	3" NPT	65.0	28.0	37.0	5.38	5.6	169
150S150-8	A	15	6"	3" NPT	68.8	28.0	40.8	5.38	5.6	174
150S200-9	A	20	6"	3" NPT	75.2	30.6	44.6	5.38	5.6	191
150S200-10	A	20	6"	3" NPT	79.0	30.6	48.4	5.38	5.6	193
150S200-11	A	20	6"	3" NPT	82.8	30.6	52.2	5.38	5.6	198
150S250-12	A	25	6"	3" NPT	89.0	33.1	55.9	5.38	5.6	235
150S250-13	A	25	6"	3" NPT	92.8	33.1	59.7	5.38	5.6	238
150S250-14	A	25	6"	3" NPT	96.6	33.1	63.5	5.38	5.6	242
150S300-15	A	30	6"	3" NPT	103.0	35.7	67.3	5.38	5.6	260
150S300-16	A	30	6"	3" NPT	106.8	35.7	71.1	5.38	5.6	262
150S300-17	A	30	6"	3" NPT	110.5	35.7	74.8	5.38	5.6	266
150S400-18	A	40	6"	3" NPT	119.4	40.8	78.6	5.38	5.6	306
150S400-19	A	40	6"	3" NPT	123.2	40.8	82.4	5.38	5.6	308
150S400-20	A	40	6"	3" NPT	127.0	40.8	86.2	5.38	5.6	323
150S400-21	A	40	6"	3" NPT	130.8	40.8	90.0	5.38	5.7	334
150S400-22	A	40	6"	3" NPT	134.5	40.8	93.7	5.38	5.7	338
150S400-23	A	40	6"	3" NPT	138.3	40.8	97.5	5.38	5.7	340
150S500-24	A	50	6"	3" NPT	162.2	57.8	104.4	5.38	6.1	442
150S500-25	A	50	6"	3" NPT	166.0	57.8	108.2	5.38	6.1	444
150S500-26	A	50	6"	3" NPT	169.8	57.8	112.0	5.38	6.1	446
150S500-27	A	50	6"	3" NPT	173.6	57.8	115.8	5.38	6.1	448
150S500-28	A	50	6"	3" NPT	183.4	63.8	119.6	5.38	7.1	450
150S600-29	A	60	6"	3" NPT	193.7	63.8	129.9	5.38	7.1	448
150S600-31	A	60	6"	3" NPT	201.3	63.8	137.5	5.38	7.1	452
150S600-33	A	60	6"	3" NPT	208.8	63.8	145.0	5.38	7.1	456
150S500-24	A	50	8"	3" NPT	143.2	38.8	104.4	7.50	7.5	492
150S500-25	A	50	8"	3" NPT	147.0	38.8	108.2	7.50	7.5	495
150S500-26	A	50	8"	3" NPT	150.8	38.8	112.0	7.50	7.5	497
150S500-27	A	50	8"	3" NPT	154.6	38.8	115.8	7.50	7.5	499
150S500-28	A	50	8"	3" NPT	158.4	38.8	119.6	7.50	7.5	501
150S600-29*	B	60	8"	3" NPT	169.7	41.8	127.9	7.50	7.5	539
150S600-31*	B	60	8"	3" NPT	177.3	41.8	135.5	7.50	7.5	543
150S600-33*	B	60	8"	3" NPT	184.8	41.8	143.0	7.50	7.5	547
150S750-36*	B	75	8"	3" NPT	201.8	47.4	154.4	7.50	7.5	592
150S750-39*	B	75	8"	3" NPT	213.1	47.4	165.7	7.50	7.5	598

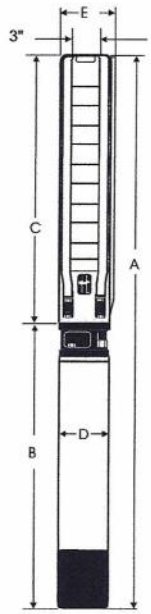


Fig. A

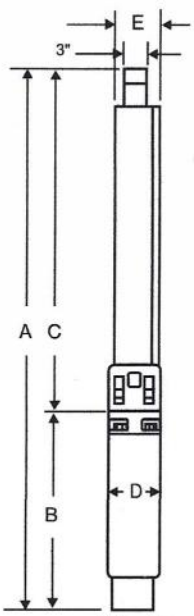


Fig. B

NOTES: All models suitable for use in 6" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
* Built into sleeve 3" NPT discharge, 8" min. well dia.

* C/W 30m FACTORY INSTALLED CORD

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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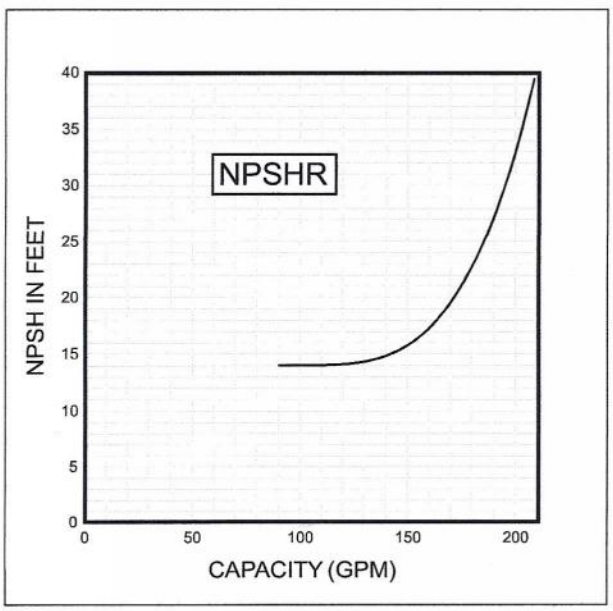
Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir.
Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

MATERIALS OF CONSTRUCTION

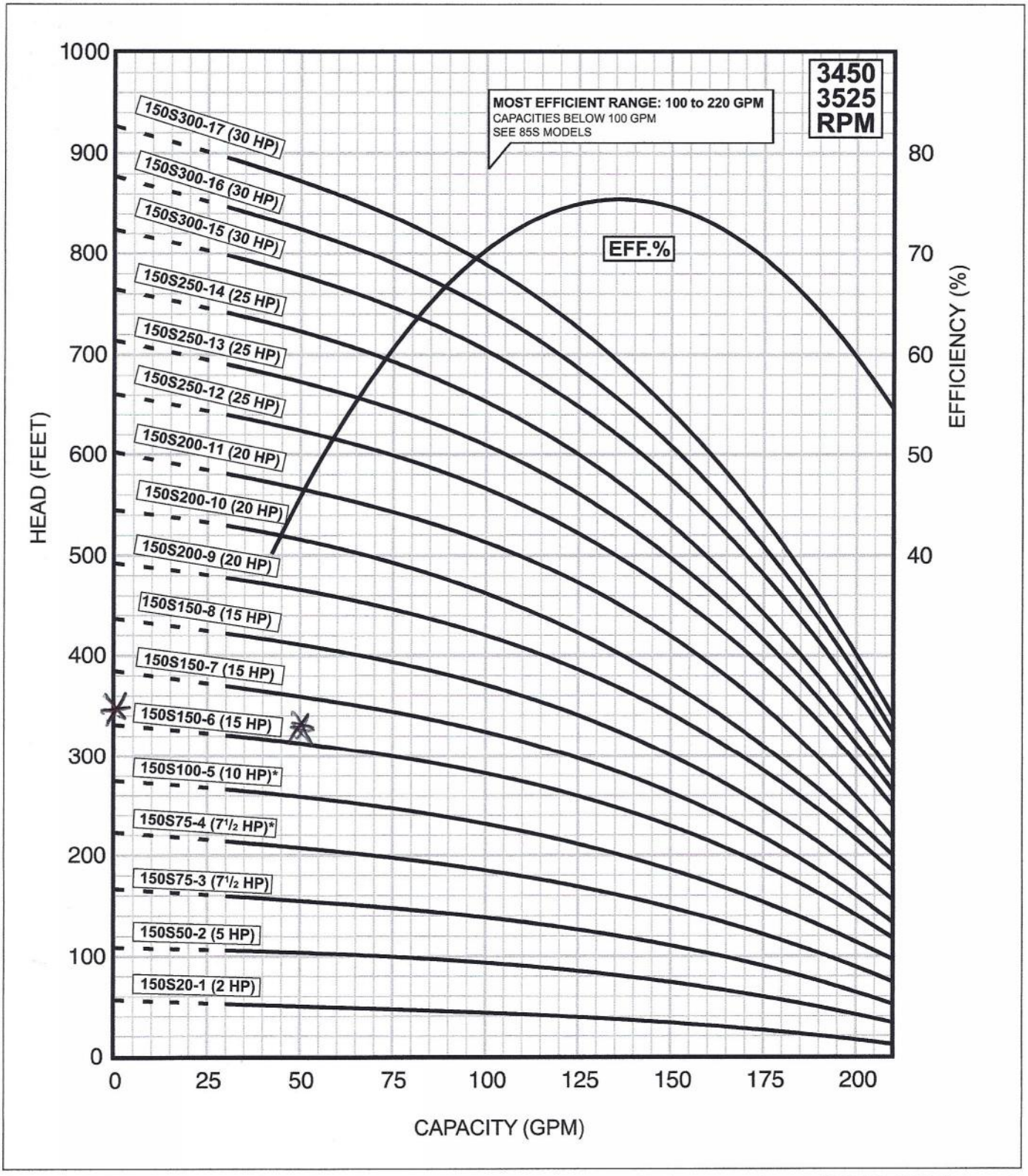
COMPONENT	CYLINDRICAL SHAFT (1-39 Stgs.)
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Seal Ring Support Plate	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Priming Inducer	304 Stainless Steel
Coupling	316/329 Stainless Steel**
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/PPS
Check Valve Seat	NBR/316 Stainless Steel
Top Bearing	NBR/304 Stainless Steel
Upthrust Disc	Carbon/Graphite
Upthrust Stop Washer	304 Stainless Steel
8" Motor Adaptor Plate	304 Stainless Steel
Sleeve*	316 Stainless Steel
Sleeve Flange	304 Stainless Steel

NOTES: Specifications are subject to change without notice.
***Required for 29-39 stage models.**
** 4" Coupling made of 316 Stainless Steel.



PERFORMANCE CURVES 150 GPM MODEL 150S

FLOW RANGE: 30 -220 GPM **OUTLET SIZE: 3" NPT** **NOMINAL DIA. 6"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 2-10 HP/3450 RPM
✱ 6" MOTOR STANDARD, 7.5-60 HP/3450 RPM, ✱
8" MOTOR STANDARD, 75 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 5 feet.

Duratec
AIRLINE SYSTEM

Submittal Data Sheet

Job or Customer:

Engineer:

Contractor:

Submitted by:

Approved by:

Order No:

Specification:

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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Date

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

Date

introduction

Duratec pipe's unique composite structure incorporates a rigid yet flexible aluminum core, permanently bonded to layers of durable high density polyethylene (HDPE) plastic. HDPE on the inner and outer layers provides the best corrosion resistance against aggressive manufacturing environments while eliminating the inner scaling and corrosion associated with traditional metal compressed air pipes. Duratec fittings are supplied in tough nickel plated brass or stainless steel and utilize unique double o-ring seals to ensure long term joint integrity.

Duratec pipe meets the requirements of ASTM F1282 and CSA B137.9, Standards specifications for PE-AL-PE Composite Pressure Pipes. Duratec fittings meet the requirements of ASTM F1974, Standard specification for Metal Insert Fittings for Composite Pressure Pipes and has a national CRN of OA02020.2C. Duratec fittings also meet ASME codes B31.3, B31.9 and are certified to OSHA safety regulations. The Duratec pipe and fitting system is rated for long term continuous operating pressures of 200psi at 73°F and 160psi at 140°F. The minimum allowable operating temperature for Duratec pipe and fittings is -40°F.

Duratec may be used for a wide range of applications including compressed air supply, hand tool operation, valve actuation, robotic installation, bulk inert gas delivery systems, industrial oxygen and CO_2 delivery for carbonated beverage lines.

< STANDARDS >

ASTM F1282
ASTM F1974

CSA B137.9
CSA B51

CRN OA02020.2C

< CODES >

ASME B31.3
ASME B31.9

COMPANION PRODUCTS

Duraplus™ air-line

Duraplus is a pressurized piping system made from high-impact, ductile ABS, and specifically engineered for conveying compressed air and inert gases. Your large diameter compressed air option with sizes available up to 4".

pipe and fitting availability

DURATEC PIPE

Sizes: 3/8", 1/2", 3/4" and 1" diameters
Configurations: 100 ft. and 300 ft. coils

DURATEC NICKEL PLATED FITTINGS

Sizes: 3/8", 1/2", 3/4" and 1"
Configurations: Couplers, Tees, Caps, Elbows, Reducers, Male Thread Adapters, Female Thread Adapters, Copper Solder Adapters

DURATEC NICKEL PLATED VALVES

Sizes: 3/8", 1/2", 3/4" and 1"
Configurations: Duratec x Duratec straight ball valves

DURATEC 316 STAINLESS STEEL FITTINGS

Sizes: 3/8", 1/2", 3/4" and 1"
Configurations: Duratec x Male Thread Straight Adapters

www.ipexinc.com
866 473-9462
Canadian Toll Free

IPEX

DAINDTIP060111

Installation Procedures

Installation:

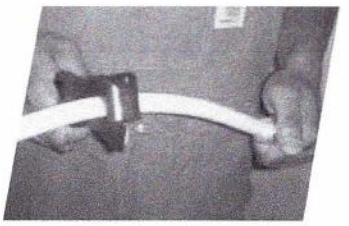
The **Duratec** fitting system is a compression style fitting with a twist. It includes a split ring that tightens down onto the outside of the pipe when the nut is tightened over the joint

Tools Required:

Installation is simple and straight forward. To install **Duratec** Pipe and **Duratec** fittings, you will need the following, Plastic Pipe Cutter, **Duratec** beveling tool, adjustable end wrench(es), Suitable bending spring (optional).

Procedure:

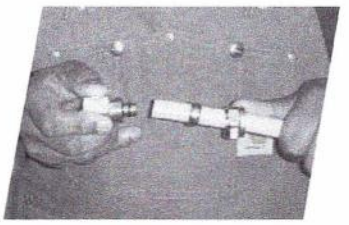
Cutting and Joining **Duratec**



1. Cut the pipe square. A plastic pipe cutter should be used. Ensure that the stainless steel cutting blade being used is in good condition and sharp. **Rotate wrist while cutting**.
2. Remove the nut and the split ring from the fitting.

3. Push the nut and the split ring onto the pipe. Bevel the inside of the pipe by inserting the Duratec reaming tool and **rotating it 360° to engage the blades**. The fitting will then slip easily into the pipe without displacing the o-rings.
4. Push the fitting onto the pipe and fully against the shoulder of the fitting. If necessary, at this point the fitting can be rotated on the pipe to facilitate threading onto a valve, tee, etc.

   Turn the nut finger tight, plus one full turn with a wrench.



5. If it is necessary to remove the fitting, release the nut, remove the split ring and pull the fitting off the pipe. Before reassembling the joint, inspect the split ring and o-rings and replace them if necessary.

Bending Duratec Pipe:

Duratec is easy to bend and unlike plastic pipes, retains it shape when bent. External bending springs and standard tube benders are available. Pipe in dimensions 3/8, 1/2, and 3/4 inch are easily bent by hand. For 1 inch pipe or if the bending radius is near the recommended limit of five (5) times the diameter of the pipe, a bending tool should be used.

Air Testing Procedures

The purpose of a site pressure test is to establish that all joints have been correctly made. Air test in accordance with the authority having jurisdiction.

After making the first 20 or 30 joints, it is recommended that a test be applied to prove that the installation is satisfactory. If a leak is discovered, follow the appropriate procedure below. Testing of **Duratec** systems can take place immediately upon installation, since the joining procedure does not require a curing time.

The pressure testing procedure detailed below should be strictly followed.

1. Fully inspect the installed piping for evidence of mechanical abuse and suspect joints.
2. Split the system into convenient test sections, not exceeding 1,000 feet. The piping should be capped off with a **Duratec** cap at the end of the pipe section to be tested.
3. Test **Duratec** to a maximum of 1.25 times the design operating pressure up to a maximum of 1.0 times the IPEX maximum rated pressure. Duration of testing shall comply with local regulatory measures or alternatively with the engineer designing and inspecting the system.
4. If there is a significant drop in pressure, or extended times are required to achieve the desired pressure, joint leakage has occurred. In this event inspect for joint leaks.
5. If joints are leaking, tighten the nut 1/8 to 1/4 turn.
6. Repeat Step 3 after repairing any leaking joints.

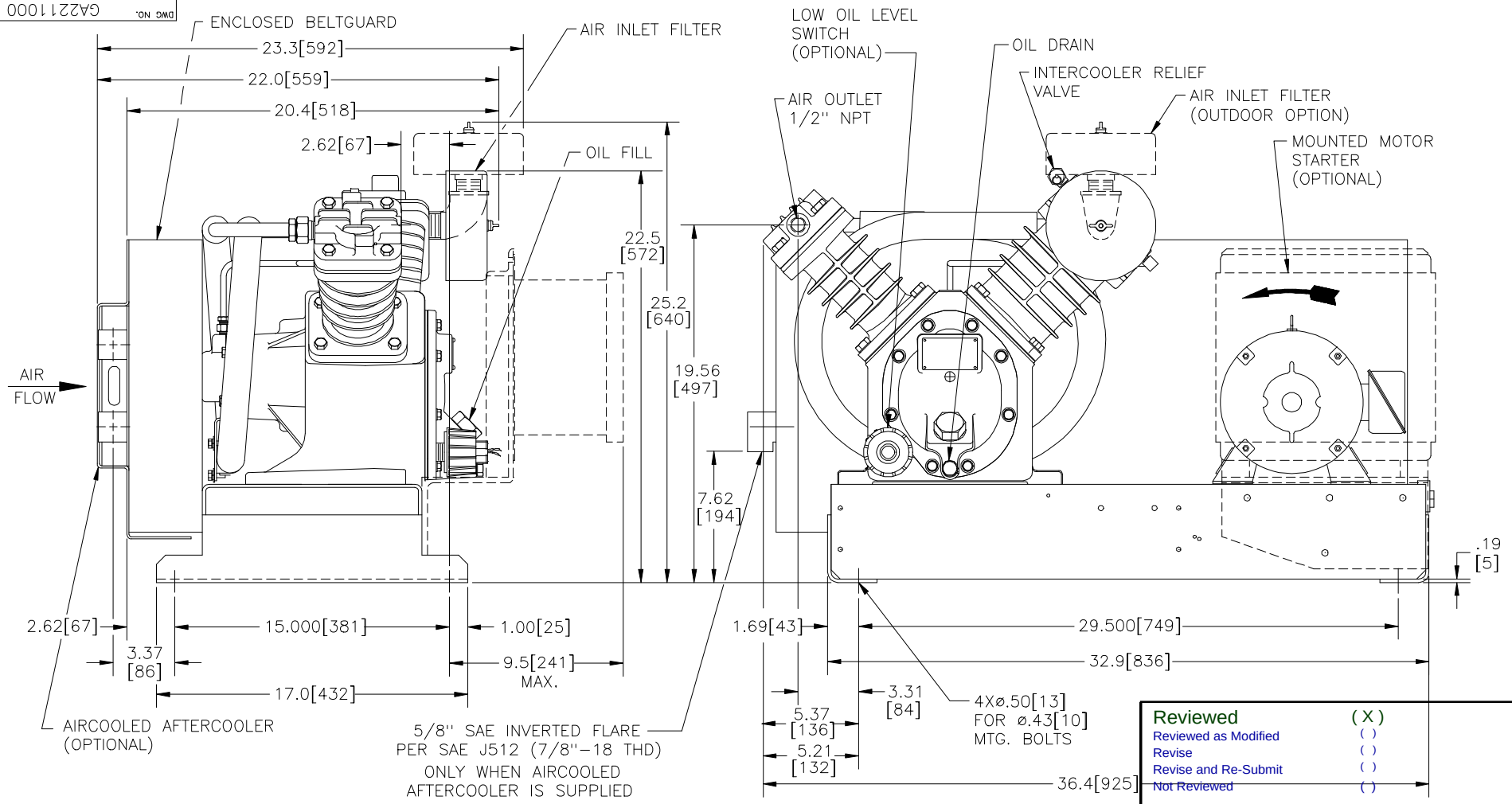
Air burst system includes:

Ingersoll Rand 2475X5 Air Compressor
Capacity- 17.1 cfm @ 125 PSIG
Maximum Pressure- 175 PSIG
TEFC motor enclosure
Nema IV starter
Nema IV pressure switch
Nema IV low oil switch
Start Up Kit

Reciever:
80 gallon vertical receiver with platform mounted compressor
200psi ASME coded vessel
Pressure gauge
Safety valve
Auto Drain 110 VAC

Valve:
Two 1.5" NPT ball valve, all stainless steel, RTFE seats and TFE stem seals, with locking handle. Valves to be installed in the field.

KUGLUTUK estimated bill of materials		
QNTY	PART NUMBER	DESCRIPTION
1	2475N5	5hp base mounted compressor
1	32276313	NEMA 4 low oil level switch
1	IR	TEFC motor
1	IR	Auto start stop NEMA 4
1	IR	start-up kit
1	B424B 200#	nema 4 pressure switch
1	EDV2000	120vac Auto drain
1	A21324048200	80 gallon receiver
1		paint receiver
2	1 1/2" 1366TEM	1 1/2" SS full ported theaded ball valves



NOTES:

1. FOUNDATION OR FLOOR MUST BE LEVEL AND SUPPORT ALL FEET EQUALLY; IF NECESSARY SHIM OR GROUT THE FOURTH FOOT.
2. FOUNDATION BOLTS SHOULD PROJECT THRU NUTS AT LEAST 1/2" [13] TO ALLOW FOR LEVELING.
3. ALLOW AT LEAST 12.00"[305] CLEARANCE MINIMUM ON ALL SIDES FOR PROPER AIR CIRCULATION.
4. APPROXIMATE NET WEIGHT: 350 LBS.[159kg]
5. ALL UNSPECIFIED DIMENSIONS: XXX = .125[3]
   XX = .25[6]
   X = .5[13]
6. DIMENSIONS IN [ ] ARE MILLIMETER DIMENSIONS UNLESS OTHERWISE SPECIFIED.

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WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray, EIT, Williams Engr.
Date: 04/11/2011

WILLIAMS ENGINEERING CANADA

APPROVED FOR:
IR ORDER NO.
CUSTOMER:
CUSTOMER ORDER NO.
PER: DATE:

SIZE:
MODEL:
PISTON DISPLACEMENT:
SPEED RPM:
DISCHARGE PRESSURE RATING:
ACTUAL DELIVERY:
REGULATION:

JOB: SPEC:
ITEM: CONTRACTOR:
ARCH.ENGR.:
MTR. H.P./KW: MTR. ENCL.:
MTR. VOLTS: PH: HZ:
STARTER TYPE:

THIRD ANGLE PROJECTION
SCALE 1/4"=1"
DATE
DRAWN J.SMITH
CHECKED
DSN. APP
ENGR. APP

INGERSOLL-RAND Co.
RECIPROCATING COMPRESSOR DIVISION
SMALL COMPRESSOR BUSINESS UNIT
CAMPBELLSVILLE, KY

REF. 2475X5
TITLE GENERAL ARRANGEMENT
SIZE C | DWG NO. GA2211000 | REV. 04
SHEET 1 OF 1

RCE-GC-11/97

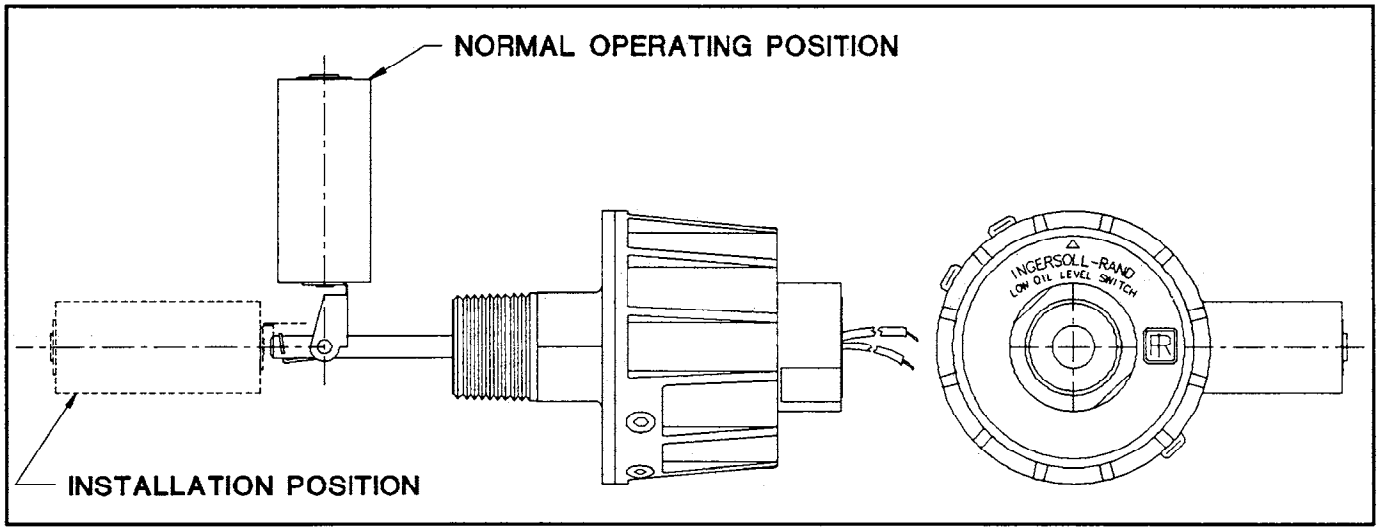

FIGURE 1. SWITCH ALIGNMENT.

checked immediately. A defective switch must be replaced.

A. REMOVAL. (**NOTE**: Frame end cover removal is not required to remove the low oil level switch).

1). Disconnect the main power supply and drain the oil from the frame (refer to your Instruction Manual for oil change procedures).
2). Disconnect the switch wires from the control circuit.
3). Loosen the three set screws and remove the switch cover.
4). Remove the switch body from the compressor frame. (**NOTE:** If the switch is to be removed from the compressor for an extended period of time, install a 3/4" NPT plug into the frame opening to keep dust and dirt out of the frame).

B. CLEANING. Thoroughly clean the float with a dry rag. If necessary, a non-flammable solvent can be used provided the float is wiped clean before the switch is reinstalled.

C. TESTING. The switch can be tested with a standard 12-volt automotive test light.

1). Align the cover on the switch body as shown in Figure 1.
2). Hold the float up so that the contact rod and cover do not make contact. The test light should be on.
3). Release the float. When the rod and cover make contact, the test light should go off.

D. INSTALLATION.

1). With the switch cover removed, apply pipe thread sealant to the switch threads.
2). With the float extended straight out, insert the switch body into the frame and tighten. When properly installed, the switch should be aligned as illustrated in Figures 1 and 2.
3). Hold the contact rod straight up at a 90° angle. Install the switch cover with the arrow pointing straight up at a 90° angle.
4). Carefully and evenly tighten the three set screws to secure the cover to the switch body, using caution not to over-tighten and damage the switch. The set screws should be torqued to 24-32 In. Oz.
5). Connect the switch wires to the control circuit. (Refer to your Instruction Manual).
6). Fill the compressor frame with lubricant. (Refer to your Instruction Manual).

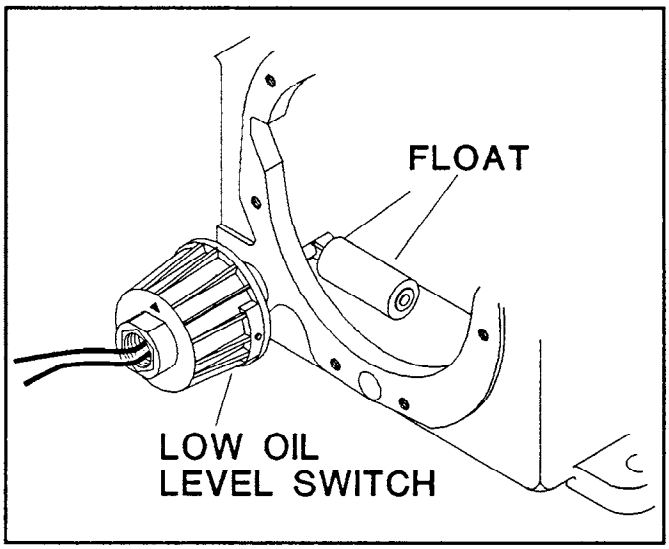

FIGURE 2. SWITCH INSTALLATION.

7. PARTS LIST DATA.

Should it ever be necessary to replace the switch, supply the information in Table 2. when ordering.

PART NBR.	DESCRIPTION
32276313	SWITCH, LOW OIL LEVEL

TABLE 2. PARTS LIST DATA.

INGERSOLL-RAND®

TECHNICAL MANUAL SUPPLEMENT

T30

Small Compressor Division
INGERSOLL-RAND COMPANY
Campbellsville, KY 47218

LOW OIL LEVEL SWITCH

PART NUMBER 32276313

⚠ WARNING

Compressed Air Has Great Force.

Can Cause Severe Injury or Death.

Always release air pressure from the compressor, air receiver and associated tubing and components before servicing this compressor.

⚠ WARNING

Hazardous Voltage.

Can Cause Severe Injury or Death.

Always disconnect power supply before performing any maintenance or repair work on this compressor.

1. PURPOSE.

The purpose of this publication is to provide maintenance and parts list information regarding the latest design improvements on your Ingersoll-Rand air compressor. The information contained herein has not yet been incorporated in the Instruction and Parts List Manuals provided with your compressor.

2. SCOPE.

This supplement is applicable to all Type 30 (T30) air compressors manufactured after April 1, 1994. Depending on the air compressor purchased, the Low Oil Level Switch is available as either standard or optional equipment.

3. PRECEDENCE.

The maintenance procedures contained in Paragraph 6 supersede the corresponding data in the Instruction Manual supplied with your air compressor. When ordering spare or replacement parts, the part numbers listed in Paragraph 8 should be used in place of those shown in the Parts List. This publication, along with the Instruction Manual and Parts List should be kept in a location which is accessible to operation and maintenance personnel.

4. DESCRIPTION.

A properly functioning Low Oil Level Switch is critical to the operation of your compressor. Operating the compressor with a defective switch can cause extensive damage should the frame oil level drop to an unsafe point undetected. The switch is a single-pole, double-throw device, and is NEMA 4 rated. Switch data is listed in Table 1.

The low oil level switch does not alleviate the need to check the frame oil level in your compressor on a regular basis (Refer to the SCHEDULED MAINTENANCE table in your Instruction Manual). Ingersoll-Rand Company cannot assume responsibility for any damage which might occur as the result of operating the compressor without adequate lubrication.

AMPS	VOLTAGE
0.4	575 VAC PILOT DUTY
1/4	250 VDC - NON-INDUCTIVE
1/2	125 VDC - NON-INDUCTIVE
3-1/2	24 VDC - NON-INDUCTIVE
10	125, 250, 480 VAC

TABLE 1. SWITCH DATA.

5. OPERATION.

If the oil level in the compressor frame reaches an unsafe level, the float will cause the switch contacts to open and shut down the unit. When the proper lubricant level has been restored, the float will reset to its original position, closing the switch contacts. The compressor can then be restarted.

6. MAINTENANCE.

Under normal operation, the low oil level switch requires no operator intervention or routine maintenance. If the switch fails, as evidenced by frequently shutting off the motor, or failing to shut off the motor if the oil level drops to an unsafe point, it should be removed and

FORM SCD-599
March 1994

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 04/11/2010

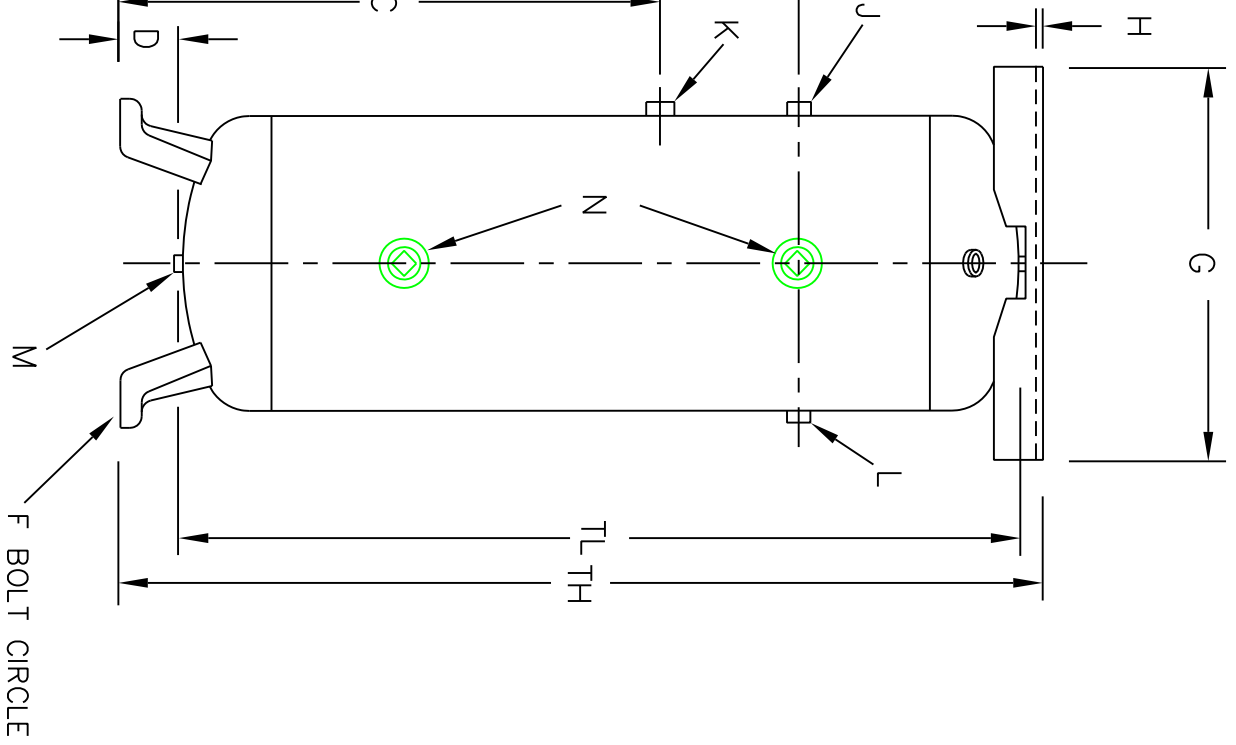
WILLIAMS ENGINEERING CANADA

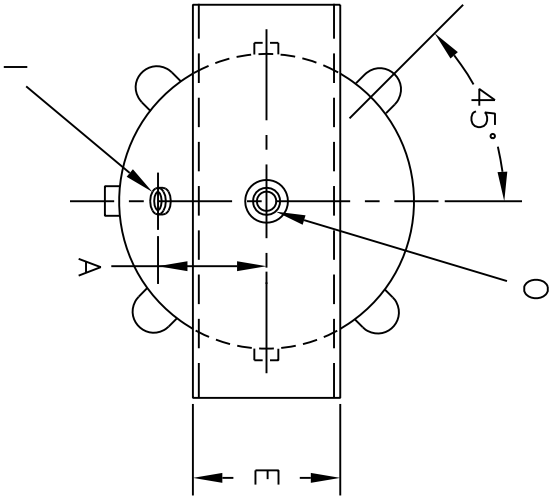
VERTICAL AIR RECEIVER

200 PSI AT 450 F

ASME CODE SECTION VIII

NAT'L BOARD REGISTERED





DESCRIPTION				DIMENSIONS								OPENINGS						
GAL	DIA	TL	TH	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
30	16	38	41 1/4	6 1/2	30 1/4	24 1/4	1 3/4	9	18	23	3/16	1/4	3/4	3/4	3/4	1/2	1 1/2	3/4
60	20	48	52	8 1/2	40	34	2 1/2	13	23	30	3/16	1/4	3/4	3/4	3/4	1/2	2	3/4
80	24	48	53 1/2	10	40 1/2	34 1/2	3 7/8	13	26	30	1/4	1/4	1 1/4	1 1/4	1 1/4	1/2	2	1 1/4

King Mechanical Specialty

VERT. AIR REC W/PLTF

1-1133 | 1

Ingersoll Rand®

EDV-2000™ Electric Drain Valve

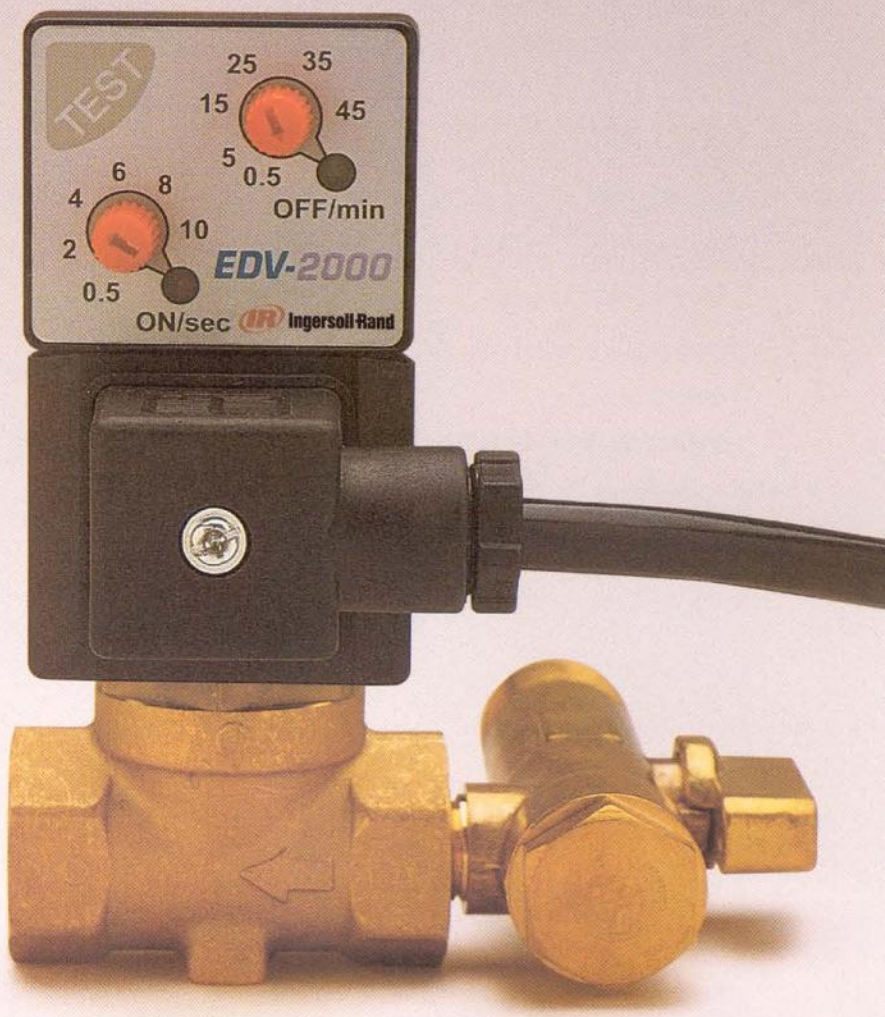
The EDV-2000 is a "user friendly" full feature automatic electric drain valve that cost effectively removes condensate from compressors, receivers, dryers, aftercoolers, filters and drip legs. Each EDV-2000 includes an electric drain valve and a strainer/ball valve.

The EDV-2000 is:

- Easy to read
- Easy to adjust
- Compact
- Reliable

The EDV-2000 provides the following features:

- **2 year warranty**
- 100% Continuous Duty.
- Large-scale, adjustable "time on" drain cycle of 0.5-10 seconds.
- Large-scale, adjustable "time off" timer interval of 0.5-45 minutes.
- Ultra bright LED to indicate power is on and to indicate valve is open.
- Soft touch TEST switch for manual override.
- Strainer/ball valve combination prevents valve from clogging and allows isolation for servicing.
- Ingersoll-Rand exclusive SBV hex cap with whistle notch to alarm if strainer is being serviced under pressure.
- Agency approvals (recognized components mark).
- NEMA 4 (IP65) enclosure
- 6' (1.83M) heavy duty power cord with AC plug.



Ingersoll Rand®

EDV-2000™ Specifications

110/120 V 50-60 Hz I-R Part No.	230/240 V* 50-60 Hz I-R Part No.	Max. Pressure psi (Bar)	Discharge Rate in gallons (liters) per 5 seconds valve "on time"	Connection Size	Orifice Size
EDV-2000					
37995925 (NPT)	37995933 (NPT)	250 (17.25)	up to 0.1 gal. (0.378ℓ)	1/4"	3/32"
EDV-2000 Field Retrofit Assembly					
97339352 (NPT)	97339402 (NPT)	250 (17.25)	up to 0.1 gal. (0.378ℓ)	1/4"	3/32"
EDV-2000					
54410931 (NPT)	37995909 (NPT)	250 (17.25)	up to 0.26 gal. (0.983ℓ)	1/4"	7/16"
38000865 (BSP)	38000873 (BSP)	250 (17.25)			
EDV-2000					
37995891 (NPT)	37995917 (NPT)	250 (17.25)	up to 1.6 gal. (6.048ℓ)	1/2"	7/16"
38000808 (BSP)	38000881 (BSP)	250 (17.25)			

*Based upon a 90 PSI (6.2 bar) air system and 5 seconds valve "on time." Flow rates may vary with installation.
**230 volt models are supplied without AC plugs.

Timer Interval.....0.5-45 minutes

Drain cycle.....0.5-10 seconds

Maximum Air Pressure.....250 psig (17.25 bar)

Dimensions.....4-3/4" x 3-1/2" x 2" (121mm x 89mm x 51mm)
(Small size is a distinct advantage for drain valves.)

Weight.....1-1/2 lbs.(680 grams)

Operating Temperature

Fluid.....33°F-265°F (1°C-129°C)

Ambient.....4°F-125°F (-16°C-52°C)

Manual Override.....Yes

Seals.....Viton

LEDs.....Ultrabrights
(Significantly brighter than competitors'.)

Controls.....Large, easy to read and adjust

Mounting.....NPT or BSP connections

NEMA 4 (IP) Enclosure.....Yes

Valve Plunger.....18FM

Valve Body.....Low lead brass (≤ 1/2%)

Size	NPT (Part No.)	BSP (Part No.)
1/4"	54381090	38002515
1/2"	37996337	38002523

The EDV-2000 Strainer/Ball Valve Assembly

- Prevents debris from clogging drain valves
- Hand turn isolation valve (1) (disconnects flow to valve)
- Trash trap hex cap (I-R exclusive) (2)
- Stainless steel filter screen, Part #38000154
- Maximum pressure 250 psi
- Brass body
- Height 3.30" (84mm), width 2.16" (55mm)
- 1/2" male NPT or BSP connection to air systems
- Available in 1/4" and 1/2" male NPT or BSP valve discharge connection

Ingersoll-Rand

 Form 3183-C Printed in U.S.A.

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

Date: 04/11/2010

WILLIAMS ENGINEERING CANADA

Ingersoll-Rand Company
Air Solutions
Davidson, NC
www.air.ingersoll-rand.com

ASHCROFT®

Pressure and Differential Pressure Switches, Watertight Enclosure, Type 400, B-Series

This general purpose Ashcroft® switch series is ideal for use in virtually all Industrial and OEM applications.

- ***Watertight NEMA 4X enclosure, IP66***
- ***Choice of switch elements for all applications, including hermetically sealed***
- ***Wide choice of wetted materials, including all-welded Monel or stainless steel***
- ***Fixed or limited adjustable deadband***
- ***Approved for UL, CSA and FM ratings***
- ***Choice of actuators, including designs for fire-safe and NACE applications(8)***
- ***Readily available***
- ***Standard pressure connection materials:***

  Pressure psi ranges
  - 316 SS

  Differential psid ranges
  - Nickel-plated brass

  Pressure and differential inches of water ranges
  - Carbon steel

1 - ENCLOSURE

B4 - Pressure switch, type 400, watertight enclosure meets NEMA 3, 4, 4X and 13, IP66 requirements

D4 - Differential pressure switch, type 400, watertight enclosure meets NEMA 3, 4, 4X and 13, IP66 requirements

2 - SWITCH ELEMENTS

Order Code	Description/Maximum Electrical Ratings UL/CSA listed SPDT	
20(4)	Narrow deadband	15A, 125/250 Vac
21	Ammonia service	5A, 125/250 Vac
22(3)	Hermetically sealed switch, narrow deadband	5A, 125/250 Vac
23	Heavy duty ac	20A,125/250 Vac
24(1)	General purpose	15A,125/250/480 Vac 1/2A, 125 Vdc 1/4A, 250 Vdc
25	Heavy duty dc	10A,125/ Vac or dc 1/8HP 125/ Vac or dc
26(4)	Sealed environment proof	15A, 125/250 Vac
27	High temp. 300°F	15A, 125/250 Vac
28	Manual reset trip on increasing	15A, 125/250 Vac
29	Manual reset trip on decreasing	15A, 125/250 Vac
31	Low level (gold) contacts	1A,125/250 Vac
32	Hermetically sealed switch, general purpose	11A, 125/250 Vac 5A, 30Vdc
50	Variable deadband	15A,125/250 Vac
	UL/CSA listed dual SPDT(2)	
61(4)	Dual narrow deadband	15A, 125/250 Vac
62(4)	Dual narrow environment proof	15A, 125/250 Vac
63	Dual high temp. 300°F	15A, 125/250 Vac
64	Dual general purpose	15A, 125/250/480 Vac 1/2A, 125 Vdc 1/4A, 250 Vdc
65	Dual ammonia service	5A, 125/250/480

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WILLIAMS ENGINEERING CANADA

3 - ACTUATOR SEAL(7)

Code & Material	Process Temp.(6) Limits °F	Range Vac "H_2O	0-600 psi	1000 psi	2000-3000 psi
B-Buna N	0 to 150	●	●	●	●
V-Viton	20 to 300	●	●	●	
T-Teflon	0 to 150	●	●	●	●
S-SS(6)	0 to 300		●	●	
P-Monel(6)	0 to 300		●	●	

4 - OPTIONS

See page 158

5 - STANDARD PRESSURE RANGES

See page 155

NOTES:

1. Standard switch.
2. Dual switches are 2 SPDT snap-action switches not independently adjustable.
3. Estimated dc rating, 2.5A, 28 Vdc (not UL listed).
4. Estimated dc rating, .4A, 120 Vdc (not UL listed).
5. Available on pressure only.
6. Ambient operating temperature limits –20 to 150°F, all styles. Setpoint shift of ±1% of range per 50°F is normal.
7. Items are wetted by process fluid.
8. Refer to Option Table.

TO ORDER THIS B-SERIES PRESSURE SWITCH:

Select: **B4 20 B XPK 600 psi**

1. Enclosure: B4
2. Switch Element: 20
3. Actuator Seal: B
4. Options (page 158): XPK
5. Pressure Range (page 155): 600 psi

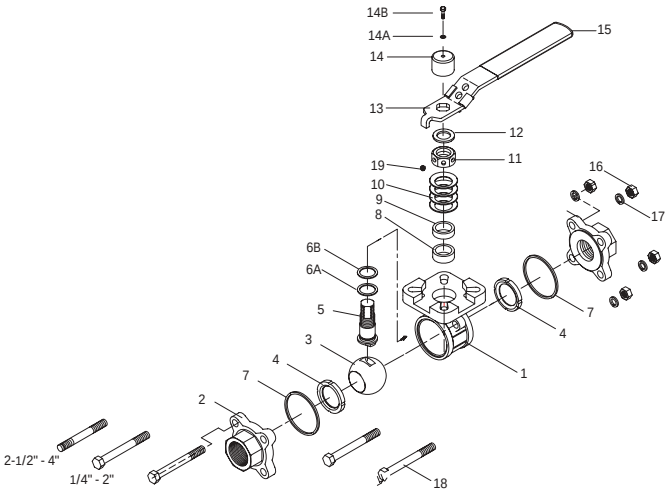
Consult factory for guidance in product selection
Phone (203) 878-5641 FAX (203) 877-8519

INSTRUMENT DIVISION DRESSER

SHARPE® SERIES 13 DIR-ACT® 3 PIECE BALL VALVES

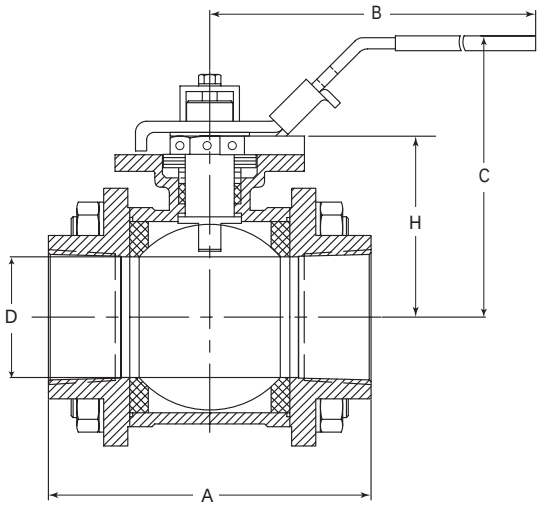
STANDARD FEATURES	ADVANTAGES
Compact Dependable Automated Assemblies	Actuator Bracket couplings are eliminated resulting in a lower profile and reliable automated assembly.
In-Service Adjustable Stem Packing	The large oversized packing nut, "Mc-Nut" is drilled on each flat. This allows the use of a standard allen wrench to make stem packing nut adjustments while the valve is in service and without removal of the actuator, **U.S. Patent No. 6,446,935 B1.**
Live Loaded Multiple Packing Stem Seal System	The stem seal system uses a combination of an internal thrust washer, an internal stem seal made from Peek, and Nova, two large Nova upper stem seals, and four Belleville spring washers to insure high cycle leak free service.
Heavy Duty Large Diameter Stem	The heavy duty stem is larger than comparable valves, which insures extended service life, less down time and overall lower cost.
Integral ISO Mounting Pads	The cast mounting pad is precision machined to ISO standards and will allow for actuation variations depending on application requirements.
Steam Rated	TFM® and RTFE seats are designed to handle 150 lb. steam.
Vented Ball	Drilled stem slot insures the ball cavity is vented to the process stream. This prevents cavity over-pressurization especially in steam service.
Full Port Design 1000 WOG	The full port design insures full flow and minimal cavitation or pressure drop in critical applications. The valve carries a pressure rating of 1000 WOG.
Three Piece Body Design 1/4" - 4"	The three piece body design provides a stable compact valve platform, with a variety of end connection options.
Option - Manual	Regular lever handle is available, also oval handle that extends 2-1/4" high.

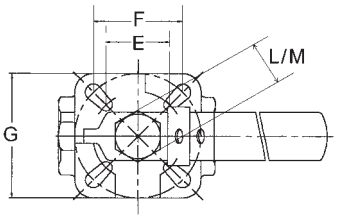
SERIES 13 PARTS AND DIMENSIONS

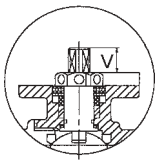


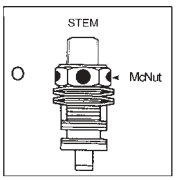
PART NO.	PART	QTY.	MATERIAL
1	Body	1	316 Stainless Steel ASTM A351 CF8M Carbon Steel ASTM A216 WCB
2	Pipe Ends	2	316 Stainless Steel ASTM A351 CF8M Carbon Steel ASTM A216 WCB
3	Ball	1	316 Stainless Steel
4	Seat	2	TFM® (1/4" - 2) RTFE (2-1/2" - 4")
5	Stem	1	316 Stainless Steel
6A	Thrust Bearing	1	PEEK
6B	Thrust Bearing	1	Nova
7	Body Seal	2	TFE
8	Stem Packing	1	Nova
9	Gland Packing	1	304 Stainless Steel
10	Belleville Washers	4	Stainless Steel
11	McNut® (Packing Nut)	1	316 Stainless Steel
12	Handle Washer	1	Stainless Steel
13	Handle	1	Stainless Steel
14	Stem Cover	1	304 Stainless Steel
14A	Washer	1	304 Stainless Stel
14B	Cover (Bolt)	1	304 Stainless Steel
15	Handle Sleeve	1	PVC
16	Bolt Nut	4/8/12*	Stainless Steel
17	Bolt Washer	4/8/12*	304 Stainless Steel
18	Bolt	4/8/12*	304 Stainless Steel
19	Set Screw	1	Stainless Steel

* 4 = 1/4"-2", 8 = 2-1/2"-3", 12 = 4"

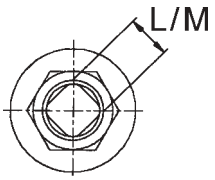


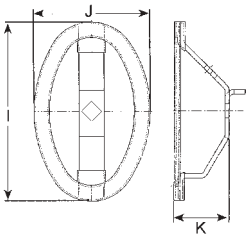






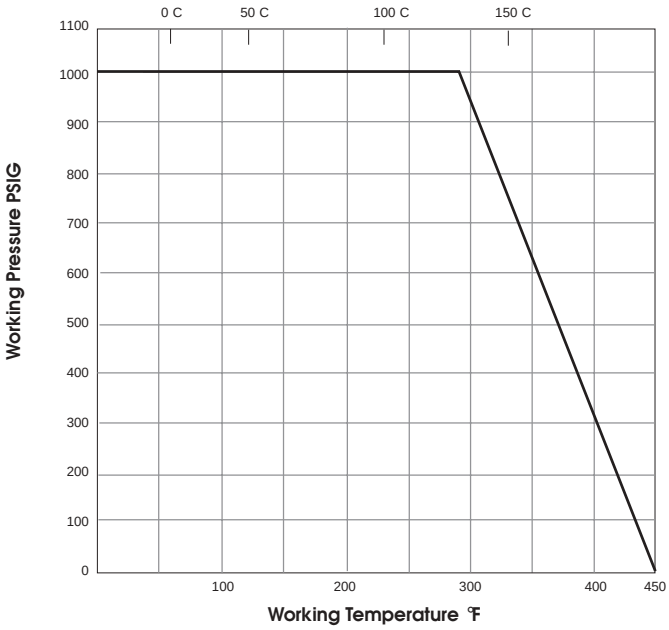
STEM ARRANGEMENTS





SIZE	A	B	C	D	E	F	G	H	I	J	K	L/M	O	V
1/4"	2.55	4.93	2.42	0.45	1.00	1.17	1.65	1.50	3.90	2.50	2.50	0.35	9/64	0.43
3/8"	2.55	4.93	2.42	0.50	1.00	1.17	1.65	1.50	3.90	2.50	2.50	0.35	9/64	0.43
1/2"	2.84	4.93	2.42	0.60	1.00	1.17	1.65	1.50	3.90	2.50	2.50	0.35	9/64	0.43
3/4"	3.35	4.93	2.74	0.78	1.17	1.39	1.97	1.85	4.15	2.50	2.50	0.35	9/64	0.45
1"	3.62	7.50	3.19	1.00	1.39	1.95	2.75	2.20	4.15	2.50	2.50	0.35	9/64	0.58
1-1/4"	4.34	7.50	3.26	1.25	1.39	1.95	2.75	2.55	6.45	4.15	2.50	0.43	9/64	0.63
1-1/2"	4.84	7.50	3.47	1.50	1.39	1.95	2.75	2.75	6.45	4.15	2.50	0.43	9/64	0.63
2"	5.58	7.50	3.84	2.00	1.39	1.95	2.75	3.15	6.45	4.15	2.50	0.43	9/64	0.63
2-1/2"	6.84	9.85	5.90	2.50	1.95	2.84	4.00	3.85	X	X	X	0.67	7/32	0.78
3"	7.59	9.85	6.30	3.00	1.95	2.84	4.00	4.25	X	X	X	0.67	7/32	0.78
4"	10.77	15.00	6.90	4.00	2.84	3.48	4.90	4.90	X	X	X	0.67	7/32	1.00

PRESSURE TEMPERATURE RATINGS



PERFORMANCE DATA

SIZE	CV	BREAKAWAY TORQUE*
1/4”	8	40 LB. IN.
3/8”	8	40 LB. IN.
1/2”	38	40 LB. IN.
3/4”	71	80 LB. IN.
1”	110	110 LB. IN.
1-1/4”	230	160 LB. IN.
1-1/2”	350	190 LB. IN.
2”	600	250 LB. IN.
2-1/2”	320	500 LB. IN.
3”	580	720 LB. IN.
4”	820	800 LB. IN.

* THE TORQUE CAN VARY DUE TO PRESSURE AND TEMPERATURE. THE TORQUE FIGURES REPRESENT MAXIMUM LINE PRESSURE.

HOW TO ORDER

VALVE SIZE	VALVE SERIES	BODY BALL & STEM	ENDS	SEATS	PNEUMATIC ACTUATOR	DOUBLE ACTING & SPRING RETURN	ELECTRIC ACTUATOR	OPTIONS
1/4”	13	6 = 316 Stainless	6 = 316 Stainless	M = TFM®	SPN 032	DA= Double Acting	SEA II RX	Pneumatic
3/8”			4 = Carbon Steel	R = RTFE	SPN 050	SR5 = Spring Return	(100 IN. LB.)	Hi-Temp
1/2”					SPN 063	5 Springs	SEA II SX	V = VITON O-Rings
3/4”			TE = Threaded Ends		SPN 075	SR6 = Spring Return	(200 IN. LB.)	Electric
1”			SW = Socket Weld		SPN 085	6 Springs	SEA II SXX	S = 2 Aux. Individually Adjustable
1-1/4”			BW = Butt Weld		SPN 100	SR7 = Spring Return	(300 IN. LB.)	M =Modulating 4-20mA, 0-10 VDC[2]
1-1/2”			SCH 5, 10, 40		SPN 125	7 Springs	SEA II MRX	H = Heater
2”					SPN 145	SR8 = Spring Return	(675 IN. LB.)	A = Indicator Arrow
2-1/2”					SPN 160	8 Springs	SEA II MLX	T = Override T-Handle
3”						SR9 = Spring Return	(1000 IN. LB.)	B = External Battery Back-up
4”						9 Springs	SEA II MHX	L = Regular Lever
						SR10 = Spring Return	(1500 IN. LB.)	OH =Oval Handle
						10 Springs		7 = 17-4PH Stem
						SR11 = Spring Return		
						11 Springs		
						SR12 = Spring Return		
						12 Springs		

3/4” 13 6 6TE M SPN 050 DA

SHARPE® VALVES
A DIVISION OF Sharon Piping & Eqpt. Inc.

Toll-Free 1-877-7SHARPE
Fax: (708) 562-0890
E-Mail: info@sharpevalves.com
www.sharpevalves.com
1260 Garnet Drive
Northlake, Illinois 60164 U.S.A.

Rev. 8/06

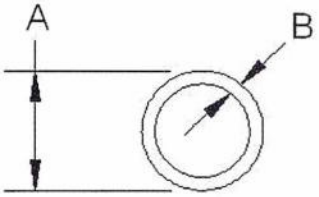
Construction
Automotive
Industry

REHAU®
Unlimited Polymer Solutions

PRODUCT SUBMITTAL 101

Product: **RAUPEX® UV Shield Pipe (Red/~~White/Blue~~)**

Date: **21-April-09 (supersedes, 1-October-09)**



Article #	Nominal Diameter	Average OD (A) inches (mm)	Wall Thickness (B) inches (mm)	Weight lb/ft (kg/m)	Capacity Gal/ft (l/m)
235331*	3/8"	0.500±0.003 (12.70±0.08)	$0.070_{+0.010/-0.000}$ ($1.78_{+0.25/-0.00}$)	0.04 (0.07)	0.0050 (0.0624)
235351	1/2"	0.625±0.004 (15.88±0.10)	$0.070_{+0.010/-0.000}$ ($1.78_{+0.25/-0.00}$)	0.06 (0.08)	0.0098 (0.1222)
235371	3/4"	0.875±0.004 (22.22±0.10)	$0.097_{+0.010/-0.000}$ ($2.47_{+0.25/-0.00}$)	0.10 (0.15)	0.0189 (0.2356)
235381	1"	1.125±0.005 (28.58±0.12)	$0.125_{+0.013/-0.000}$ ($3.18_{+0.33/-0.00}$)	0.17 (0.26)	0.0316 (0.3939)
132571+	1 ¼"	1.375±0.005 (34.92±0.12)	$0.153_{+0.015/-0.000}$ ($3.88_{+0.38/-0.00}$)	0.25 (0.37)	0.0467 (0.5827)
132581+	1 ½"	1.625±0.006 (41.28±0.16)	$0.181_{+0.019/-0.000}$ ($4.59_{+0.48/-0.00}$)	0.35 (0.52)	0.0650 (0.8118)
132591+	2"	2.125±0.006 (53.98±0.16)	$0.236_{+0.024/-0.000}$ ($6.00_{+0.61/-0.00}$)	0.60 (0.90)	0.1114 (1.3906)

*Only available in Red or Blue
+ Only available in White

TECHNICAL DESCRIPTION

Specification	English	SI	Standard
Minimum Density	58 lb/ft³	926 kg/m³	ASTM F 876 DIN 53479
Degree of Cross-Linking	70 - 89%	70 - 89%	ASTM F 876 DIN 16892
Thermal Conductivity	0.24 BTU/(hr ft °F)	0.41 w/(m°K)	DIN 52612
Linear Exp.	9.33 x 10-4 in/ft°F @ 68°F 1.33 x 10-3 in/ft°F @ 212°F	0.14 mm/(m°C) @ 20°C 0.2 mm/(m°C) @ 100°C	DIN 42328
Modulus of Elasticity	87,000 - 130,500 psi @ 68°F 43,500 - 58,000 psi @176°F	600 - 900 N/mm2 @ 20°C 300 – 400 N/mm2 @ 80°C	DIN 53457

Specification	English	SI	Standard
Tensile Strength	4194-4355 psi @ 68°F 2610-2900 psi @ 176°F	26-30 N/mm2 @ 20°C 18-20 N/mm2 @ 80°C	DIN 53455
IZOD Impact Res.	No Break	No Break	DIN 53453
Temperature Working Range	-40°F to 200°F	-40°C to 93°C	N/A
Roughness	e=0.00028 in	e=0.007 mm	N/A
Max. Short-term Exposure	150 psig @ 210°F (48 hr)	1035 kPa @ 99°C (48 hr)	ASTM F 876
Red/Blue UV Resistance	One year	One year	PPI TN-33
White UV Resistance	3 Months	3 Months	PPI TN-33

Reviewed (X)
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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

FUNCTIONAL DESCRIPTION

RAUPEX UV Shield pipes are manufactured using REHAU's high-pressure peroxide method for cross-linked polyethylene (Engel method, PEXa). All RAUPEX UV Shield pipe meets or exceeds the requirements of ASTM F 876, F 877, CSA B 137.5 and PPI TR-3, and is certified to NSF Standards 14/61. RAUPEX UV Shield pipe also meets the requirements of NSF P 171 and ASTM F 2023 for chlorine resistance. RAUPEX UV Shield pipe is produced in REHAU's ISO 9001 certified manufacturing facilities.

RAUPEX UV Shield pipe is rated for continuous operation of 160 psi @ 73.4°F (1105 kPa @ 23°C), 100 psi @ 180°F (690 kPa @ 82.2°C) and 80 psi @ 200°F (550 kPa @ 93.3°C). It is compatible with brass crimp ring fittings certified to ASTM F 1807, RAUPEX compression nut fittings, and compression-sleeve fittings certified to ASTM F 2080 and CSA B 137.5. Use of RAUPEX UV Shield pipe in heating systems requires corrosion protection and/or isolation by using a heat exchanger or non-ferrous components throughout the system.

2. EVERLOC FITTINGS

EVERLOC fittings are ideal for fire protection applications. EVERLOC fittings and sleeves create reliable connections that can be embedded directly in a thermal mass (when walled-in or wrapped in chloride-free tape or RAUCROSS™ heat shrink tubing to help reduce corrosion caused by the surrounding environment – check local codes for compliance) or walled in. Installation is easy with EVERLOC tools.

EVERLOC fittings are produced from solid brass stock. Elbows and tees are hot-forged for superior strength and durability, while straight fittings are machined from solid brass rod. The EVERLOC fittings and sleeves listed below are produced to ASTM F2080 and meet the performance requirements of NSF 61, ASTM F877, CSA B137.5, UL 1821 and UL 1713.

EVERLOC Sleeves

		Package Quantity		Unit Weight		Minimum
Article No.	Description	Box	Carton	g	lb	Order
260577	3/4" EVERLOC Sleeve	80	480	37	0.08	1 box
260877 ✶	1" EVERLOC Sleeve	40	240	73	0.16	1 box

Sleeves are unplated brass. Tapered end installs toward fitting.

EVERLOC Couplings

		Package Quantity		Unit Weight		Minimum
Article No.	Description	Box	Carton	g	lb	Order
260317	3/4" x 3/4" EVERLOC	35	210	82	0.18	1 box
260427 ✶	1" x 1" EVERLOC	20	120	136	0.30	1 box

Order EVERLOC sleeves separately.

EVERLOC Plugs

		Package Quantity		Unit Weight		Minimum
Article No.	Description	Box	Carton	g	lb	Order
260397	3/4" EVERLOC Plug	60	360	54	0.12	1 box
260497	1" EVERLOC Plug	30	180	91	0.20	1 box

Order EVERLOC sleeves separately.

EVERLOC Copper Adapters

		Package Quantity		Unit Weight		Minimum
Article No.	Description	Box	Carton	g	lb	Order
260837	3/4" EVERLOC x 1" C Male (Street) or 3/4" C Female (Sweat)	25	150	118	0.26	1 box
260947	1" EVERLOC x 1 1/4" C Male (Street) or 1" C Female (Sweat)	20	120	163	0.36	1 box

Copper adapters connect RAUPEX pipe to copper pipe in sizes indicated. Many of these copper adapters can be used as male (street) or female (sweat) fittings. Make solder connection before connecting to RAUPEX pipe. Order EVERLOC sleeves separately.

EVERLOC Dual MPT/Copper Adapters

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
260327	3/4" EVERLOC x 3/4" MPT or 1/2" C Female (Sweat)	25	150	122	0.27	1 box
260597	3/4" EVERLOC x 1" MPT or 3/4" C Female (Sweat)	20	120	109	0.24	1 box
260437 ✳	1" EVERLOC x 1" MPT or 3/4" C Female (Sweat)	15	90	195	0.43	1 box

Dual adapters connect RAUPEX pipe to either female threaded fittings (first size) or copper pipe (second size) in sizes indicated. Make threaded or solder connections before connecting to RAUPEX pipe. Order EVERLOC sleeves separately.

EVERLOC Straight Tees

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
260617	3/4" x 3/4" x 3/4" EVERLOC Tee	15	90	191	0.42	1 box
260977 ✳	1" x 1" x 1" EVERLOC Tee	8	48	349	0.77	1 box

Order EVERLOC sleeves separately.

EVERLOC Run Reducing Tees

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
260687	1" x 3/4" x 1" EVERLOC Tee	10	60	322	0.71	1 box

Order EVERLOC sleeves separately.

EVERLOC Branch Reducing Tees

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
260707	1" x 1" x 3/4" EVERLOC Tee	10	60	295	0.65	1 box

Order EVERLOC sleeves separately.

EVERLOC FPT Tees

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
244077	3/4" x 3/4" EVERLOC x 1/2" FPT Tee	10	60	190	0.42	1 box
244087	1" x 1" EVERLOC x 1/2" FPT Tee	5	30	290	0.63	1 box

These EVERLOC tees are specially designed for installation of the residential sprinklers. Order EVERLOC sleeves separately.

90° Elbows – EVERLOC to EVERLOC

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
260677	3/4" x 3/4" EVERLOC Elbow	25	150	132	0.29	1 box
260717	1" x 1" EVERLOC Elbow	10	60	254	0.56	1 box

Order EVERLOC Sleeves separately.

90° Elbows – EVERLOC to FPT, Drop Ear

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
244027	3/4" EVERLOC x 1/2" FPT Drop Ear Elbow	15	90	150	0.33	1 box
244057	1" EVERLOC x 1/2" FPT Drop Ear Elbow	10	60	200	0.43	1 box

These EVERLOC elbows are specially designed for installation of the residential sprinklers. Order EVERLOC sleeves separately.

EVERLOC FPT Side Outlet Elbow

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
244037	3/4" EVERLOC x 3/4" EVERLOC x 1/2" FPT Side Outlet Elbow	15	90	220	0.48	1 box
244067	1" EVERLOC x 1" EVERLOC x 1/2" FPT Side Outlet Elbow	10	60	310	0.67	1 box

These EVERLOC elbows are specially designed for installation of the residential sprinklers. Order EVERLOC sleeves separately.

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

NCI
Your Single Source Solution

FP600
FULL PORT FORGED
BRASS BALL VALVES
600 CWP

TFP600

SFP600

APPLICATIONS

Multi-purpose shut-off valve for use in engineered hot and cold water systems, gas applications and compressed air services.

MATERIALS AND CONSTRUCTION

- Forged brass body and patented "Raised V" end pieces for increased strength.
- Full port construction for high flow coefficient.
- Durable chrome-plated brass ball.
- Viton® "O" Ring and PTFE packing for upper-stem seal.
- Stem-threaded packing nut for easy adjustment.
- Blow-out Proof Stem.
- Conforms to MSS SP-110 standards

DESIGN CRITERIA

Threaded (IPS) only:

- CAN/CGA 3.16
  (1/2" through 2")
  125 psig
- AGA3-88 / CGA CR91-002
  (1/4" through 2")
  5 psig
- UL Listed Subject 258 for Trim and Drain (1/4" through 2")
- 150 WSP
- Available up to 4" in threaded and solder ends.
- cULus 300 PSI (Threaded only)

Reviewed	(X)
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WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray EIT, Williams Engir

Date: 26/10/2010

NCI MARKETING INC
66 Don Hillock Drive
Aurora, Ontario L4G 0H6

Tel: 905.727.5545 or 1.800.268.3509
Fax: 905.727.4088

www.nci-marketing.com

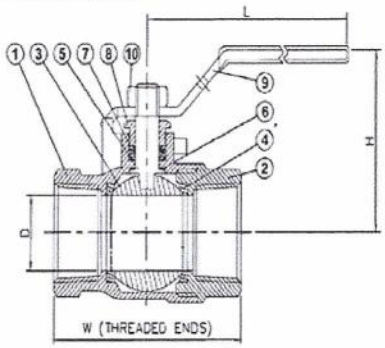
FP600 FULL PORT FORGED BRASS BALL VALVE

T-FP600 Threaded End (IPS)
1/4" through 2" 600 CWP
2½" through 4" 400 CWP

NCI
Your Single Source Solution

MATERIALS LIST		
	PART	SPECIFICATION
1	BODY	FORGED BRASS ASTM B124 C37700
2	END CAP	FORGED BRASS ASTM B124 C37700
3	SEAT	PTFE
4	BALL	BRASS ASTM B16 C36000/B124 C37700
5	STEM	BRASS ASTM B16 C36000
6	THRUST WASHER	PTFE
7	STEM PACKING	PTFE
8	GLAND	PTFE
9	HANDLE	BRASS ASTM B16 C36000
10	NUT	STEEL

Size (IN)	L	D	H	W
1/4"	3.23	0.37	1.37	1.81
3/8"	3.23	0.37	1.37	1.81
1/2"	3.23	0.50	1.45	2.12
3/4"	3.94	0.75	1.78	2.41
1"	4.72	0.98	2.29	2.96
1-1/4"	4.72	1.22	2.44	3.28
1-1/2"	7.09	1.50	3.00	3.67
2"	7.09	1.97	3.30	4.21
2-1/2"	8.66	2.50	4.59	5.38
3"	8.66	3.00	4.92	6.06
4"	9.84	3.98	5.73	7.39



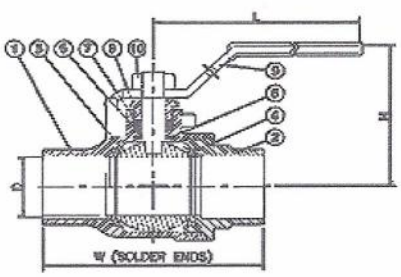
Above port dimensions meet or exceed full MSS 110 standards.

S-FP600 Solder End (C x C)
1/2" through 2" 600 CWP
2-1/2" through 4" 400 CWP

MATERIALS LIST		
	PART	SPECIFICATION
1	BODY	FORGED BRASS ASTM B124 C37700
2	END CAP**	FORGED BRASS ASTM B124 C37700
3	SEAT	PTFE
4	BALL	BRASS ASTM B16 C36000/B124 C37700
5	STEM	BRASS ASTM B16 C36000
6	THRUST WASHER	PTFE
7	STEM PACKING	PTFE
8	GLAND	PTFE
9	HANDLE	BRASS ASTM B16 C36000
10	NUT	STEEL

** *Patented "Raised V" design negates body joint leakage.*

Size (IN)	L	D	H	W
1/2"	3.23	0.50	1.45	1.94
3/4"	3.94	0.75	1.78	2.73
1"	4.72	0.98	2.29	3.29
1-1/4"	4.72	1.22	2.44	3.74
1-1/2"	7.09	1.50	3.00	4.30
2"	7.09	1.97	3.30	5.31
2-1/2"	8.66	2.50	4.59	6.29
3"	8.66	3.00	4.92	7.19
4"	9.84	3.98	5.73	9.26



FP600-0110

Raychem

BTV *

Visit www.tycothermal.com for more information on our ten-year extended warranty.

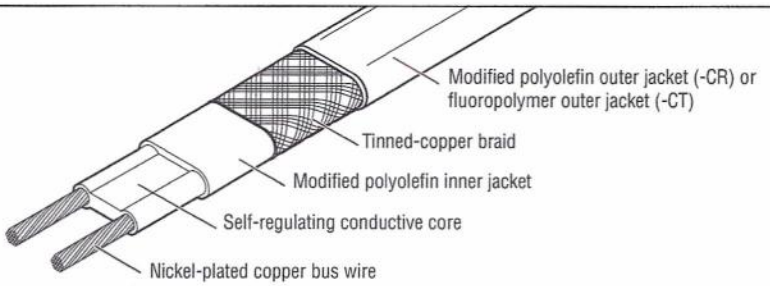
Self-regulating heating cables

Electrical freeze protection for both nonhazardous and hazardous locations.

The BTV family of self-regulating heating cables provides the solution to freeze-protection and process-temperature maintenance applications. BTV heating cables maintain process temperatures up to 150°F (65°C) and can withstand intermittent exposure to temperatures up to 185°F (85°C). The heating cables are configured for use in nonhazardous and hazardous locations, including areas where corrosives may be present.

Raychem® BTV cables meet the requirements of the U.S. National Electrical Code and the Canadian Electrical Code. For additional information, contact your Tyco Thermal Controls representative or call Tyco Thermal Controls at (800) 545-6258.

Heating cable construction



Application	
Area classification	Nonhazardous and hazardous locations
Traced surface type	Metal and plastic
Chemical resistance	Exposure to aqueous inorganic chemicals: Use -CR (modified polyolefin outer jacket) Exposure to organic chemicals or corrosives: Use -CT (fluoropolymer outer jacket) For aggressive organics and corrosives: Consult your Tyco Thermal Controls representative.
Supply Voltage	
BTV1	100–130 Vac
* BTV2	200–277 Vac
Temperature Rating	
Maximum maintain or continuous exposure temperature (power on)	150°F (65°C)
Maximum intermittent exposure temperature, 1000 hours (power on)	185°F (85°C)
Temperature ID Number (T-Rating)	T6: 185°F (85°C) Temperature ID numbers are consistent with North America national electrical codes.

Approvals

IECEx BAS 06.0043X
Ex e II T6 Ex tD A21 IP66

(1) BTV-CR is not CSA Certified for Division 1
(2) BTV-CT only

Hazardous Locations

FM APPROVED
Class I, Div. 2, Groups A, B, C, D
Class II, Div. 2, Groups F, G
Class III

Class I, Div. 1(1) & 2, Groups A, B, C, D
Class II, Div. 1(1) & 2, Groups E, F, G
Class III

Zone Approvals

FM APPROVED
CLI, ZN1, AEx e II T6(2)

Ex e II T6(2)

BTV heating cables also have many other approvals, including Baseefa (2001) Ltd., PTB, DNV, and ABS.

Design and Installation

For proper design and installation, use TraceCalc® Pro design software or the Design section of the *Industrial Product Selection and Design Guide* (H56550). Also, refer to the *Industrial Heat-Tracing Installation and Maintenance Manual* (H57274). Literature is available via the Tyco Thermal Controls Web site, www.tycothermal.com.

Raychem

BTV *

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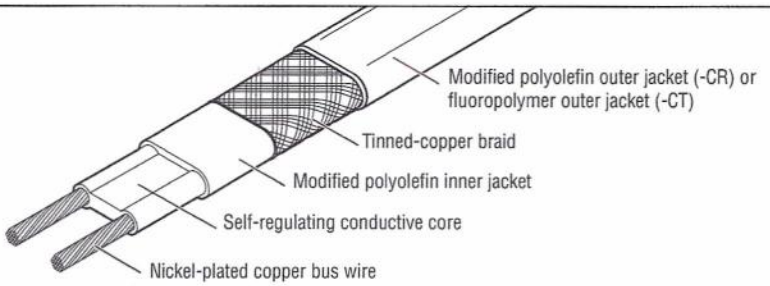

Application	
Area classification	Nonhazardous and hazardous locations
Traced surface type	Metal and plastic
Chemical resistance	Exposure to aqueous inorganic chemicals: Use -CR (modified polyolefin outer jacket) Exposure to organic chemicals or corrosives: Use -CT (fluoropolymer outer jacket) For aggressive organics and corrosives: Consult your Tyco Thermal Controls representative.
Supply Voltage	
BTV1	100–130 Vac
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Hazardous Locations

FM APPROVED
Class I, Div. 2, Groups A, B, C, D
Class II, Div. 2, Groups F, G
Class III

Class I, Div. 1(1) & 2, Groups A, B, C, D
Class II, Div. 1(1) & 2, Groups E, F, G
Class III

Zone Approvals

FM APPROVED
CLI, ZN1, AEx e II T6(2)

Ex e II T6(2)

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België / Belgique
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Fax: (32) 16/213 603

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United States
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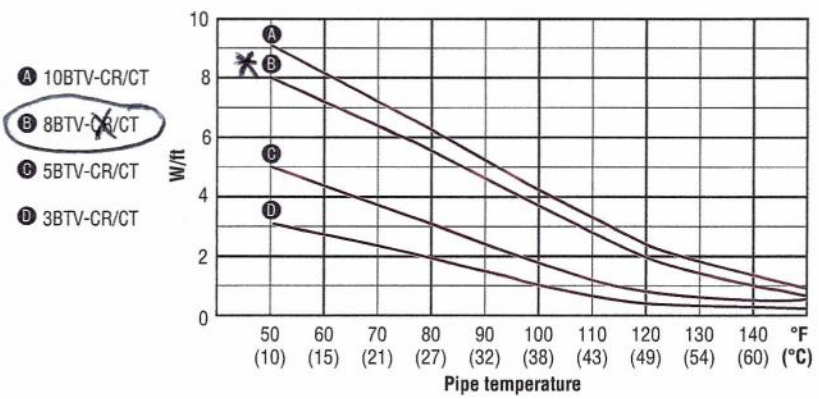
20F, Innovation Building,
1009 Yi Shan Rd,
Shanghai 200233,
P.R.China
Tel: 86-21-2412-1688
Fax: 86-21-5426-2937 / 5426-3167

tyco
Thermal Controls

Nominal Power Output Rating on Metal Pipes at 120 V/240 V

	Adjustment factors	
	Power output	Circuit length
208 V		
3BTV2-CR/CT	0.82	0.96
5BTV2-CR/CT	0.85	0.94
8BTV2-CR/CT	0.89	0.92
10BTV2-CR/CT	0.89	0.92
277 V		
3BTV2-CR/CT	1.13	1.08
5BTV2-CR/CT	1.12	1.09
8BTV2-CR/CT	1.08	1.11
10BTV2-CR/CT	1.08	1.11



Note: To choose the correct heating cable for your application, use the Design section of the *Industrial Product Selection and Design Guide* (H56550). For more detailed information, use TraceCalc Pro design software.

Maximum Circuit Lengths Based on Circuit Breaker Sizes

	Ambient temperature at start-up		Maximum circuit length (in feet) per circuit breaker							
			120 V				240 V			
			15 A	20 A	30 A	40 A	15 A	20 A	30 A	40 A
3BTV-CR/CT	50°F	(10°C)	330	330	330	330	660	660	660	660
	0°F	(–18°C)	200	265	330	330	395	530	660	660
	–20°F	(–29°C)	175	235	330	330	350	465	660	660
	–40°F	(–40°C)	155	205	310	330	310	410	620	660
5BTV-CR/CT	50°F	(10°C)	230	270	270	270	460	540	540	540
	0°F	(–18°C)	140	190	270	270	285	380	540	540
	–20°F	(–29°C)	125	165	250	270	250	330	500	540
	–40°F	(–40°C)	110	145	220	270	220	295	440	540
8BTV-CR/CT	50°F	(10°C)	150	200	210	210	300	400	420	420
	0°F	(–18°C)	100	130	200	210	200	265	400	420
	–20°F	(–29°C)	85	115	175	210	175	235	350	420
	–40°F	(–40°C)	80	105	155	210	155	210	315	420
10BTV-CR/CT	50°F	(10°C)	120	160	180	180	240	315	360	360
	0°F	(–18°C)	80	110	160	180	160	215	325	360
	–20°F	(–29°C)	70	95	140	180	145	190	285	360
	–40°F	(–40°C)	65	85	125	170	125	170	255	340

Ground-Fault Protection	Tyco Thermal Controls and national electrical codes require both ground-fault protection of equipment and a grounded metallic covering on all heating cables. The DigiTrace® HTPI and HTPG distribution panels meet this requirement. The following ground-fault breakers can also be used: Square D Type QOB-EPD or QO-EPD, TraceGuard 277®, Cutler Hammer Type QBGFEP.	
Product Characteristics	**3BTV, 5BTV**	**8BTV, 10BTV**
Minimum bend radius	@68°F (20°C):0.5 in (12.7 mm)	@68°F (20°C): 0.5 in (12.7 mm)
Weight (lb per 10 ft, nominal)	0.7	1.0
Bus wire size	16 AWG	16 AWG
Outer jacket color	Black	Black
Heating cable dimensions	0.46 in x 0.25 in (11.7 mm x 6.35 mm)	0.65 in x 0.26 in (16.5 mm x 6.6 mm)
Components	Tyco Thermal Controls offers a full range of components for power connections, splices, and end seals. These components must be used to ensure proper functioning of the product and compliance with warranty, code, and approvals requirements.	

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tyco
Thermal Controls

Raychem

E-100-A and E-100-L-A

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

D100 0AT0 011A

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

By:
WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.
Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

Visit www.tycothermal.com for more information on our ten-year extended warranty.

End seal and lighted end seal kits

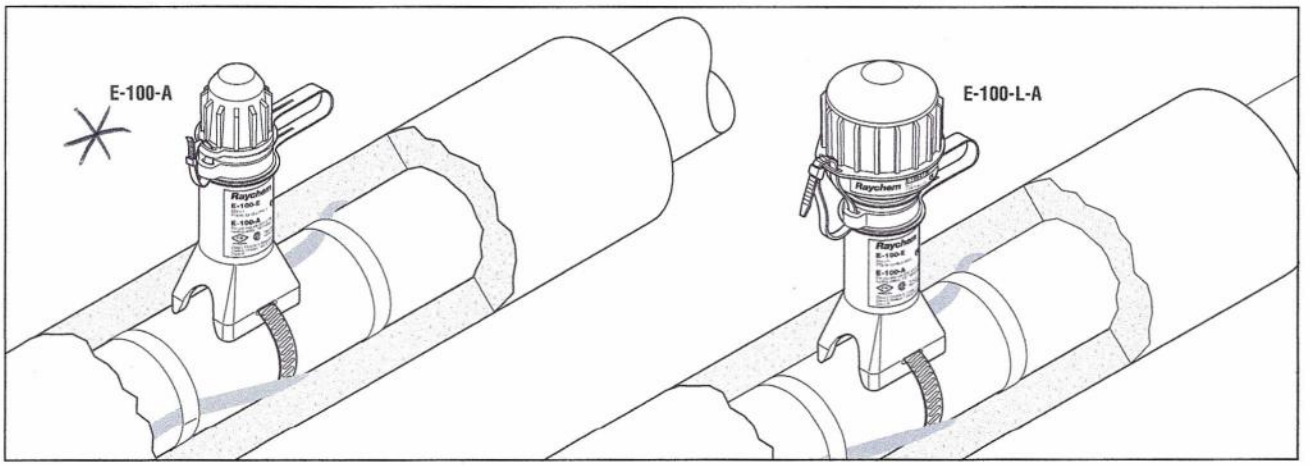
The E-100-A and E-100-L-A serve as above-insulation end seal kits for Raychem® brand BTV, QTVR, XTV, KTV, or VPL heating cables. They are approved by FM and CSA for use in hazardous locations.

Both the E-100-A and the E-100-L-A are mounted on the pipe and project through the thermal insulation and cladding for ease of maintenance. The E-100-L-A end seal with signal light uses an array of bright LEDs for exceptional visibility and long product life.

These rugged end seals are made from high-performance engineering polymer and resist impact, high temperature, and chemical and UV exposure. The stand allows for up to four inches (100 mm) of thermal insulation. The encapsulated light and boot reliably prevent moisture and dust ingress. The industrial-grade electronics used in the E-100-L-A are encapsulated.

Both the E-100-A and E-100-L-A are re-enterable, allowing easy access for testing. Voltage and continuity checks can be done by simply unscrewing the E-100-A cap and removing the reusable sealing boot. The E-100-L-A makes maintenance even easier by allowing for visual inspection of heating circuit continuity. The E-100-L-A is available in two voltages and can be retrofitted into previously installed E-100-A end seals. The light module is replaceable.

The kits contain all the necessary materials for a complete installation except for one pipe strap, which must be ordered separately.



	E-100-A	E-100-L-A*
Description	Above-insulation end seal, cold-applied	Above-insulation end seal with red signal light, cold-applied *Not for use with 480 V VPL
Kit Contents **Note:** Order appropriate pipe strap separately (one per kit)	1 end seal	1 end seal with red indicator light
Approvals	**Hazardous Locations** FM APPROVED: Class I, Div. 2, Groups A, B, C, D; Class II, Div. 1 and 2, Groups E, F, G; Class III CSA (1) FM APPROVED: CLI, ZN1, AEx e II T(2) CSA: Ex e II T(2)	**Hazardous Locations** FM APPROVED: Class I, Div. 2, Groups A, B, C, D; Class II, Div. 1 and 2, Groups E, F, G; Class III CSA (1) FM APPROVED: CLI, ZN1, AEx em II T(2) CSA: Ex em II T(2)

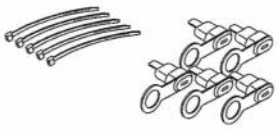
(1) Except VPL
(2) For T-rating, see heating cable or design documentation

	E-100-A	E-100-L-A	
Product Specifications			
Heating cable capability	BTV-CR, BTV-CT, QTVR-CT, XTV-CT, KTV-CT and VPL-CT		
Ingress protection	NEMA 4X (IP65)	NEMA 4X (IP65)	
Minimum installation temperature	–40°F (–40°C)	–40°F (–40°C)	
Minimum usage temperature	–60°F (–50°C)	–60°F (–50°C)	
Maximum pipe temperature	500°F (260°C)	500°F (260°C)	
Maximum operating voltage	480 Vac	120/277 Vac	
Overall height	7 in (175 mm)	8 in (200 mm)	
Outer diameter at insulation	2.0 in (50 mm) Usable with up to 4 in (100 mm) thermal insulation	3 in (75 mm)	
Materials	High-performance glass-filled engineered polymer	High-performance glass-filled engineered polymer	
Light source		Super-bright light-emitting diodes (LEDs), red	
Light source power supply		Linear (nonswitching)	
Power consumption		< 2 W	

Ordering Details

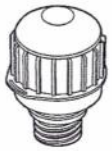
End seal			
Catalog number	E-100-A (100–480 Vac)	E-100-L1-A (100–120 Vac)	E-100-L2-A (200–277 Vac)
Part number	046567-000	583377-000	478767-000
Weight	0.6 lb (272 g)	1.3 lb (630 g)	1.3 lb (630 g)

Spare boot pack for E-100



Catalog number	E-100-BOOT-5-PACK
Part number	281053-000
Pack weight	0.25 lb (140 g)
Pack contents	Five sealant-filled boots and five cable ties

Replacement indicator light for E-100-LXX-A



Catalog number	E-100-LR1-A (100–120 Vac)	E-100-LR2-A (200–277 Vac)
Part number	552225-000	874485-000
Weight	0.9 lb (450 g)	0.9 lb (450 g)

#S

Use on 1-1/2" pipe and smaller

Internal Dimensions

9/16" H x 9/16" W

14.2 mm H x 14.2 mm W

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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Per,

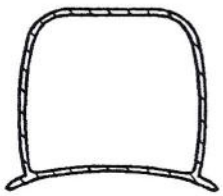
WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

#M



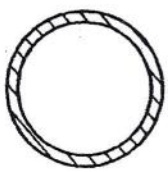
Use on 2" pipe and larger

Internal Dimensions

3/4" H x 7/8" W

19 mm H x 22 mm W

#R



LDPE Tubing for factory insulated fittings

Internal Dimensions

5/8" Dia.

15.8 mm Dia.

URECON LTD

CALMAR, AB ST-LAZARE, QC

URECON PLASTIC TRACE CONDUITS

Dwg No.	Date	Rev.
URE-010	Jan. 5/99	1

Raychem

JBM-100

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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For:
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engin
Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

Visit www.tycothermal.com for more information on our ten-year extended warranty.

Multiple-entry power/splice/tee connection with junction box

The JBM-100 kit serves as a power connection, splice, or tee for up to three Raychem® brand BTV, QTVR, XTV, KTV, or VPL heating cables. It is approved by FM, CSA, and PTB for use in hazardous locations.

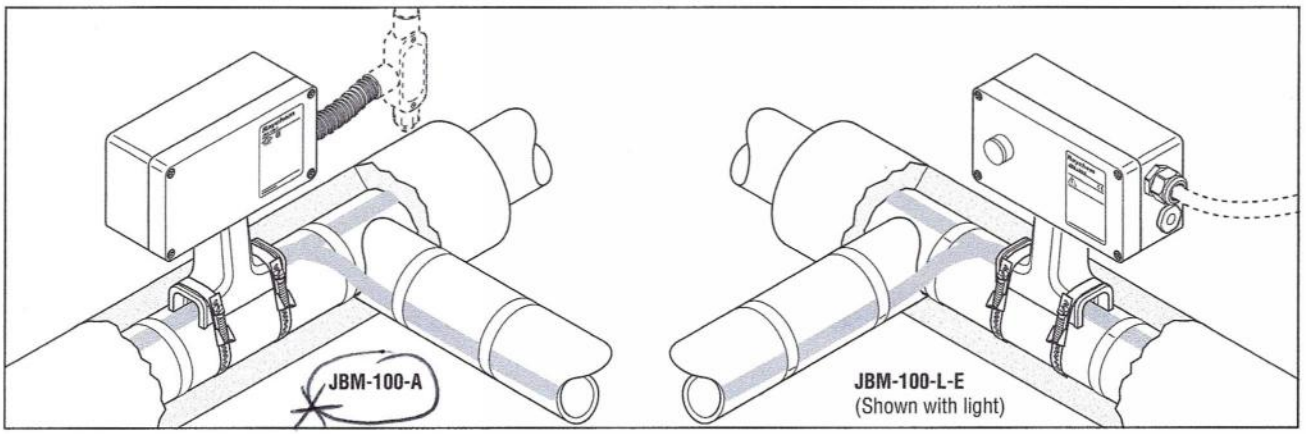
The JBM-100 integrates the functions of connection kits and insulation entries. The rugged stand protects the heating cable and allows for up to four inches (100 mm) of thermal insulation.

The cold-applied core sealer does not require a heat gun or torch for installation, so no hot work permit is necessary. The silicone-free, noncuring sealant allows easy installation and re-entry for maintenance.

Innovative spring clamp terminals provide fast installation and safe, reliable, maintenance-free operation.

Compared with other systems, this connection kit significantly reduces installation time. The kit is offered in three versions, customized for local installation practices. All kits are also available with a plug-in LED light (-L) that indicates when power is supplied to the heating cable circuit.

The kit contains all the necessary materials for a complete installation except for the pipe straps, which must be ordered separately.



	JBM-100-A* JBM-100-L-A* *Not for use with 480 V VPL	JBM-100-E JBM-100-L-E*	JBM-100-EP JBM-100-L-EP*
Description	This kit has a junction box with one 3/4 in through hole. The kit includes one stopping plug.	This kit has a junction box with two M25 threaded entries, one stopping plug and one plastic power cable gland.	This kit has a junction box with two M25 threaded entries, an earthing plate and an external earthing stud. It is designed for use with armored power cables.
Kit Contents **Note:** Order appropriate pipe straps separately (two straps per kit)	1 junction box with terminals 1 stand assembly 3 core sealers 3 green/yellow tubes 1 3/4 in stopping plug assembly 1 light module (for -L only) 2 grommet plugs	1 junction box with terminals 1 stand assembly 3 core sealers 3 green/yellow tubes 1 M25 gland for power cable 8–17 mm in diameter 2 M25 stopping plugs 1 light module (for -L only) 2 grommet plugs	1 junction box with terminals, earth continuity plate, and stud 1 stand assembly 3 core sealers 3 green/yellow tubes 2 M25 stopping plugs 1 light module (for -L only) 2 grommet plugs

	JBM-100-A ✂ JBM-100-L-A*	JBM-100-E JBM-100-L-E*	JBM-100-EP JBM-100-L-EP*

*Not for use with 480 V VPL

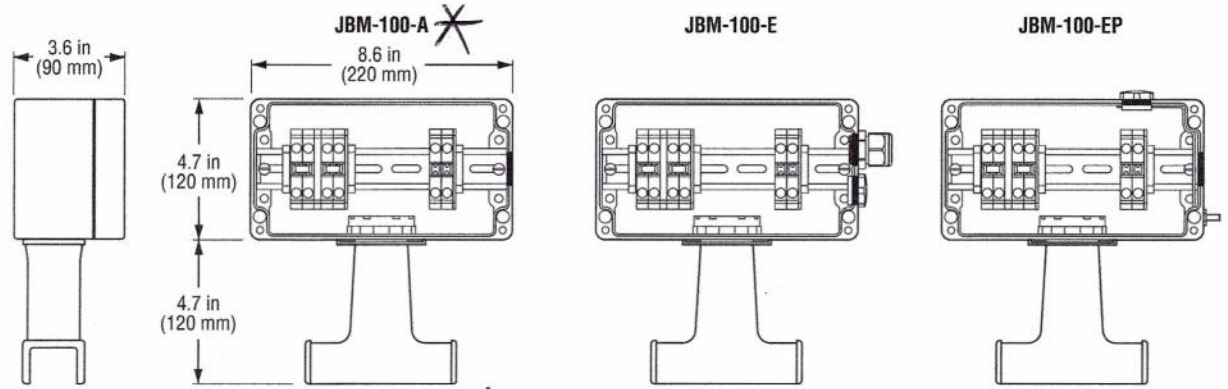
Approvals

Hazardous Locations

JBM-100-A ✂ JBM-100-L-A*	JBM-100-E JBM-100-L-E*	JBM-100-EP JBM-100-L-EP*
FM APPROVED: Class I, Div. 2, Groups A, B, C, D Class II, Div. 1 & 2, Groups E, F, G Class III	Ex: II 2 GD EEx e II II 2 GD EEx em II (for -L only) PTB 98 ATEX 1021 U	Ex: II 2 GD EEx e II II 2 GD EEx em II (for -L only) PTB 98 ATEX 1021 U
SP	SP: Ex e II T(2) Ex em II T(2) (for -L only)	SP: Ex e II T(2) Ex em II T(2) (for -L only)
(1) FM APPROVED: CLI, ZN1, AEx e II T(2) CLI, ZN1, AEx em II T(2) (for -L only)		
SP: Ex e II T(2) Ex em II T(2) (for -L only)		

(1) Except VPL
(2) For T-rating, see heating cable or design documentation

Dimensions



	JBM-100-A ✂	JBM-100-E	JBM-100-EP
Product Specifications			
Heating cable capability	BTV-CR, BTV-CT, QTVR-CT, XTV-CT, KTV-CT and VPL-CT		
Ingress protection	NEMA 4X	IP66	IP66
Entries	1 x 0.75 in	2 x M25	2 x M25
Minimum installation temperature	–40°F (–40°C)	–40°F (–40°C)	–40°F (–40°C)
Minimum usage temperature	–60°F (–50°C)	–60°F (–50°C)	–60°F (–50°C)
Maximum pipe temperature	500°F (260°C)	500°F (260°C)	500°F (260°C)
Terminals	Spring clamp EEx e 4 line, 2 ground	Spring clamp EEx e 2 phase, 2 neutral, 2 earth	Spring clamp EEx e 2 phase, 2 neutral, 2 earth
Maximum conductor size	8 AWG	10 mm^2	10 mm^2
Maximum operating voltage	480 Vac	480 Vac	480 Vac
Maximum circuit breaker rating	50 A	40 A	40 A
Materials			
Enclosure	Electrostatic charge-resistant glass-filled engineered polymer, black	Electrostatic charge-resistant glass-filled engineered polymer, black	Electrostatic charge-resistant glass-filled engineered polymer, black
Lid screws	Stainless steel	Stainless steel	Stainless steel
Lid gasket	Silicone rubber	Silicone rubber	Silicone rubber
Earth continuity plate	n/a	n/a	Steel, zinc-plated and yellow-chromated
Optional LED Indicator Light			
Color	Red	Green	Green
Voltage rating	100–277 Vac	100–277 Vac	100–277 Vac
Power consumption	< 1 W	< 1 W	< 1 W

	JBM-100-A	JBM-100-E	JBM-100-EP
Ordering Details			
Multiple-entry power/splice/tee connection			
Catalog number	JBM-100-A	JBM-100-E	JBM-100-EP
Part number	179955-000	831519-000	986415-000
Weight	4.3 lb (1.95 kg)	1.9 kg (4.2 lb)	2.1 kg (4.6 lb)
Multiple-entry power/splice/tee connection with light			
Catalog number	JBM-100-L-A	JBM-100-L-E	JBM-100-L-EP
Part number	656081-000	395855-000	300273-000
Weight	5.3 lb (2.4 kg)	2.3 kg (5.1 lb)	2.5 kg (5.5 lb)

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Raychem

JBS-100

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Single-entry power connection with ju

The JBS-100 kit is designed to connect power to a single Raychem® brand BTV, QTVR, XTV, KTV, or VPL heating cable. It is approved by FM, CSA, and PTB for use in hazardous locations.

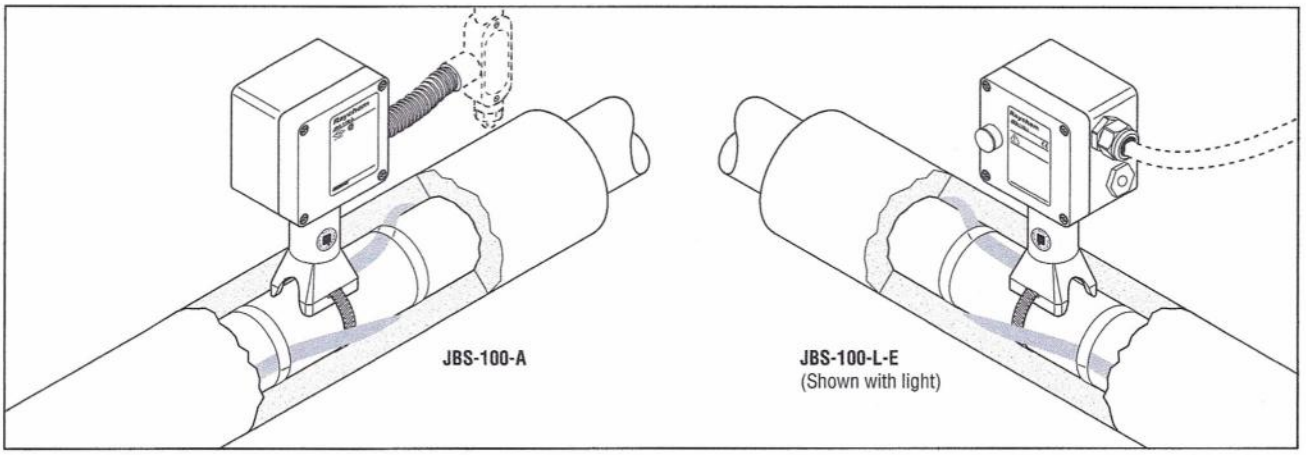
The JBS-100 integrates the functions of connection kits and insulation entries. The rugged stand protects the heating cable and allows for up to four inches (100 mm) of thermal insulation.

The cold-applied core sealer does not require a heat gun or torch for installation, so no hot work permit is necessary. The silicone-free, noncuring sealant allows easy installation and re-entry for maintenance.

Innovative spring clamp terminals provide fast installation and safe, reliable, maintenance-free operation.

Compared with other systems, this connection kit significantly reduces installation time. The kit is offered in three versions, customized for local installation practices, and is also available with a plug-in LED light (-L) that indicates when power is supplied to the heating cable circuit.

The kit contains all the necessary materials for a complete installation except for one pipe strap, which must be ordered separately.



JBS-100-A

JBS-100-L-E
(Shown with light)

	JBS-100-A, A6 JBS-100-L-A* *Not for use with 480 V VPL	JBS-100-E JBS-100-L-E*	JBS-100-EP JBS-100-L-EP*
Description	This kit has a junction box with one 3/4 in through hole.	This kit has a junction box with two M25 threaded entries, one stopping plug and one plastic power cable gland.	This kit has a junction box with two M25 threaded entries, an earthing plate and an external earthing stud. It is designed for use with armored power cables.
Kit Contents **Note:** Order appropriate pipe strap separately (one per kit)	1 junction box with terminals 1 stand assembly 1 core sealer 1 green/yellow tube 1 light module (for -L only) 1 cable tie	1 junction box with terminals 1 stand assembly 1 core sealer 1 green/yellow tube 1 M25 gland for power cable 8–17 mm in diameter 1 M25 stopping plug 1 light module (for -L only)	1 junction box with terminals, earth continuity plate, and stud 1 stand assembly 1 core sealer 1 green/yellow tube 1 M25 stopping plug 1 light module (for -L only)

	JBS-100-A, A6 JBS-100-L-A*	JBS-100-E JBS-100-L-E*	JBS-100-EP JBS-100-L-EP*

*Not for use with 480 V VPL

Approvals

Hazardous Locations

FM APPROVED — Class I, Div. 2, Groups A, B, C, D
Class II, Div. 1 & 2, Groups E, F, G
Class III

II 2 GD EEx e II
II 2 GD EEx em II (for -L only)
PTB 97 ATEX 1058 U

II 2 GD EEx e II
II 2 GD EEx em II (for -L only)
PTB 97 ATEX 1058 U

Ex e II T(2)
Ex em II T(2) (for -L only)

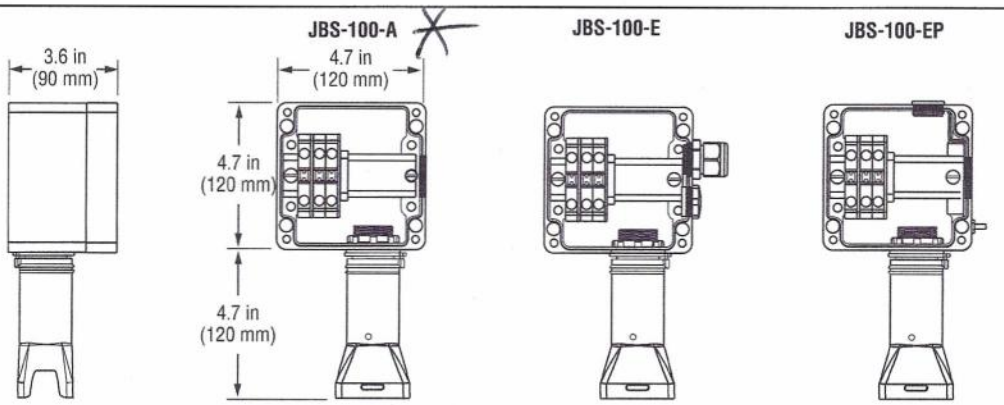
Ex e II T(2)
Ex em II T(2) (for -L only)

(1) FM APPROVED — CLI, ZN1, AEx e II T(2)
CLI, ZN1, AEx em II T(2) (for -L only)

Ex e II T(2)
Ex em II T(2) (for -L only)

(1) Except VPL
(2) For T-rating, see heating cable or design documentation

Dimensions



	JBS-100-A, A6	JBS-100-E	JBS-100-EP
Product Specifications			
Heating cable capability	BTV-CR, BTV-CT, QTVR-CT, XTV-CT, KTV-CT and VPL-CT		
Ingress protection	NEMA 4X	IP66/IP67	IP66/IP67
Entries	1 x 3/4 in	2 x M25	2 x M25
Minimum installation temperature	–40°F (–40°C)	–40°F (–40°C)	–40°F (–40°C)
Minimum usage temperature	–60°F (–50°C)	–60°F (–50°C)	–60°F (–50°C)
Maximum pipe temperature	500°F (260°C)	500°F (260°C)	500°F (260°C)
Terminals	Spring clamp EEx e 2 line, 1 ground	Spring clamp EEx e 1 phase, 1 neutral, 1 earth	Spring clamp EEx e 1 phase, 1 neutral, 1 earth
Maximum conductor size	8 AWG (A6 to 6 AWG)	10 mm^2	10 mm^2
Maximum operating voltage	480 Vac	480 Vac	480 Vac
Maximum circuit breaker rating	50 A	40 A	40 A
Materials			
Enclosure	Electrostatic charge-resistant glass-filled engineered polymer, black	Electrostatic charge-resistant glass-filled engineered polymer, black	Electrostatic charge-resistant glass-filled engineered polymer, black
Lid screws	Stainless steel	Stainless steel	Stainless steel
Lid gasket	Silicone rubber	Silicone rubber	Silicone rubber
Earth continuity plate	n/a	n/a	Steel, zinc-plated and yellow-chromated
Optional LED Indicator Light			
Color	Red	Green	Green
Voltage rating	100–277 Vac	100–277 Vac	100–277 Vac
Power consumption	< 1 W	< 1 W	< 1 W

	JBS-100-A, A6	JBS-100-E	JBS-100-EP
Ordering Details			
Power connection			
Catalog number	JBS-100-A / JBS-100-A6	JBS-100-E	JBS-100-EP
Part number	085947-000 / C26470-000	829939-000	158251-000
Weight	2.5 lb (1.1 kg)	1.2 kg (2.6 lb)	1.3 kg (2.9 lb)
Power connection with light			
Catalog number	JBS-100-L-A	JBS-100-L-E	JBS-100-L-EP
Part number	944699-000	054363-000	075249-000
Weight	3.5 lb (1.6 kg)	1.6 kg (3.5 lb)	1.7 kg (3.7 lb)

Worldwide Headquarters
Tyco Thermal Controls
307 Constitution Drive
Menlo Park, CA 94025-1164
USA
Tel: (800) 545-6258
Tel: (650) 216-1526
Fax: (800) 527-5703
Fax: (650) 474-7711
info@tycothermal.com
www.tycothermal.com

Canada
Tyco Thermal Controls
250 West St.
Trenton, Ontario
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Tel: (800) 545-6258
Fax: (800) 527-5703

Europe, Middle East, Africa
Tyco Thermal Controls
Romeinse Straat 14
3001 Leuven
België / Belgique
Tel: (32) 16/213 511
Fax: (32) 16/213 603

Latin America
Tyco Thermal Controls
7433 Harwin Drive
Houston, TX 77036
United States
Tel: (713) 868-4800
Tel: (713) 735-8645
Fax: (713) 868-2333

North Asia
Tyco Thermal Controls
20F, Innovation Building,
1009 Yi Shan Rd,
Shanghai 200233,
P.R.China
Tel: 86-21-2412-1688
Fax: 86-21-5426-2937 / 5426-3167

tyco
Thermal Controls

Raychem

T-100

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

D100 0AT0 011A

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engin.

Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

Visit www.tycothermal.com for more information on our ten-year extended warranty.

Splice or tee connection kit

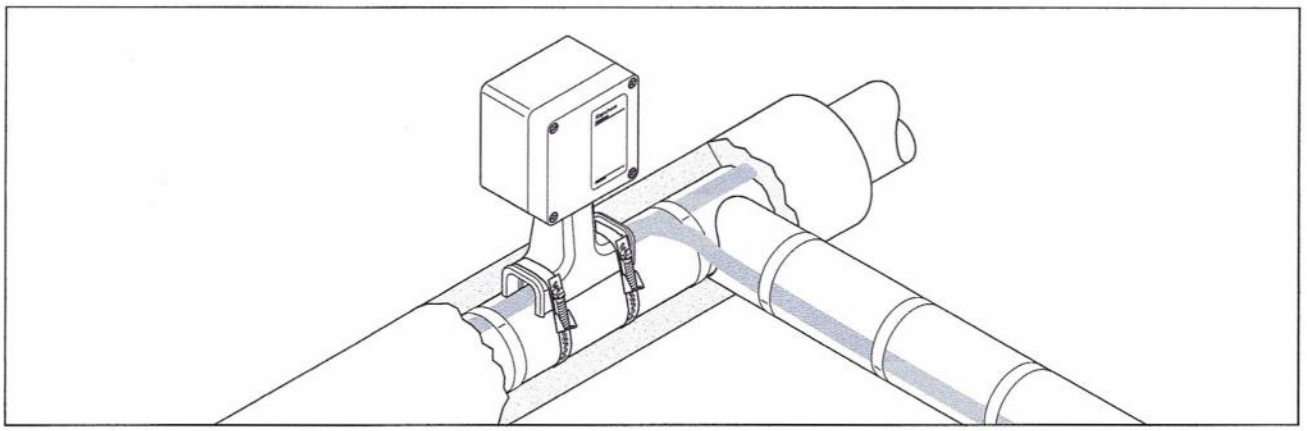
The T-100 serves as an above-insulation splice or tee for up to three Raychem® brand BTV, QTVR, XTV, KTV, or VPL heating cables. It is approved by FM, CSA, and PTB[1] for use in hazardous locations.

The T-100 integrates the functions of connection kits and insulation entries. The rugged stand protects the heating cable and allows for up to four inches (100 mm) of thermal insulation.

The cold-applied core sealer does not require a heat gun or torch for installation, so no hot work permit is necessary. The silicone-free, noncuring sealant in the core sealer allows easy installation and re-entry for maintenance.

The electrical connections in the T-100 are made with insulated crimps. For a splice or tee connection with terminal blocks, use the JBM-100.

Each kit contains all the necessary materials for a complete installation except for the pipe straps, which must be ordered separately.



Description	Above-insulation splice/tee kit appropriate for use in hazardous locations
Kit Contents	1 splice/tee enclosure and lid 1 stand assembly 3 core sealers 3 green/yellow tubes 3 compression crimps 3 crimp insulating boots 2 grommet plugs 1 spanner wrench 1 strain relief assembly **Note:** Order appropriate pipe straps separately (two straps per kit).

Approvals

Hazardous Locations

FM APPROVED — Class I, Div. 2, Groups A, B, C, D
Class II, Div. 1 and 2, Groups E, F, G
Class III

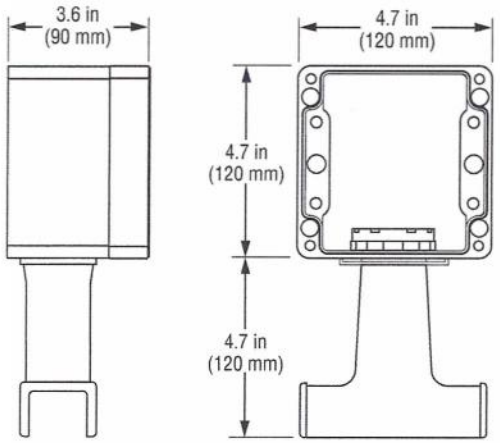
FM APPROVED[1] — CLI, ZN1, AEx e II T[2]

Ex e II T[2]

II 2 GD EEx e II
PTB 98 ATEX 1020 U

(1) Except VPL
(2) For T-rating, see heating cable or design documentation

Dimensions (nominal)



Product Specifications

Heating cable capability	BTV-CR, BTV-CT, QTVR-CT, XTV-CT, KTV-CT, and VPL-CT
Ingress protection	NEMA 4X/IP66/IP67
Minimum installation temperature	–40°F (–40°C)
Minimum usage temperature	–60°F (–50°C)
Maximum pipe temperature	500°F (260°C)
Maximum operating voltage	480 Vac
Maximum circuit breaker rating	50 A for FM, CSA; 40 A for PTB

Materials

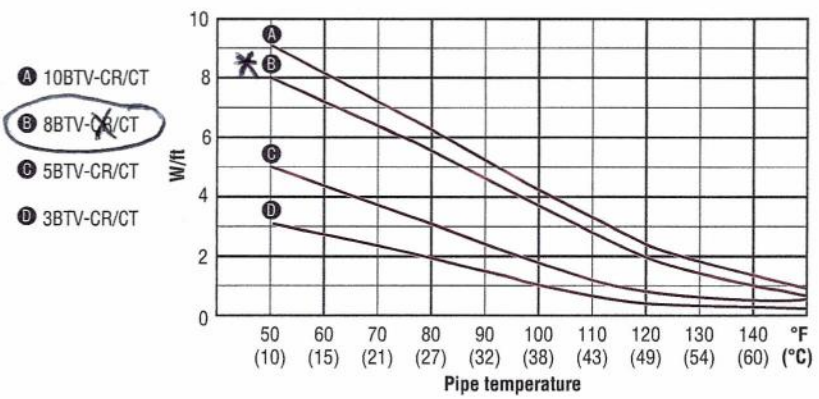
Enclosure	Electrostatic charge-resistant glass-filled engineered polymer, black
Lid screws	Stainless steel
Lid gasket	Silicone rubber

Ordering Details

Catalog number	T-100
Part number	447379-000
Weight	2.5 lb (1.2 kg)
Crimp tool	T-100-CT (not included in kit; equivalent to Panduit CT-1570) PN 954799-000
Spare crimps and insulating tubes	T-100-CRIMP-KIT PN 577853-000

Nominal Power Output Rating on Metal Pipes at 120 V/240 V

	Adjustment factors	
	Power output	Circuit length
208 V		
3BTV2-CR/CT	0.82	0.96
5BTV2-CR/CT	0.85	0.94
8BTV2-CR/CT	0.89	0.92
10BTV2-CR/CT	0.89	0.92
277 V		
3BTV2-CR/CT	1.13	1.08
5BTV2-CR/CT	1.12	1.09
8BTV2-CR/CT	1.08	1.11
10BTV2-CR/CT	1.08	1.11



Note: To choose the correct heating cable for your application, use the Design section of the *Industrial Product Selection and Design Guide* (H56550). For more detailed information, use TraceCalc Pro design software.

Maximum Circuit Lengths Based on Circuit Breaker Sizes

	Ambient temperature at start-up		Maximum circuit length (in feet) per circuit breaker							
			120 V				240 V			
			15 A	20 A	30 A	40 A	15 A	20 A	30 A	40 A
3BTV-CR/CT	50°F	(10°C)	330	330	330	330	660	660	660	660
	0°F	(–18°C)	200	265	330	330	395	530	660	660
	–20°F	(–29°C)	175	235	330	330	350	465	660	660
	–40°F	(–40°C)	155	205	310	330	310	410	620	660
5BTV-CR/CT	50°F	(10°C)	230	270	270	270	460	540	540	540
	0°F	(–18°C)	140	190	270	270	285	380	540	540
	–20°F	(–29°C)	125	165	250	270	250	330	500	540
	–40°F	(–40°C)	110	145	220	270	220	295	440	540
8BTV-CR/CT	50°F	(10°C)	150	200	210	210	300	400	420	420
	0°F	(–18°C)	100	130	200	210	200	265	400	420
	–20°F	(–29°C)	85	115	175	210	175	235	350	420
	–40°F	(–40°C)	80	105	155	210	155	210	315	420
10BTV-CR/CT	50°F	(10°C)	120	160	180	180	240	315	360	360
	0°F	(–18°C)	80	110	160	180	160	215	325	360
	–20°F	(–29°C)	70	95	140	180	145	190	285	360
	–40°F	(–40°C)	65	85	125	170	125	170	255	340

Ground-Fault Protection	Tyco Thermal Controls and national electrical codes require both ground-fault protection of equipment and a grounded metallic covering on all heating cables. The DigiTrace® HTPI and HTPG distribution panels meet this requirement. The following ground-fault breakers can also be used: Square D Type QOB-EPD or QO-EPD, TraceGuard 277®, Cutler Hammer Type QBGFEP.	
Product Characteristics	**3BTV, 5BTV**	**8BTV, 10BTV**
Minimum bend radius	@68°F (20°C):0.5 in (12.7 mm)	@68°F (20°C): 0.5 in (12.7 mm)
Weight (lb per 10 ft, nominal)	0.7	1.0
Bus wire size	16 AWG	16 AWG
Outer jacket color	Black	Black
Heating cable dimensions	0.46 in x 0.25 in (11.7 mm x 6.35 mm)	0.65 in x 0.26 in (16.5 mm x 6.6 mm)
Components	Tyco Thermal Controls offers a full range of components for power connections, splices, and end seals. These components must be used to ensure proper functioning of the product and compliance with warranty, code, and approvals requirements.	

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WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engin.

Date: 26/10/2010

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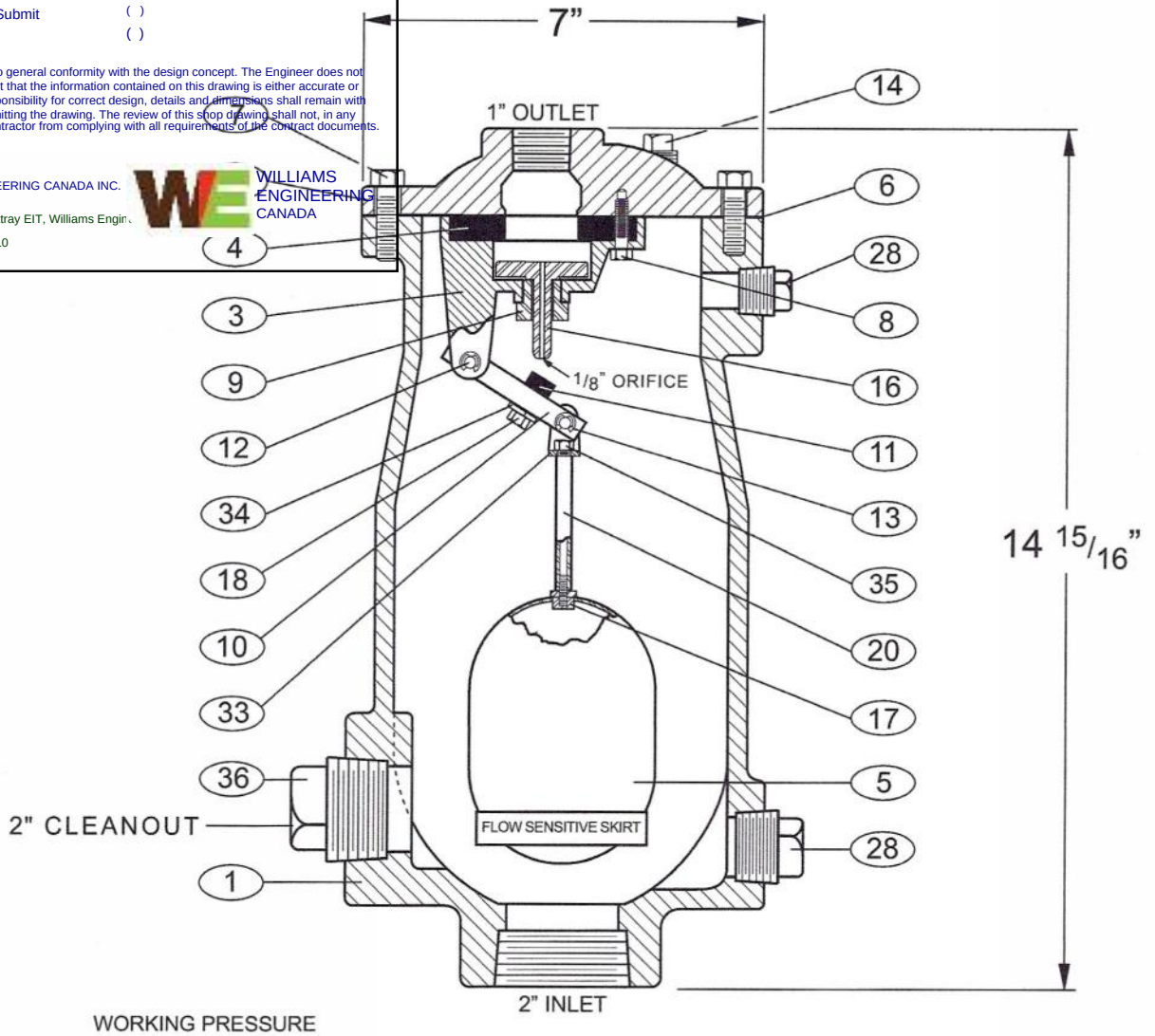

WORKING PRESSURE
150 P.S.I. COLD WORKING PRESSURE-C.W.P.

TEST PRESSURE
1.5 TIMES COLD WORKING PRESSURE-C.W.P.

1. BODY
2. COVER
3. BAFFLE
4. SEAT
5. FLOAT
6. GASKET
7. COVER BOLT
8. RETAINING SCREW
9. BUSHING
10. FLOAT ARM
11. ORIFICE BUTTON
12. PIVOT PIN
13. RETAINING RING
14. PIPE PLUG
16. PLUG
17. FLOAT RETAINER
18. LOCK NUT
20. GUIDE SHAFT
28. PIPE PLUG
33. CLEVIS
34. LOCK WASHER
35. GUIDE SHAFT RETAINER
36 PIPE PLUG

SEE DRAWING NO. VM-801A-M FOR STANDARD MATERIALS OF CONSTRUCTION.
SEE DRAWING NO. VM-801ASV-M FOR SUPER VALVE MATERIALS OF CONSTRUCTION.

Revised 2-3-10

WASTEWATER COMBINATION AIR VALVE

DATE 3-17-00

VAL-MATIC® VALVE AND MANUFACTURING CORP.

DRWG. NO. VM-801A

WASTEWATER COMBINATION AIR VALVE

SERIES NO. 801A

STANDARD MATERIALS OF CONSTRUCTION

PART NO.	PART NAME	MATERIAL
1	BODY	CAST IRON ASTM A126, CLASS B
2	COVER	CAST IRON ASTM A126, CLASS B
3	BAFFLE (1"-2") BAFFLE (3"-4")	CAST IRON ASTM A126, CLASS B DUCTILE IRON ASTM A536, GRADE 65-45-12
4	SEAT	BUNA-N
5	FLOAT	STAINLESS STEEL T316, ASTM A240
6	GASKET	COMPRESSED NON-ASBESTOS FIBER
7	COVER BOLT	ALLOY STEEL SAE, GRADE 5
8	RETAINING SCREW	STAINLESS STEEL T316, ASTM F593
9	GUIDE BUSHING	STAINLESS STEEL T316, ASTM A582
10	FLOAT ARM	STAINLESS STEEL T316, ASTM A582
11	ORIFICE BUTTON	STAINLESS STEEL & BUNA-N
12	PIVOT PIN	STAINLESS STEEL T316, ASTM A276
13	RETAINING RING	STAINLESS STEEL PH 15-7 MO
14	PIPE PLUG	STEEL
16	PLUG	STAINLESS STEEL T316, ASTM A276
17	FLOAT RETAINER	STAINLESS STEEL T316, ASTM F880
18	LOCK NUT	STAINLESS STEEL T316, ASTM A594
20	GUIDE SHAFT	STAINLESS STEEL T316, ASTM A582
28	PIPE PLUG	STEEL
33	CLEVIS	STAINLESS STEEL T316, ASTM A240
34	LOCK WASHER	STAINLESS STEEL T316, ASTM A240
35	GUIDE SHAFT RETAINER	STAINLESS STEEL T316, ASTM A593
36	PIPE PLUG	STEEL

NOTE: ALL SPECIFICATIONS AS LAST REVISED.

Revised 8-12-03

MATERIALS OF CONSTRUCTION	DATE 3/17/00
VAL-MATIC® VALVE AND MANUFACTURING CORP.	DRWG. NO. VM-801A-M

PROJECT	
OWNER	
CONTRACTOR	
DISTRIBUTOR	
CONSULTANT	

CLOW CANADA

2"-12" R/W VALVE NRS FLANGED ENDS GENERAL DIMENSIONS

MODEL F6102

FUSION EPOXY - NSF 61 AND AWWA C550

COMPLIES WITH AWWA C509

Reviewed (X)
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By: Kevin Rattray EIT, Williams Engir
Date: 27/10/2010

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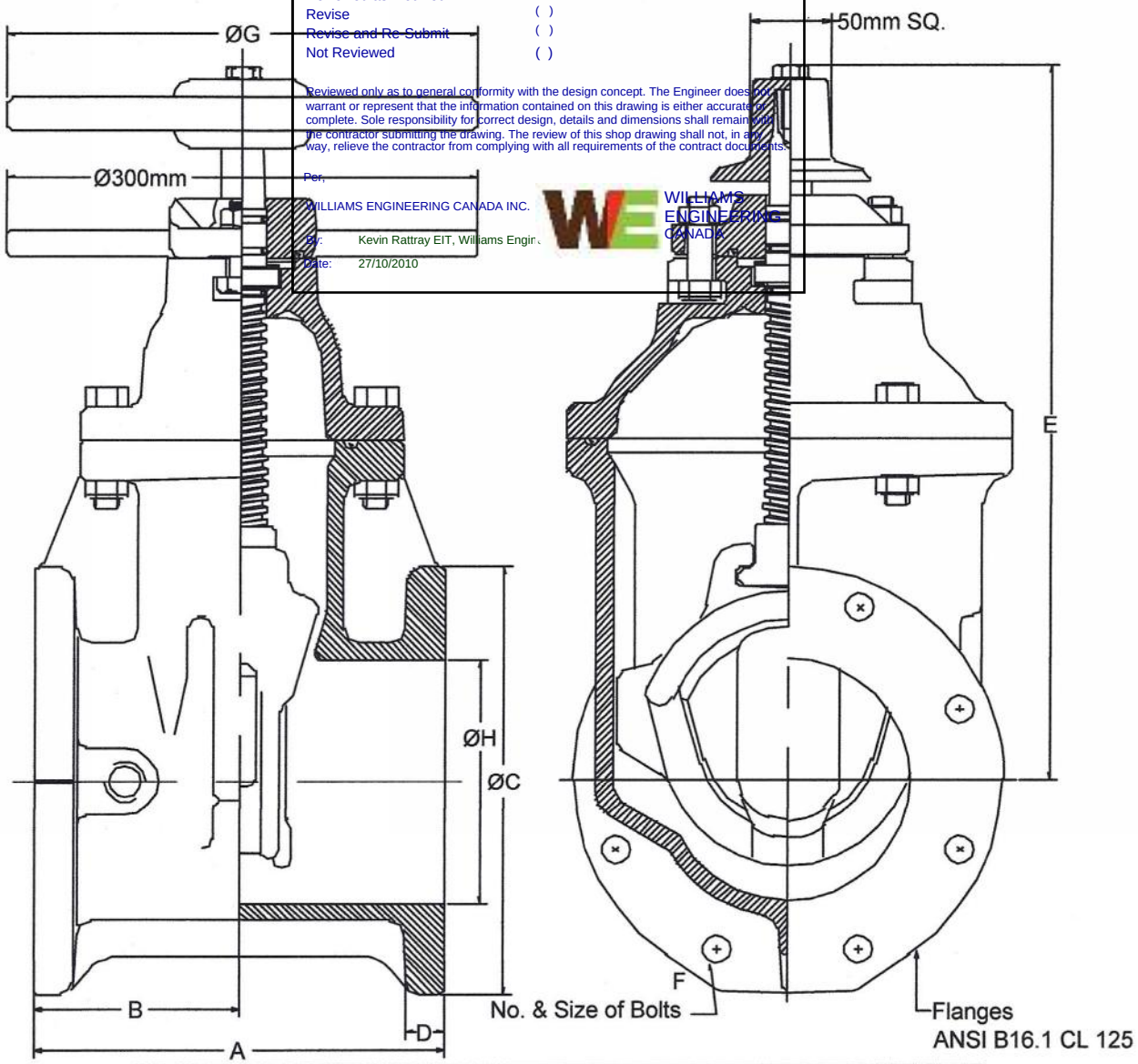


METRIC DIMENSIONS

VALVE SIZE	A	B	C	D	E	F	G	H
50	180	90	150	16	275	4-5/8	185	50
62.5	190	95	180	18	290	4-5/8	185	62.5
75	200	100	190	19	315	4-5/8	250	75
100	230	115	230	23	375	8-5/8	250	108
150	265	130	280	25	480	8-3/4	300	160
200	290	145	140	28	570	8-3/4	350	210
250	330	165	400	30	670	12-7/8	450	260
300	350	180	480	32	750	12-7/8	450	310

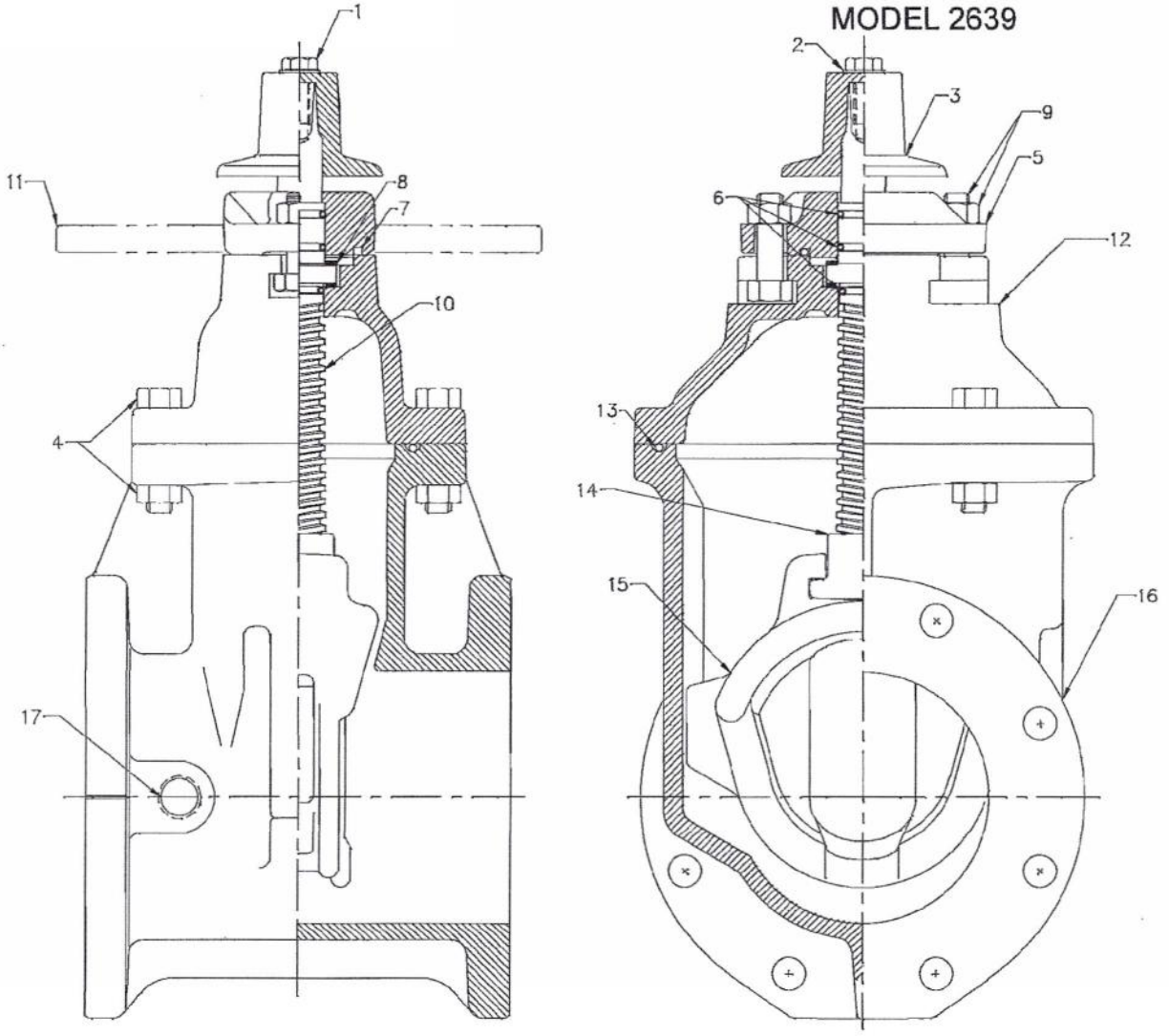
2640-01
A 7/29/02

Complies with applicable requirements of AWWA C509

2"-12" R/S VALVE MATERIAL LIST

CLOW VALVE COMPANY

MODEL 2639



ITEM	DESCRIPTION	MATERIAL	ASTM SPEC.
1	Hex Head Bolt	Stainless Steel	ASTM F593 304 SST
2	Flat Washer	Stainless Steel	304 SST
3	Operating Nut	Gray Iron	ASTM A126 Cl B
4	Hex Head Bolts & Nuts	Stainless Steel	ASTM F593/4 304 SST
5	Follower Plate	Ductile Iron	ASTM A536 65-45-12
6	Stem O-Ring	EPDM	------
7	Follower Plate O-Ring/gasket	EPDM	------
8	Thrust Washer Bearing	Delrin	------
9	Hex Head Bolts & Nuts	Stainless Steel	ASTM F593/4 304 SST
10	Stem	Bronze	ASTM B584 C86700
11	Indicator Post Plate (Optional 3-12")	Gray Iron	ASTM A126 Class B
12	Cover	Ductile Iron	ASTM A536 65-45-12
13	Cover O-Ring	EPDM	------
14	Stem Nut	Bronze	ASTM B584 C83600
15	Wedge	Gray Iron & EPDM	ASTM A126 Cl B
16	Body - all types	Ductile Iron	ASTM A536 65-45-12
17	Pipe Plug (Optional Some Styles)	Stainless Steel	------

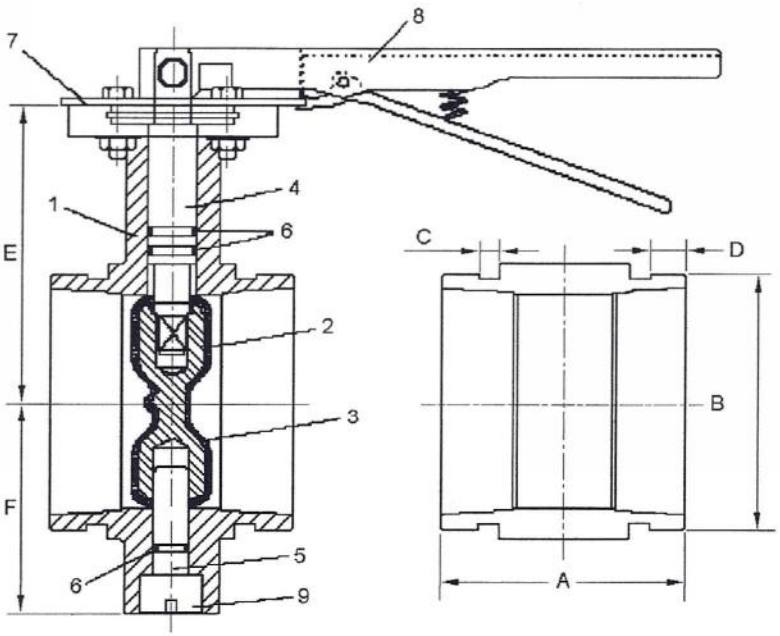
2639-02
C 7/19/05

KVC Industries Corp.

300# GROOVED END BUTTERFLY VALVE – Lever Handle

Figure: GBV-3000 Series

Valves to MSS-SP67 & API 609
Valves conform to AWWA C-606
Maximum operating temperature:
EPDM encapsulated disc: 121ºC (250ºF)
Buna-N encapsulated disc: 88ºC (190ºF)



Materials:

No.	Part Name	Specifications
1	Body	Ductile iron A536
2	Disc	Ductile iron A536
3	Rubber lining	EPDM aa
4	Upper stem	Stainless steel A433 410
5	Lower stem	Stainless steel A433 410
6	O-Ring	Buna-N aa
7	Position plate*	Carbon steel A27-91 65-35
8	Lever handle	Malleable iron A47-90 22010
9	Plug	Steel

Test Pressure	Shell: 450 psi
	Seat: 330 psi

Options:
- Buna-N lining on disc
- Manual gear operator, electric or pneumatic actuation.

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WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir
Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

Dimensions:

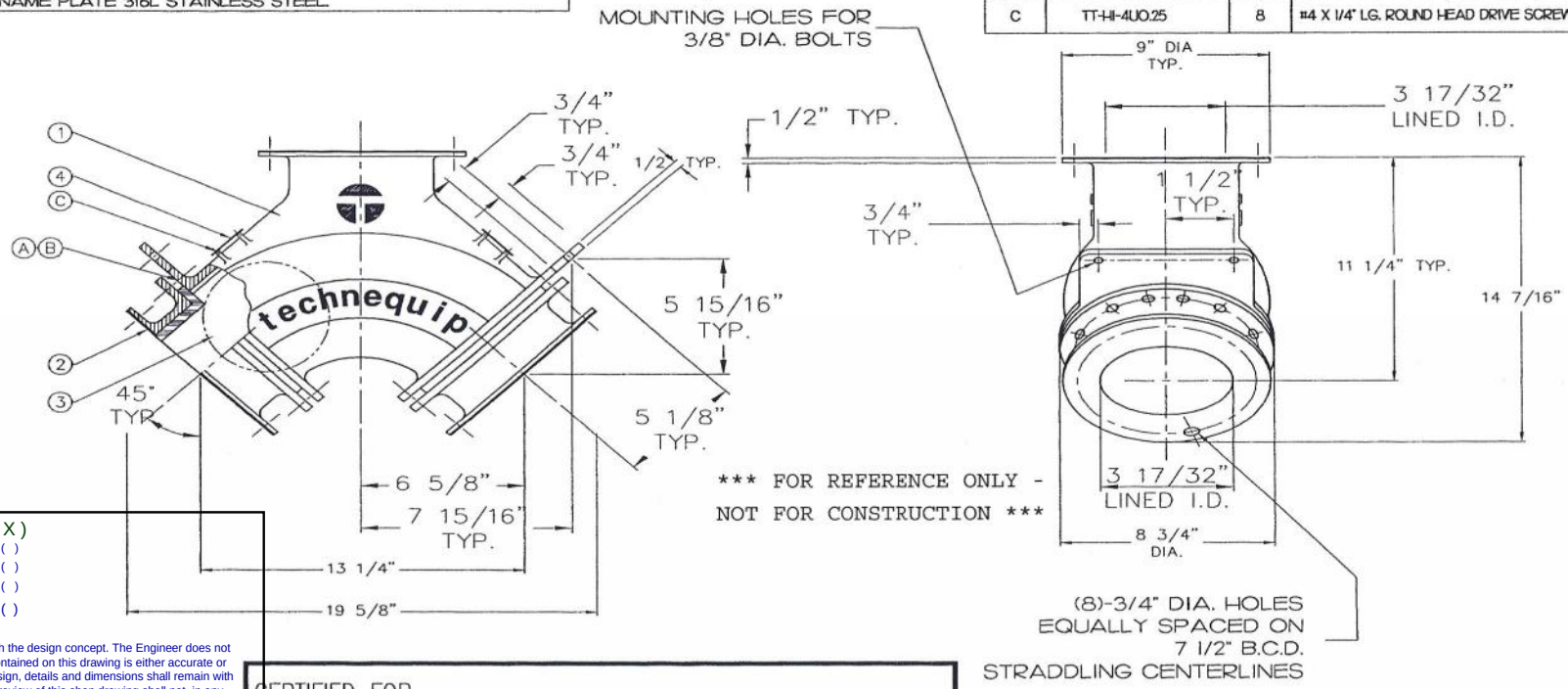
Size		A		B		C		D		E		F		Weight	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg
2	50	3.2	81	2.4	60	.31	8	.63	16	3.3	85	2.2	57	5.9	2.7
2½	65	3.8	97	2.9	73	.31	8	.63	16	4.2	106	2.6	65	7.5	3.4
3	80	3.8	97	3.5	89	.31	8	.63	16	4.4	113	3.0	75	8.6	3.9
4	100	4.6	116	4.5	114	.39	10	.63	16	5.3	135	3.5	90	11.9	5.4
5	125	5.8	148	5.6	141	.39	10	.63	16	5.8	148	4.3	110	20	9.1
6	150	5.8	148	6.6	168	.39	10	.63	16	7.1	181	4.9	124	23	10.5
8	200	5.3	134	8.6	219	.43	11	.75	19	8.0	204	6.1	155	37.4	17
10	250	6.3	159	10.7	273	.51	13	.75	19	9.1	230	7.5	190	84	38.1
12	300	6.5	166	12.8	324	.51	13	.75	19	10.6	270	9.1	230	100	45.4

308 – 20701 Langley Bypass, Langley, BC, Canada, V3A 5E8 Tel: (604) 533-2073 Fax: (604) 533-2074

1.	TT-H4R-A	VALVE HOUSING, PURE GUM RUBBER LINED.
2.	TT-AF4R-A	VALVE INLET ADAPTER, PURE GUM RUBBER LINED. (2 REQUIRED).
3.	TT-AHR5	TTV BALL PURE GUM RUBBER LINED.
4.	TT-NP-MEDIUM	NAME PLATE 316L STAINLESS STEEL.

HARDWARE LIST

ITEM No.	PART No.	QTY	DESCRIPTION
A	TT-HI-38W	16	3/8" WASHERS
B	TT-HI-38BL5O	16	3/8" SIZE X 1 1/2" LG. UNC BOLT
C	TT-HI-4UO.25	8	#4 X 1/4" LG. ROUND HEAD DRIVE SCREW TYPE U STEEL.



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WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

CERTIFIED FOR _____
P.O. No. _____
REQ. No. _____ S.O. No. _____
QUAN. _____ MODEL _____
SERIAL NO. _____
BY _____ DATE _____

FLSmidth KREBS
5505 WEST GILLETTE ROAD TUCSON, ARIZONA 85743
PHONE: (520) 744-8200 FAX: (520) 744-8300

INLET CONNECTION:	4"
OUTLET CONNECTION:	4"
CONNECTION TYPE:	FLANGE (ANSI 150# DRILLING)
MAX. OPERATING TEMPERATURE:	150°F (65°C)
VALVE LINING:	PURE GUM RUBBER
MAX. OPERATING PRESSURE:	150 PSI (1000 KPa)
EMPTY WEIGHT:	73 LBS (33.1 kg)
VOLUME:	0.33 CU.FT.
REPLACEABLE BALL: No.:	TT-AHR5
SIZE:	5" DIA.
MATERIAL:	PURE GUM RUBBER

NO.	DATE	REVISION DESCRIPTION
1	2-11-10	CHANGED CUSTOMER NAME & PO NUMBER

REVISION 3
Rev. By: NP
Rev. Date: 2/12/10
Appvd. By: BTO 2/12/10

FLSmidth KREBS
5505 WEST GILLETTE ROAD
TUCSON, AZ 85743
www.krebs.com

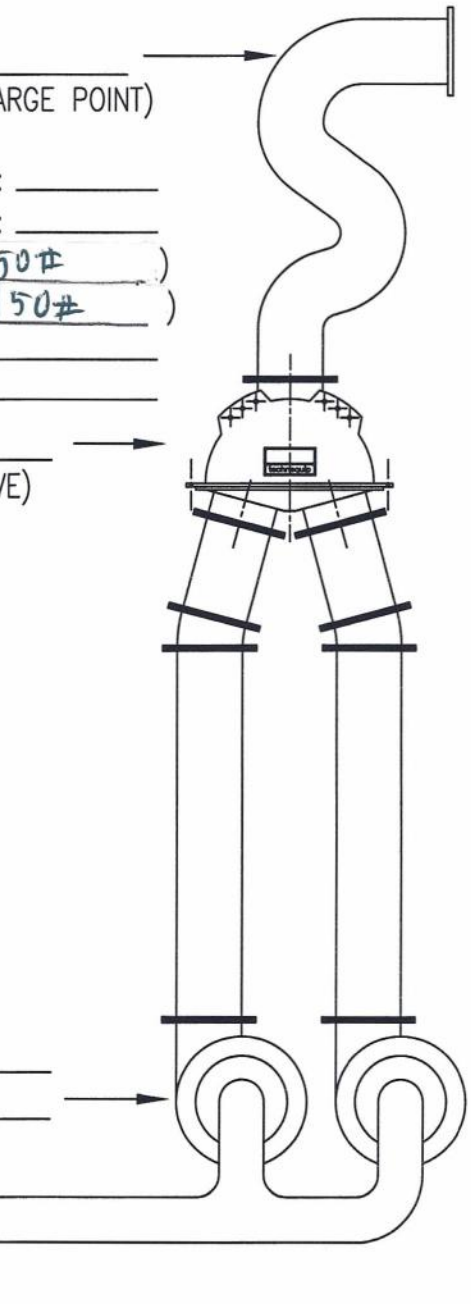
Scale:	Dwn. By:	Date Drawn:	Appvd. By:	Sheet:
---	NP	1/6/10	BTO DSS	1 OF 1

GENERAL PARTS ARRANGEMENT
TECH-TAYLOR VALVE
MODEL: T2F4R-150C-ANSI150
PART NO. TT4-150-00160

A DWG. NO. TT4-150-00160U

FLSmidth Krebs - Technequip Valves
5505 W. Gillette Rd., Tucson, AZ 85743
Tel: (520) 744-8200 Fax: (520) 744-8300
www.krebs.com

Tech-Taylor™ Valve T2 Application Sheet



PIPE LINE

CUSTOMER INLET/PIPE SIZE: 4" LINED? [YES / NO] LINED I.D.: _____
CUSTOMER OUTLET/PIPE SIZE: 4" LINED? [YES / NO] LINED I.D.: _____
INLET CONNECTION TYPE:(PLAIN END/VICTAULIC/FLANGED; DRILLING 150#)
OUTLET CONNECTION TYPE:(PLAIN END/VICTAULIC/FLANGED; DRILLING 150#)
DESIRED RATING (150,300,600 PSI): 150PSI
LINING MATERIAL: GUM RUBBER

PUMP

DISCHARGE OUTLET SIZE: 4"
FLOW RATE: _____
PUMP TYPE: _____
(PISTON, DIAPHRAGM, CENTRIFUGAL, ETC...)
GLAND SEAL WATER DRAINS INSTALLED: YES NO

SUMP

SLURRY S.G.: _____
SLURRY TEMP: _____
MAX. PARTICLE SIZE: _____
UNIQUE PROPERTIES (PH, CARRIER IF OTHER THAN WATER, ETC): _____
_____
_____
_____

End User: _____
Approved by: _____
Date Approved: _____

TTVINFO.DWG REVE

ASHCROFT®

Type 3005/3005P
Metric Case Commercial Gauge

FEATURES

- *304 stainless steel case liquid-filled, dry or field-fillable (Type 3005)*
- *ABS case, liquid-filled, dry or field-fillable (Type 3005P)*
- *Patented PowerFlex™ movement with polyester segment*
- *Pressure ranges from vacuum to 15,000 psi and compound*
- *Two-year warranty on liquid-filled gauges*
- *True Zero™ indication, a unique safety feature*

Ashcroft® Type 3005/3005P gauges are an exceptional value. The materials, construction, and design of these gauges provide a product of superior quality, able to withstand the rigors of pressure spikes, mechanical shock and high vibration levels.

These gauges offer flexibility in fit and function. Type 3005 gauges are 63mm in diameter and available in lower or back connection. Type 3005P are also 63mm and available in ¼ NPT lower connection only. These gauges can be purchased either dry, liquid filled or field fillable. Back connection Type 3005 gauges can be panel mounted with a variety of optional panel mounting kits. Metric socket configurations and metric dials are also available.

As with other Ashcroft commercial gauges, both the Type 3005 and 3005P incorporate the patented PowerFlex™ movement, a proven performer, offering superior resistance to shock, vibration and pulsation. The result is a more durable, longer-lasting gauge.

True Zero™ indication, a standard feature on these gauges, is the accurate indication of zero pressure being applied to the gauge. In addition to increased safety benefits, this means reduced inspection and manufacturing cost for you and your customer.

PRODUCT SPECIFICATIONS

Ashcroft® Model No.: 3005/3005P

Size:	63mm (2½˝)
Case:	3005 – 304 stainless steel, dry or liquid filled 3005P – Black ABS, dry or liquid filled
Fill Fluid:	Glycerin (20° to 150°F ambient; –7°C to 65°C)
Ring:	None
Window:	Polycarbonate with O-ring seal
Dial:	Black figures on white background, aluminum
Pointer:	Black, aluminum
Bourdon Tube:	– C-shaped bronze (vac.-600 psi and compound) – Helical bronze (1000 psi-6000 psi) – Helical stainless steel (10,000 psi-15,000 psi)
Movement:	Patented Power*Flex*™ movement
Socket:	Brass, with O-ring case seal
Restrictor:	Brass throttle plug, 0.013˝ orifice (no throttle plug in vacuum or 15 psi ranges)
Connection:	3005 – ¼ NPT lower and back 3005P – ¼ NPT lower only
Ranges:	Vac thru 15,000 psi and compound. Equivalent metric ranges available
Accuracy:	ASME B40.100, Grade B, ±3-2-3%
Operating Temp.:	–40°F to 150°F (dry gauge) –40°C to 65°C

OPTIONAL FEATURES

Case:	Sealed case, field fillable (LJ) Silicone filled (GV) (–40°F to 150°F; –40°C to 65°C)
Movement:	FlutterGuard™
Mounting Hardware:	U-clamp (UC), front flange (FF), retrofit flange (RF) – back connect only
Socket:	Throttle Plugs, 0.007,˝ 0.020,˝ 0.063˝ JIS, DIN and other connections on application
Others:	Customized dials Nonstandard ranges Special calibration on application

COMMONLY USED ON

Hydraulic systems, machine tools, pressure washers/sprayers, compressors, irrigation equipment, a variety of other applications

HOW TO ORDER (Typical example)

63	W	3005	H	L	02L	1000#

Dial Size: 63mm
Movement: Patented Power*Flex*™
Case Type Number: 3005 (Stainless Steel)
Socket Material: Brass
Liquid Filled Case:
Connection Size/Location: ¼ NPT Lower
Range: 1000 psi

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

* 63-W-3005HL02B
300PSI

ISO 9001
REGISTERED FIRM

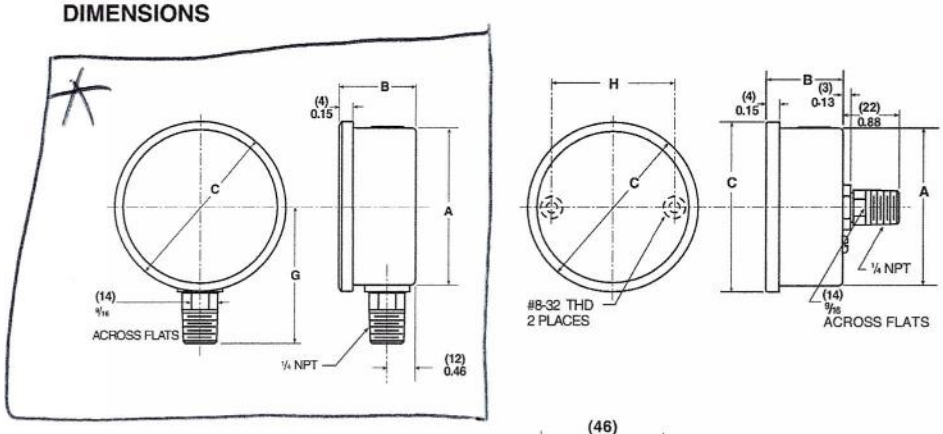
BULLETIN CG-35

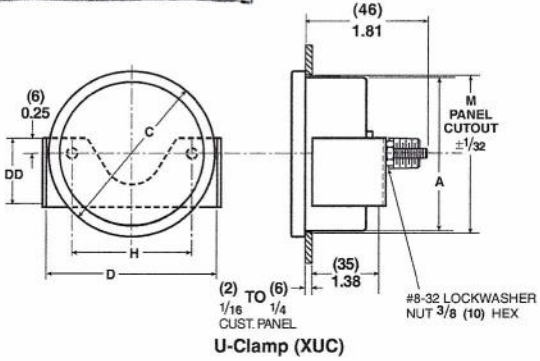
Ashcroft Inc., 250 East Main Street, Stratford, CT 06614 USA
Tel: 203-378-8281 • Fax: 203-385-0408
email: info@ashcroft.com • www.ashcroft.com

ASHCROFT®

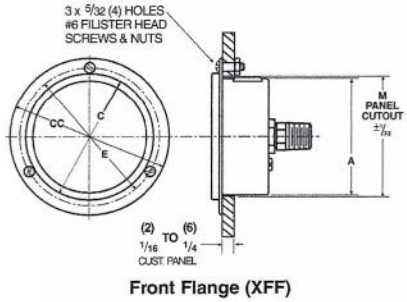
Type 3005/3005P
Metric Case Commercial Gauge

DIMENSIONS

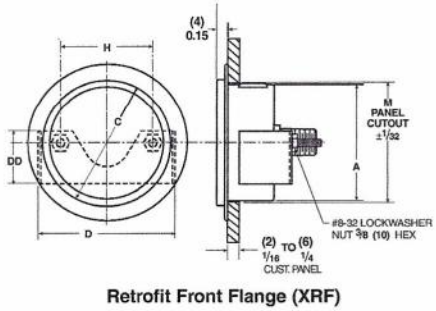




U-Clamp (XUC)



Front Flange (XFF)



Retrofit Front Flange (XRF)

Size/Type	A	B	C	CC	D	DD	E	G	H	M
63mm, 3005	(63) 2.48	(29) 1.16	(68) 2.67	(86) 3.36	(75) 2.95	(28) 1.12	(75) 2.95	(56) 2.20	(49) 1.94	(65) 2.54
63mm, 3005P*	(64) 2.53	(31) 1.22	(68) 2.67	—	—	—	—	(56) 2.20	—	—

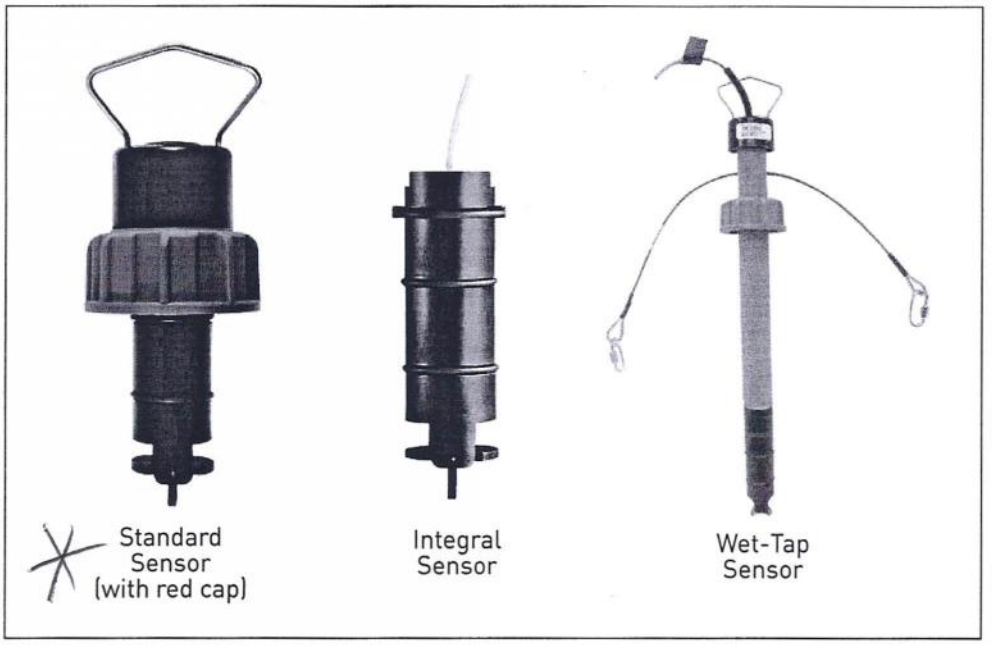
*Lower connect only Dimensions in (mm) inches.

ISO 9001
REGISTERED FIRM

BULLETIN CG-35

Ashcroft Inc., 250 East Main Street, Stratford, CT 06614 USA
Tel: 203-378-8281 • Fax: 203-385-0408
email: info@ashcroft.com • www.ashcroft.com

Signet 515 Rotor-X Paddlewheel Flow Sensors



Features

- Operating range 0.3 to 6 m/s (1 to 20 ft/s)
- Wide turndown ratio of 20:1
- Highly repeatable output
- Simple, economical design
- Installs into pipe sizes DN15 to DN900 (½ to 36 in.)
- Self-powered/no external power required
- Test certificate included for -X0, -X1
- Chemically resistant materials

Description

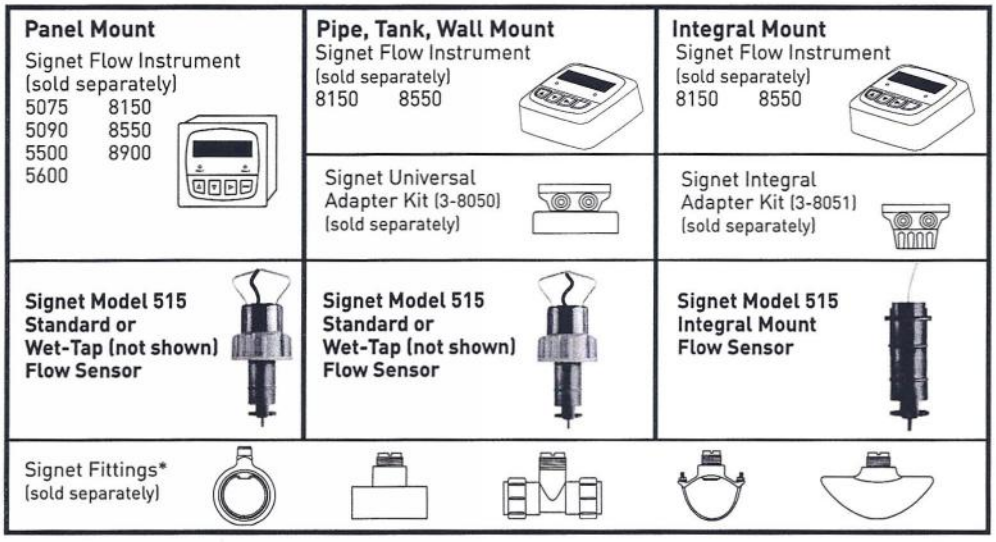
Simple to install with time-honored reliable performance, Signet 515 Rotor-X Paddlewheel Flow Sensors are highly repeatable, rugged sensors that offer exceptional value with little or no maintenance. The output signal of the Model 515 is a sinusoidal frequency capable of driving a self-powered flowmeter (Model 3-5090). The wide dynamic flow range of 0.3 to 6 m/s (1 to 20 ft/s) allows the sensor to measure liquid flow rates in full pipes and can be used in low pressure systems.

The Model 515 sensors are offered in a variety of materials for a wide range of pipe sizes and insertion configurations. The many material choices including PP and PVDF make this model highly versatile and chemically compatible to many liquid process solutions. Sensors can be installed in up to DN900 (36 in.) pipes using Signet's comprehensive line of custom fittings. These custom fittings, which include tees, saddles, and weldolets, seat the sensor to the proper insertion depth into the process flow. The sensors are also offered in configurations for wet-tap and intrinsically safe installation requirements.

Applications

- Pure Water Production
- Filtration Systems
- Chemical Production
- Liquid Delivery Systems
- Pump Protection
- Scrubber Systems
- Water Monitoring
- Not suitable for gases

System Overview (For overview of Wet-Tap System, see 3519 product page)



FM APPROVED

LEAD FREE Pb RoHS COMPLIANT

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

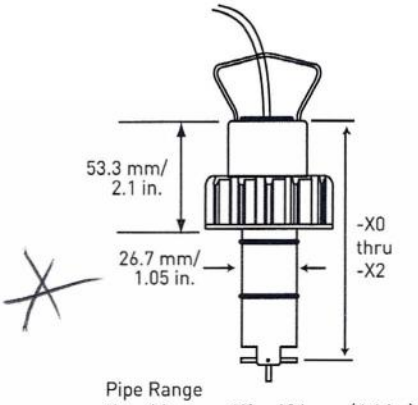
Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

* See Fittings section for more information.

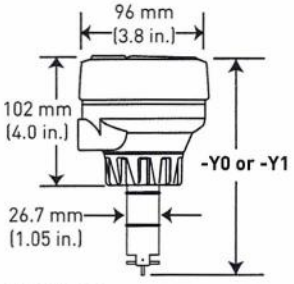
Dimensions

515 Standard Mount Sensor



Pipe Range
½ to 4 in.: **-X0** = 104 mm (4.1 in.)
5 to 8 in.: **-X1** = 137 mm (5.4 in.)
10 in. and up: **-X2** = 213 mm (8.4 in.)

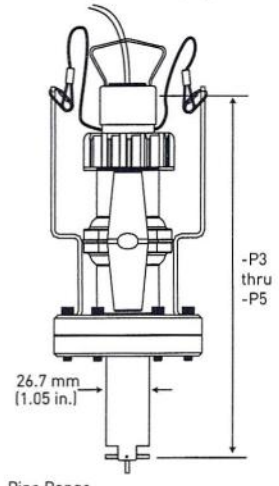
515 Integral Mount Sensor shown with Transmitter (sold separately)



Pipe Range
0.5 to 4 in. **-Y0** = 152mm (6.0 in.)
5 to 8 in. **-Y1** = 185mm (7.3 in.)

515 Wet-Tap Mount Sensor with 3519 Wet-Tap Valve

See more information on the 3519 Wet-Tap Valve, refer to the 3519 product page.



Pipe Range
½ to 4 in. **-P3** = 297 mm (11.7 in.)
5 to 8 in. **-P4** = 333 mm (13.1 in.)
10 in. and up **-P5** = 409 mm (16.1 in.)

Specifications

General

Operating Range:
0.3 to 6 m/s (1 to 20 ft/s)
Pipe Size Range:
DN15 to DN900 (½ to 36 in.)
Linearity:
±1% of max. range @ 25 °C (77 °F)
Repeatability:
±0.5% of max. range @ 25 °C (77 °F)
Min. Reynolds Number Required: 4500

Wetted Materials

- Sensor Body:
  Glass-filled PP (black) or PVDF (natural)
- O-rings:
  FPM (std)
  optional EPR (EPDM) or FFPM
- Rotor Pin:
  Titanium, Hastelloy-C or PVDF;
  optional Ceramic, Tantalum, or Stainless Steel
- Rotor:
  Black PVDF or Natural PVDF;
  optional Tefzel®, with or without Fluoroloy G® sleeve

Electrical

Frequency:
19.7 Hz per m/s nominal
(6 Hz per ft/s); sinusoidal
Amplitude:
3.3 V p/p per m/s nominal
(1 V p/p per ft/s)
Source Impedance: 8 KΩ
Cable Type:
2-conductor twisted pair with shield, 22 AWG
Cable Length:
7.6 m (25 ft) can be extended up to 60 m (200 ft) maximum

Max. Temperature/Pressure Rating Standard and Integral Sensor

- PP: 12.5 bar @ 20 °C,
  1.7 bar @ 90 °C
  (180 psi @ 68 °F, 25 psi @ 194 °F)
- PVDF: 14 bar @ 20 °C,
  1.4 bar @ 100 °C
  (200 psi @ 68 °F, 20 psi @ 212 °F)

Operating Temperature:

- PP: -18 °C to 90 °C (0°F to 194 °F)
- PVDF: -18 °C to 100 °C (0 °F to 212 °F)

Wet-Tap Sensor

- PP: 7 bar @ 20 °C, 1.4 bar @ 66 °C
  (100 psi @ 68 °F, 20 psi @ 150 °F)

Operating temperature:
-18 °C to 66 °C (0 °F to 150 °F)
Max. wet-tap sensor removal rating:
1.7 bar @ 22 °C (25 psi @ 72 °F)

See Temperature and Pressure Graphs for more information.

Shipping Weight

P51530-X0	0.454 kg	1.00 lb
P51530-X1	0.476 kg	1.04 lb
P51530-X2	0.680 kg	1.50 lb
P51530-X3	0.794 kg	1.75 lb
P51530-X4	0.850 kg	1.87 lb
P51530-X5	1 kg	2.20 lb
3-8510-X0	0.23 kg	.50 lb
3-8510-X1	0.23 kg	.50 lb

Standards and Approvals

- FM Class I, II, III/Div. 1/groups A-G
- RoHS compliant
- Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management

Application Tips:

- Use the Conduit Adapter Kit to protect the cable-to-sensor connection when used in outdoor environments. See Accessories section for more information.
- Use a sleeved rotor in abrasive liquids to reduce wear.
- Sensor plug can be used to plug installation fitting after extraction of sensor from pipe.
- For liquids containing ferrous particles, use Signet Magmeters.
- For systems with components of more than one material, the maximum temperature/pressure specification must always be referenced to the component with the lowest rating.

Please refer to Wiring, Installation, Accessories and Fittings sections for more information.

Ordering Information

Model 515 Standard Mount Paddlewheel

When choosing this style of sensor, the instrument can be mounted nearby on a pipe or wall or in a remote location up to 60 m/200 ft (standard cable length is 7.6 m/25 ft) by connecting the sensor through a standard 3-8050-1 universal junction box. Use Signet fittings for proper seating of the sensor into the process flow.

Model 515 Standard Paddlewheel Flow Sensor

Sensor Part Number			
P51530	Flow Sensor for use with remote mount instrument		
	Body/Rotor/Pin Material-Choose One*		
	- H	Polypropylene/Black PVDF/Hastelloy-C	
	- P	Polypropylene/Black PVDF/Titanium	
	- S	Polypropylene/Black PVDF/Natural PVDF	
	- T	Natural PVDF/Natural PVDF/Natural PVDF	
	- V	Natural PVDF/Natural PVDF/Hastelloy-C	
		Pipe Size - Choose One	
		0	½ to 4 in.
		1	5 to 8 in.
		2	10 to 36 in.
		↓	
P51530	**- P**	**0**	**Example Part Number**

Mfr. Part No.*	Code	Mfr. Part No.*	Code
P51530-H0	**198 801 659**	P51530-T0	**198 801 663**
P51530-P0	**198 801 620**	P51530-T1	**198 801 664**
P51530-P1	**198 801 621**	P51530-V0	**198 801 623**
P51530-P2	**198 801 622**	P51530-V1	**198 801 624**
P51530-S0	**198 801 661**	P51530-V2	**198 801 625**

***Model 515 Ordering Notes**

1) Most common part number combinations shown. For all other combinations contact factory.
2) Other rotor and pin materials are available for purchase from the factory and can be easily replaced in the field. See Accessories section.

Model 515 Integral Mount Paddlewheel

When choosing this style of sensor, the instrument is mounted directly onto the sensor for a local display. See Guideline below for instructions.

Sensor Part Number			
3-8510	Flow Sensor for integral mounting on the 8150 or 8550 instrument using the 3-8051 adapter (instrument and adapter sold separately)		
	Body/Rotor/Pin Material-Choose One*		
	- P	Polypropylene/Black PVDF/Titanium	
	- T	Natural PVDF/Natural PVDF/Natural PVDF**	
	- V	Natural PVDF/Natural PVDF/Hastelloy-C**	
		Pipe Size - Choose One	
		0	½ to 4 in.
		1	5 to 8 in.
		↓	
3-8510	**- P**	**0**	**Example Part Number**

**PVDF available ½ in. to 4 in. only

Model 515 Integral Mount Paddlewheel Flow Sensor

Mfr. Part No.*	Code	Mfr. Part No.*	Code
3-8510-P0	**198 864 504**	3-8510-T0	**159 000 622**
3-8510-P1	**198 864 505**	3-8510-V0	**198 864 506**

Guideline: Combining a 515 Integral mount flow sensor with an integrally mounted instrument

Option 1

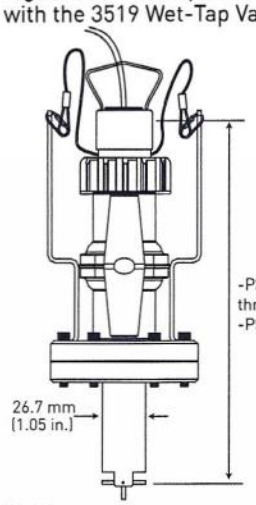
Once an integral mount sensor is chosen, it can be mounted directly to a field mount transmitter by following these guidelines:

a) Order the integral adapter kit 3-8051 (sold separately) to connect the sensor to an instrument.
b) Order a field mount transmitter (sold separately). The following part numbers are compatible: 3-8550-1, 3-8550-2, 3-8550-3, 3-8150-1.
c) Assembling the sensor with the integral adapter and instrument is quick and simple.

Option 2

These parts can also be ordered as an assembled part. See page 74 "Integral Mount" for more information.

Signet 515 Wet-Tap Sensor with the 3519 Wet-Tap Valve



Pipe Range
½ to 4 in. **-P3** = 297 mm (11.7 in.)
5 to 8 in. **-P4** = 333 mm (13.1 in.)
10 in. and up **-P5** = 409 mm (16.1 in.)

***Model 515 Ordering Notes**

1) Other rotor and pin materials are available for purchase from the factory and can be easily replaced in the field. See Accessories section.

Rotor

Rotor Pin

Sensor Cap

Sensor Plug

Conduit Adapter Kit

Ordering Information (continued)

Model 515 Wet-Tap Mount Paddlewheel Flow Sensor

When choosing this style of sensor, the instrument can be mounted nearby on a pipe or wall or in a remote location up to 60 m (200 ft) by connecting the sensor through a standard 3-8050-1 universal junction box. Standard cable length is 7.6 m (25 ft). This style of sensor uses the 3519 Wet-Tap valve only (see individual product page for more information).

Sensor Part Number			
P51530	Flow Sensor for wet-tap mounting with the 3519 Wet-Tap Valve (sold separately)		
	Body/Rotor/Pin Material*		
	- P	Polypropylene/Black PVDF/Titanium	
		Pipe Size - Choose One	
		3	½ to 4 in.
		4	5 to 8 in.
		5	10 to 36 in.
		↓	
P51530	**- P**	**3**	**Example Part Number**

Mfr. Part No.*	Code
P51530-P3	**198 840 310**
P51530-P4	**198 840 311**
P51530-P5	**198 840 312**

Guideline: Combining a 515 Wet-Tap Sensor with a 3519 Wet-Tap Valve

a) Sensor can be mounted in a 3519 Wet-Tap Valve (sold separately)
b) Assembling a sensor with a 3519 Wet-Tap valve is quick and simple. These parts can also be ordered as complete assemblies. See 3519 product page.

Accessories and Replacement Parts

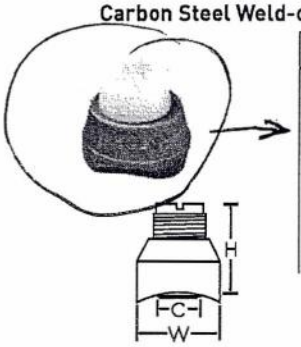
Mfr. Part No.	Code	Description
Rotors		
M1538-2	**198 801 181**	Rotor, PVDF Black
P51547-3	**159 000 474**	Rotor, PVDF Natural
M1538-4	**198 820 018**	Rotor, Tefzel®
P51550-3	**198 820 043**	Rotor and pin (matched set), PVDF Natural
3-0515.322-1	**198 820 059**	Sleeved rotor, PVDF Black
3-0515.322-2	**198 820 060**	Sleeved rotor, PVDF Natural
3-0515.322-3	**198 820 017**	Sleeved rotor, Tefzel®
Rotor Pins		
M1546-1	**198 801 182**	Pin, Titanium
M1546-2	**198 801 183**	Pin, Hastelloy-C
M1546-3	**198 820 014**	Pin, Tantalum
M1546-4	**198 820 015**	Pin, Stainless Steel
P51550-3	**198 820 043**	Rotor and pin, PVDF Natural
P51545	**198 820 016**	Pin, Ceramic
O-Rings		
1220-0021	**198 801 186**	O-ring, FPM (2 required per sensor)
1224-0021	**198 820 006**	O-ring, EPR (EPDM) (2 required per sensor)
1228-0021	**198 820 007**	O-ring, FFPM (2 required per sensor)
Miscellaneous		
P31536	**198 840 201**	Sensor plug, Polypropylene
P31542	**198 801 630**	Sensor cap, Red
P31934	**159 000 466**	Conduit cap
P51589	**159 000 476**	Conduit adapter kit
5523-0222	**159 000 392**	Cable (per foot), 2 cond. w/shield, 22 AWG
3-8051	**159 000 187**	Transmitter integral adapter (for use with 8510 and 8512) (see system overview for graphics)
6400-9001	**159 001 466**	Intrinsic safety barriers (2 required)
3-8051-1	**159 000 753**	Universal junction box

Rev A (3/09)

3401 Aerojet Avenue, El Monte, CA 91731-2882 U.S.A. • Tel. (626) 571-2770 • Fax (626) 573-2057 • www.gfsignet.com • e-mail: signet.ps@georgfischer.com

Installation Fittings

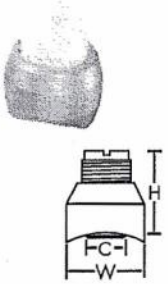
Carbon Steel Weld-on Weldolets for use with SCH 40 metal pipe (ASTM)



Part No.	Code	Size	W	H	C	Sensor Type
CS4W025	198 801 464	2.50 in.	2.60	2.48	1.31	Flow -X0, pH -XX
CS4W030	198 801 557	3.00 in.	2.60	2.47	1.31	Flow -X0, pH -XX
CS4W040	198 801 552	4.00 in.	2.60	2.45	1.31	Flow -X0, pH -XX
CS4W050	198 801 465	5.00 in.	3.50	2.24	2.10	Flow -X1
CS4W060	198 801 553	6.00 in.	3.50	3.11	2.10	Flow -X1
CS4W080	198 801 574	8.00 in.	3.50	2.88	2.10	Flow -X1
CS4W100	198 801 575	10.0 in.	3.50	5.63	2.10	Flow -X2
CS4W120	198 801 576	12.0 in.	3.50	5.40	2.10	Flow -X2

- For use with P51530-X0/-X1/-X2, 3-2536-X0/-X1/-X2, 3-8510-X0/-X1, 3-8512-X0/-X1, 3-2537-XC-X0/-X1, 3-2551-X0-XX/-X1-XX/-X2-XX, 3-272X-XX
- C - Clearance dimension
- Up to 8 in. - PVDF insert, over 8 in. - PVC insert
- PTFE wetted material. Contact factory for available options.

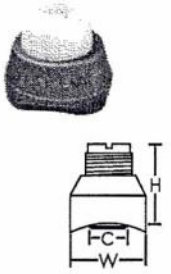
Brass Brazolet with PVDF insert for use with copper pipe (SCH 40 ASTM)



Part No.	Code	Size	W	H	C	Sensor Type
BR4B025	198 801 794	2.5 in.	2.50	2.48	1.31	Flow -X0, pH -XX
BR4B030	198 801 795	3.0 in.	2.50	2.47	1.31	Flow -X0, pH -XX
BR4B040	198 801 796	4.0 in.	2.50	2.45	1.31	Flow -X0, pH -XX
BR4B050	198 801 797	5.0 in.	3.50	2.24	2.10	Flow -X1
BR4B060	198 801 798	6.0 in.	3.50	3.11	2.10	Flow -X1
BR4B080	198 801 799	8.0 in.	3.50	2.88	2.10	Flow -X1
BR4B100	198 801 800	10.0 in.	3.50	5.63	2.10	Flow -X2
BR4B120	198 801 801	12.0 in.	3.50	5.40	2.10	Flow -X2

- For use with P51530-X0/-X1/-X2, 3-2536-X0/-X1/-X2, 3-8510-X0/-X1, 3-8512-X0/-X1, 3-2537-XC-X0/-X1, 3-2551-X0-XX/-X1-XX/-X2-XX, 3-272X-XX
- C - Clearance dimension
- Up to 8 in. - PVDF insert, over 8 in. - PVC insert
- PTFE wetted material. Contact factory for available options.

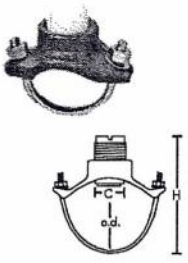
316 SS (1.4401) Weldolets with PVDF insert for use with SCH 40 metal pipe (ASTM)



Part No.	Code	Size	W	H	C	Sensor Type
CR4W025	198 801 786	2.50 in.	2.50	2.48	1.31	Flow -X0, pH -XX
CR4W030	198 801 787	3.00 in.	2.50	2.47	1.31	Flow -X0, pH -XX
CR4W040	198 801 788	4.00 in.	2.50	2.45	1.31	Flow -X0, pH -XX
CR4W050	198 801 789	5.00 in.	3.50	2.24	2.10	Flow -X1
CR4W060	198 801 790	6.00 in.	3.50	3.11	2.10	Flow -X1
CR4W080	198 801 791	8.00 in.	3.50	2.88	2.10	Flow -X1
CR4W100	198 801 792	10.0 in.	3.50	5.63	2.10	Flow -X2
CR4W120	198 801 793	12.0 in.	3.50	5.40	2.10	Flow -X2

- For use with P51530-X0/-X1/-X2, 3-2536-X0/-X1/-X2, 3-8510-X0/-X1, 3-8512-X0/-X1, 3-2537-XC-X0/-X1, 3-2551-X0-XX/-X1-XX/-X2-XX, 3-272X-XX
- Up to 8 in. - PVDF insert, over 8 in. - PVC insert
- C - Clearance dimension
- PTFE wetted material. Contact factory for available options.

Iron Strap-on Saddle for use with SCH 80 metal pipe (ASTM)



Part No.	Code	Size	H	o.d min	o.d max	C	Sensor Type
IR8S020	198 801 425	2.00 in.	5.50	2.35	2.56	1.44	Flow -X0, pH -XX
IR8S025	198 801 426	2.50 in.	5.50	2.44	2.91	1.44	Flow -X0, pH -XX
IR8S030	198 801 427	3.00 in.	6.50	2.97	3.54	1.44	Flow -X0, pH -XX
IR8S040	198 801 420	4.00 in.	7.50	3.74	4.55	2.25	Flow -X0, pH -XX
IR8S050	198 801 429	5.00 in.	9.00	4.74	5.63	2.25	Flow -X1
IR8S060	198 801 430	6.00 in.	10.5	5.94	6.70	2.25	Flow -X1
IR8S080	198 801 431	8.00 in.	12.0	7.69	8.72	2.25	Flow -X1
IR8S100	198 801 432	10.0 in.	18.0	10.64	12.12	2.25	Flow -X2
IR8S120	198 801 433	12.0 in.	20.0	12.62	14.32	2.25	Flow -X2

- For use with P51530-X0/-X1/-X2, 3-2536-X0/-X1/-X2, 3-8510-X0/-X1, 3-8512-X0/-X1, 3-2537-XC-X0/-X1, 3-2551-X0-XX/-X1-XX/-X2-XX, 3-272X-XX
- C - Clearance dimension
- Up to 8 in. - PVDF insert, over 8 in. - PVC insert
- Buna-N O-ring
- Larger sizes may be available and PTFE wetted material. Contact factory.

Signet 8550 Flow Transmitters

Member of the ProcessPro® Family of Instruments

Panel Mount

Pipe, Wall, Tank and Integral Mount

Description

Signet 8550 Flow Transmitters are advanced instruments that convert the signal from frequency and digital (S^3L) flow sensors into a 4 to 20 mA signal for long distance transmission. Configuration flexibility is maximized with single or dual input/output, two optional relays for process control, two packaging options for integral/pipe mount or panel installation, and scalability for virtually any flow range or engineering unit. State-of-the-art electronic design ensures long-term reliability, signal stability, and simple user setup and operation.

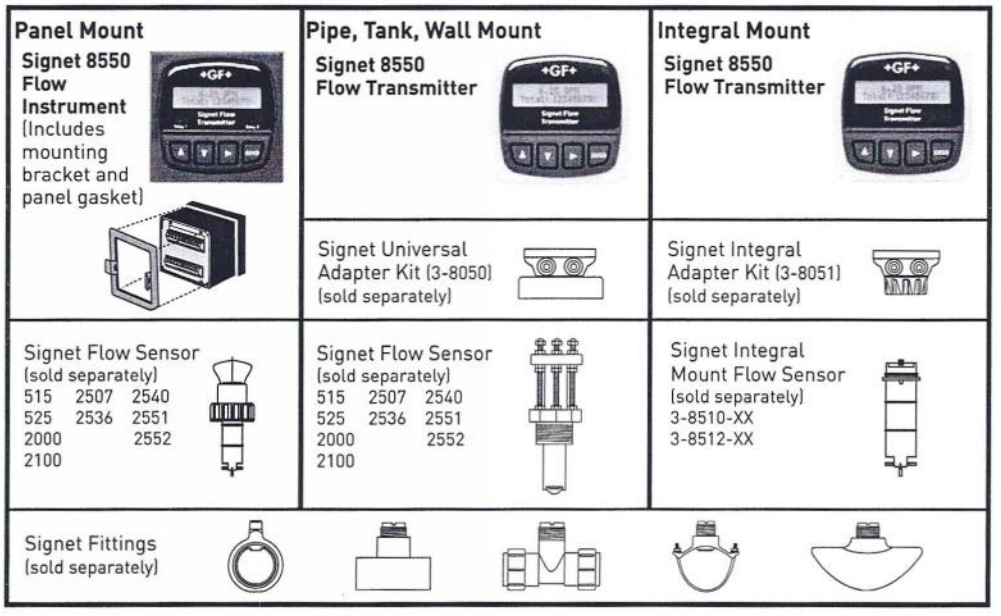
Features

- **2 or 4 wire power**
- **Available with single or dual input/output**
- **4 to 20 mA scaleable outputs**
- **Permanent & resettable totalizers**
- **Relay options available**
- **NEMA 4X enclosure with self-healing window**
- **Output simulation for complete system testing**

Applications

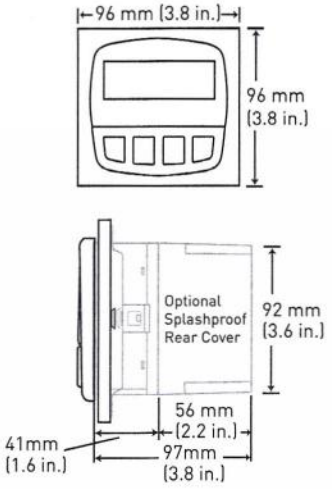
- **Flow Control and Monitoring**
- **Filtration or Softener Regeneration**
- **Effluent Totalization**
- **Pump Protection**
- **Feed Pump Pulsing**
- **Ratio Control**
- **Water Distribution**
- **Leak Detection**

System Overview

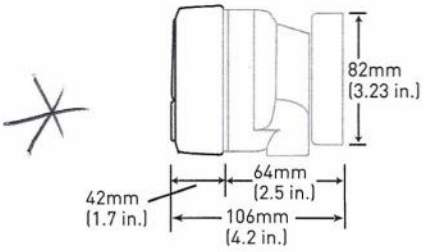


Dimensions

3-8550-XP



Field version with universal mount



Model 8550
Ordering Notes

1) Use the field mount version to directly mount the instrument to the Model 515 or 2536 integral mount sensor. See sensor data sheet for more information.
2) Field mount and sensor can be ordered in a package. See Integral Mount for more information.
3) Panel Cutout should be 92 mm X 92 mm (3.62 in X 3.62 in.).
4) An optional splash proof rear cover for the panel mount version can be ordered separately if needed.

Please refer to Wiring, Installation, and Accessories sections for more information.

Specifications

General
Compatibility:
Signet Flow Sensors with frequency outputs
Accuracy: ± 0.5% of reading
Display: Alphanumeric 2 x 16 LCD
Update Rate: 1 second
Contrast: User selectable, 5 levels

Materials
- Enclosure: PBT
- Panel Case Gasket: Neoprene
- Window: Polyurethane coated polycarbonate
- Keypad: Sealed 4-key silicone rubber

Electrical
Power: 12 to 24 VDC ±10%, regulated
(-1) 90 mA max.
(-2) 220 mA max.
(-3) 100 mA max.
Sensor Input Range: 0.5 to 1500 Hz
Sensor Power:
- 2-wire: 5 VDC ± 1% @ 1.5 mA
- 3 or 4 wire: 5 VDC ± 1% @ 20 mA
Optically isolated from current loop
Short circuit protected

Current Output
- 4 to 20 mA, isolated, passive, fully adjustable and reversible
- Max. Loop Impedance:
50 Ω max. @ 12 V
325 Ω max. @ 18 V
600 Ω max. @ 24 V
- Update Rate: 100 ms
- Accuracy: ±0.03 mA

Electrical (continued)
Relay Output:
- Mechanical SPDT contacts: High, Low, Pulse, Off
- Maximum Voltage Rating: 30 VDC @ 5 A , 250 VAC @ 5 A resistive load
- Hysteresis: User selectable
- Maximum 400 pulses/min.

Open-Collector Output:
- High, Low, Pulse, Off
- Optically isolated, 50 mA max. sink, 30 VDC max. pull-up voltage.
- Hysteresis: User selectable for exiting alarm condition
- Maximum 400 pulses/min.

Environmental
Operating Temperature:
-10 °C to 70 °C (14 °F to 158 °F)
Storage Temperature:
-15 °C to 80 °C (5 °F to 176 °F)
Relative Humidity:
0 to 95%, non-condensing
Enclosure: NEMA 4X/IP65 (front)

Shipping Weight 0.325 kg 0.8 lb

Standards and Approvals
- CE, UL, CUL
- RoHS compliant
- Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management

Ordering Information

Instrument Part Number			
3-8550	ProcessPro® Flow Transmitter		
	Sensor Input, Sensor Power, Outputs - Choose One		
	-1		One input, 2 or 4 wire, 4 to 20 mA and open collector for Hi, Lo, Pulse, or Frequency
	-2		One input, 4 wire, 4 to 20 mA and 2 relays for Hi, Lo, or Pulse
	-3		Two inputs, 2 or 4 wire, two 4 to 20 mA outputs and 2 open collectors for Hi, Lo, Pulse, or Frequency
		Field or Panel Mount - Choose One	
		-	Field mount
		P	Panel mount; includes mounting bracket and panel gasket
3-8550	**- 1**		**Example Part Number - Field mount**

Mfr. Part No.	Code
3-8550-1	**159 000 047**
3-8550-1P	**159 000 048**
3-8550-2	**159 000 049**

Mfr. Part No.	Code
3-8550-2P	**159 000 050**
3-8550-3	**159 000 051**
3-8550-3P	**159 000 052**

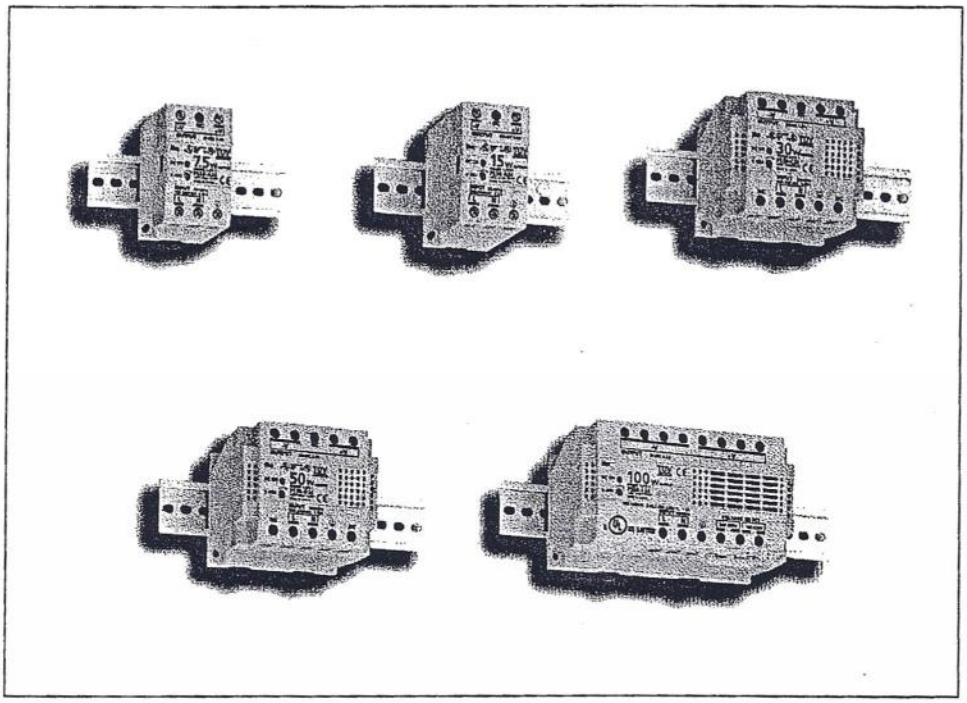
Accessories and Replacement Parts

Mfr. Part No.	Code	Description
Mounting Accessories		
3-8050	**159 000 184**	Universal mounting kit
3-8051	**159 000 187**	Flow integral mount NPT
3-0000.596	**159 000 641**	Heavy duty wall mount bracket (panel mount only)
3-5000.598	**198 840 225**	Surface mount bracket (panel mount only)
3-8050.395	**159 000 186**	Splashproof rear cover (panel mount only)
Liquid Tight Connectors and Other		
3-9000.392	**159 000 368**	Liquid tight connector kit for rear cover (includes 3 connectors)
3-9000.392-1	**159 000 839**	Liquid tight connector kit, NPT (1 connector)
3-9000.392-2	**159 000 841**	Liquid tight connector kit, PG 13.5 (1 connector)
3-8050.396	**159 000 617**	RC filter kit (for relay use)

3-8550.099 Rev C (03/10)

3401 Aerojet Avenue, El Monte, CA 91731-2882 U.S.A. • Tel. (626) 571-2770 • Fax (626) 573-2057 • www.gfsignet.com • e-mail: signet.ps@georgfischer.com

Signet 7300 Switching Power Supplies



Features

- Regulated 24 VDC output voltage
- Five output capacities: 300 mA, 600 mA, 1.3 A, 2.1 A and 4.2 A
- DIN rail or surface mount
- Universal AC input (85 to 264 VAC)
- DC compatible input (105 to 370 VDC)
- Fused input
- Auto resetting output overcurrent protection
- Unique spring-up, finger-safe terminals
- Short-circuit protection
- Output voltage adjust (+/- 10%)
- Light-weight plastic housing

Description

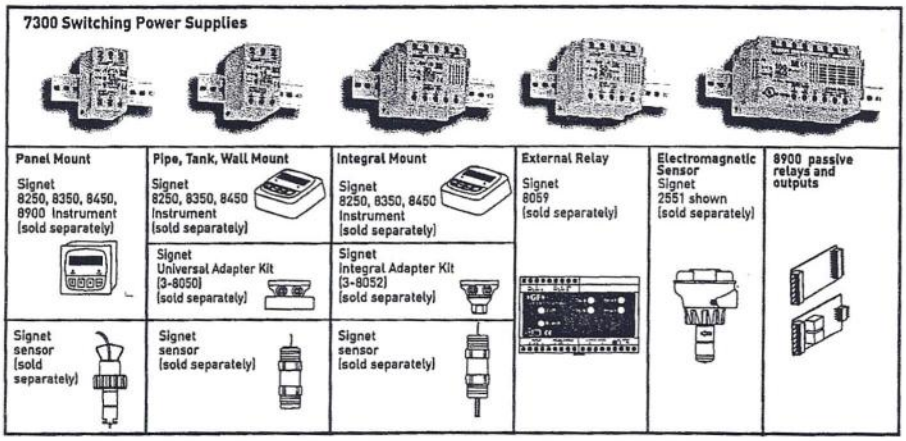
Signet 7300 Switching Power Supplies provide regulated output voltage in compact and lightweight plastic housings that can be DIN Rail or surface mounted. The series includes five different output capacities from 300 mA to 4.2 A (7.5W to 100W), all of which accept universal AC line voltage input and meet worldwide standards for performance and safety. These units meet the power requirements for a single system, multiple Signet instruments or other devices requiring 24 VDC operation.

Applications

- Signet Instruments
- Electromagnetic Flow Sensors
- Suitable for Electric Actuated Valves, including Solenoid
- Suitable for powering passive outputs and relays

CE cULus E177168

System Overview



Specifications

	7300-7524	7300-1524	7300-3024	7300-5024	7300-1024
Output Capacity	300 mA	600 mA	1.3 A	2.1 A	4.2 A
General					
Operation Indicator	LED				
Dielectric Strength	Between input and output terminals: 3,000 VAC, 1 minute				
	Between input terminals and housing: 2,000 VAC, 1 minute				
	Between output terminals and housing: 500 VAC, 1 minute				
Insulation Resistance	Between input and output terminals/input terminals and housing: 100 MΩ min. (500 VDC megger)				
Termination	Spring-up, fingersafe terminals with captive M3.5 screws				
Materials	Housing: PPHOX (polyphenylene oxide)				
Mounting	DIN Rail or Surface Mount				
Dimensions (L/W/H)	75/45/70 mm	75/45/95 mm	75/90/95 mm	75/90/95 mm	75/145/95 mm
	2.9/1.7/2.7 in.	2.9/1.7/3.7 in.	2.9/3.5/3.7 in.	2.9/3.5/3.7 in.	2.9/5.7/3.7 in.
Package Dimensions (L/W/H)	108/82/51 mm	133/89/51 mm	133/95/89 mm	133/95/89 mm	209/101/89 mm
	4.25/3.25/2.0 in.	5.25/3.5/2.0 in.	5.25/3.75/3.5 in.	5.25/3.75/3.5 in.	8.25/4.0/3.5 in.
Input					
Input Voltage	100 to 240 VAC nominal (85 to 264 VAC), ±10% regulated, 50/60 Hz (47 to 63 Hz)				
Input Current (typical)	0.17 A @ 100 VAC	0.3 A @ 100 VAC	0.68 A @ 100 VAC	1.15 A @ 100 VAC	2.5 A @ 100 VAC
Internal Fuse Rating	2 A	2 A	3.15 A	3.15 A	4 A
Inrush Current	50 A maximum (at cold start at 200 VAC				
Leakage Current (at no load)	0.75 mA maximum (60 Hz, measured in conformance with UL, CSA, VDE)				
Typical Efficiency	75% at 24 V	79% at 24 V	75% at 24 V	79% at 24 V	85% at 24 V
Overvoltage Protection	Outputs turn off at 105% (typical)				
Output					
Voltage & Current Ratings	24 V, 0.3 A	24 V, 0.6 A	24 V, 1.3 A	24 V, 2.1 A	24 V, 4.2 A
Voltage Adjustments	± 10% (V.ADJ screw on top)				
Output Holding Time	20 minutes maximum (at full rated input and output)				
Rise Time	200 minutes maximum (at full rated input and output)				
Fluctuation due to Input Voltage change	0.4% maximum				
Fluctuation due to Load Change	1.5% maximum				
Fluctuation due to Ambient Temperature Change	0,05% maximum				
Ripple Voltage	2% peak to peak maximum (including noise)				
Overload Protection	120% typical (Zener-limiting)		120% typical, auto reset		
Shipping Weight	.40 lb (.18 kg)	.48 lb (.22 kg)	.92 lb (.42 kg)	.98 lb (.44 kg)	1.54 lb (.70 kg)
Environmental					
Operating Temperature	-10 °C to 60 °C (14 °F to 140 °F) - see derating curves				
Storage Temperature	-30 °C to 85 °C (-22 °F to 185 °F)				
Operating Humidity	20% to 90% relative humidity (no condensation)				
Vibration Resistance	45m/s², 10 to 55 Hz, 2 hours on each of 3 axes				
Shock Resistance	294 m/s², 3 shocks in each of 6 directions				

Standards and Approvals

- CE, UL, UL508 Listed

WALCHEM
An Iwaki America Company

WEC/WDEC410 | Electrodeless Conductivity Controllers

OVERVIEW

The WEC/WDEC410 Series Single and Dual Input Electrodeless Conductivity Controllers measure conductivity of a solution via an encapsulated, non-contacting sensor to control replenishment pumps and alarms. They may be installed in a variety of very harsh chemical control applications, including oily cleaner baths, chromates, rinse tanks, fume scrubbers and other concentrated chemicals up to a conductivity of 1000 mS/cm.

Four conducivity ranges may be selected to configure the controller over a wide range of applications. Choice of measurement units is µS/cm, mS/cm, ppm and % concentration. The non-contacting, toroidal sensor technology is immune to thin coatings and the contamination and calibration problems that direct contacting sensors are prone to.

Integrated datalogging is available to validate performance. A USB memory stick is all that's needed to extract data and event logs that include conductivity measurements, temperature and relay status. Download log files from the USB stick to a PC at your convenience. It couldn't be easier!

SUMMARY OF KEY BENEFITS

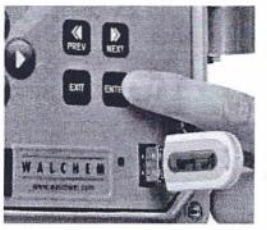
Dual Input Reduces Cost
WDEC can accept two electrodeless conductivity sensor inputs, allowing one controller to take the place of two, reducing cost and space requirements, and simplifying installation.

Versatility for a Broad Range of Applications
Choose PEEK sensors for higher temperature, more aggressive chemical applications, or CPVC sensors for lower temperature, less aggressive chemical applications. Both are available for in-line or submersible applications. On/Off and Time Proportional control modes are menu selectable.

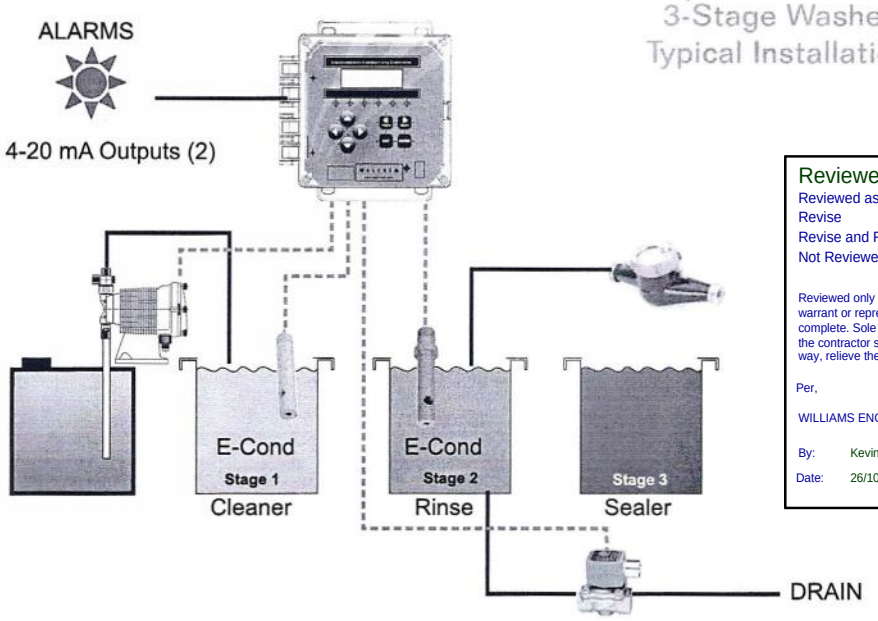
Ideal for Harsh Environments
The rugged, NEMA 4X enclosure, combined with Walchem's electrodeless conductivity sensors, provides a waterproof system with no metallic parts exposed to wet or corrosive environments.

Built-in Safety Features
Programmable output limit timers prevent run-away chemical addition. Digital Interlock Input may be used from a flow switch or level input to prevent chemical addition based on a stagnant sample, or control of an empty tank. The alarm relay notifies plant personnel of alarm conditions as soon as they occur.

Simple, Integrated Data Collection
Download stored data from the controller to a USB stick with the press of a button. Use the data to simply and easily validate system performance, document compliance, and reduce liability. The data and event logs show conductivity and temperature values, as well as accumulated chemical feed and alarm relay activation times.



WEC/WDEC410 Series | Electrodeless Conductivity Controller



3-Stage Washer
Typical Installation

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

Single or Dual Input
One unit monitors two baths with control and alarm relay for each, resulting in considerable cost savings

Electrodeless sensor design
Measures accurately over a wide dynamic range can can be used in applications from 50 μS to 1000 mS

Time proportional and control option
Selectable on front panel keypad
Varies the pump or valve on time depending on deviation from set point

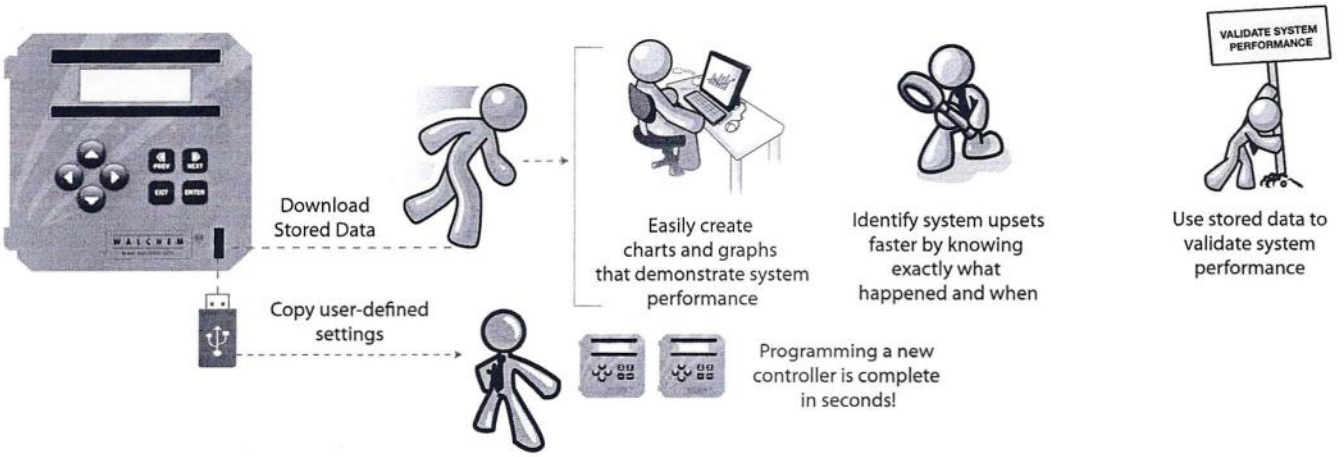
Self-diagnostics
Monitor performance without taking the unit off-line, permitting faster troubleshooting and less downtime

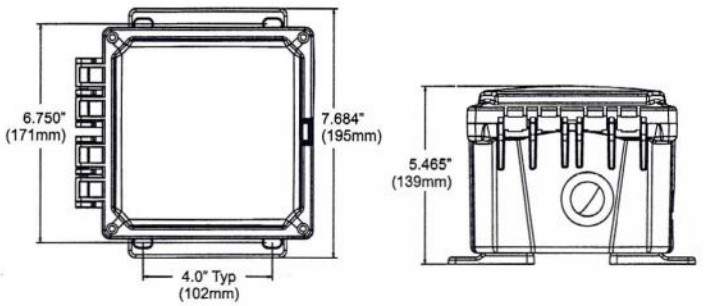
USB Flashstick Support
Optional for data logs, event/relay and reset logs, and user configuration file import/export

Measurement Units
Choice of μS/cm, mS/cm, ppm or % concentration
% Concentration allows the user to enter up to 5 calibration data points

Optional USB Features

Integrated datalogging collects analytical measurements at 10 minute intervals and captures all relay activations.





AGENCY CERTIFICATIONS

UL	ANSI/UL 61010-1:2004, 2nd Edition*
CAN/CSA	C22,2 No.61010-1:2004 2nd Edition*
CE Safety	EN 61010-1 2nd Edition (2001)*
CE EMC	EN 61326 :1998 Annex A*

Note: For EN61000-4-6,-3 the controller met performance criteria B.

*Class A equipment: Equipment suitable for use in establishments other than domestic, and those directly connected to a low voltage (100-240 VAC) power supply network which supplies buildings used for domestic purposes.

Inputs

Input Power

100-240 VAC, 50/60 Hz, 8A
Fuse: 1.0 ampere, 5 x 20 mm

Input Signals

Conductivity:	±2000 mV
Temperature Compensation:	100 kohm
Interlock (optional):	Isolated, dry contact closure required (i.e. reed switch)

Outputs

Mechanical Relays (5)

Internally powered relays switching line voltage
6A (resistive), 1/8 HP
All relays are fused together in one group, total current for this group must not exceed 6A

4 - 20 mA 1 or 2 (optional)

Internally powered
Fully isolated
600 Ohm max resistive load
Resolution .001% of span
Accuracy ± 1% of reading

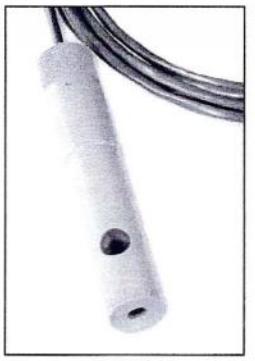
Sensor Power: ±5VDC, 5mA

Measurement Performance

Conductivity Range	50-1000 µS/cm	1000-10,000 µS/cm	10-100 mS/cm	100-1000 mS/cm
Resolution	1 µS	1 µS	0.1 mS	1 mS
Accuracy	±3% of reading below 50 µS/cm accuracy ±25%	±1% of reading below 1000 µS/cm accuracy ±25%	±1% of reading below 10 mS/cm accuracy ±25%	±1% of reading below 100 mS/cm accuracy ±25%

Temperature Range	32 to 212°F (0 to 100°C)
Resolution	1°F (1°C)
Accuracy	±1°F (±1°C)

CPVC



PEEK

Mechanical (controller)

Enclosure	Polycarbonate
NEMA Rating	NEMA 4X (IP65)
Display	2 x 16 character backlit liquid crystal
Ambient Temperature	32 to 122°F (0 to 50°C)
Storage Temperature	-20 to 180°F (-29 to 80°C)
Shipping weight	7 lbs (3 kg) (approximately)

Sensor Specifications

	CPVC	PEEK
O-ring	FKM (in-line mounting)	N/A
Adapter	CPVC (in-line mounting)	316 SS
Dimensions	7" (178mm) L x 1.75" (44mm) diameter	7" (178mm) L x 1.75" (44mm) diameter
Sensing Coil	0.5" (13mm aperture)	0.5" (13mm aperture)
Temperature Limitations	20° to 180°F (-5° to 80°C)	20° to 190°F (-5° to 88°C)
Pressure Rating	-15 to 140 psi (-0.1 to 0.98 MPa)	-15 to 250 psi (-0.1 to 1.75 MPa)
Mounting	Submersion: 1" NPTM thread In-line: 2" NPTM adapter	1" NPTM thread 2" NPTM adapter
Cable	20 ft. (6 m)	20 ft. (6 m)

ORDER INFORMATION

WEC410 – [I] [N] [D] [N]
voltage output sensor 1 USB

WDEC410 – [ ] [ ] [ ] [ ] [ ]
voltage output sensor 1 sensor 2 USB

VOLTAGE
1 = 120 VAC, prewired
5 = Hardwired, cable glands

OUTPUT
N = No 4-20 mAdata output
4 = One (1) Isolated 4-20 mA output
2 = Two (2) Isolated 4-20 mA outputs

SENSOR (SELECT 2 IN ALPHABETICAL ORDER FOR WDEC)
N = No sensor

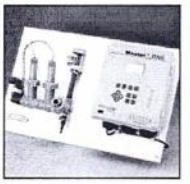
0.1 to 1.0 mS/cm
A = Submersion PEEK sensor
B = In-line PEEK sensor w/SS adapter
C = Submersion CPVC sensor
D = In-line CPVC sensor w/CPVC adapter

1.0 to 10.0 mS/cm
E = Submersion PEEK sensor
F = In-line PEEK sensor w/SS adapter
G = Submersion CPVC sensor
H = In-line CPVC sensor w/CPVC adapter

10.0 to 100 mS/cm
I = Submersion PEEK sensor
J = In-line PEEK sensor w/SS adapter
K = Submersion CPVC sensor
L = In-line CPVC sensor w/CPVC adapter

100 to 1000 mS/cm
M = Submersion PEEK sensor
O = In-line PEEK sensor w/SS adapter
P = Submersion CPVC sensor
Q = Submersion CPVC sensor

USB FEATURES
N = Software upgrade capability only
U = Integrated datalogging, event/reset logging, and configuration file import/export



WebMaster®ONE
WebMasterONE is the most advanced online cooling tower and boiler controller in the water treatment industry. The flexible multi-I/O platform allows you to control multiple cooling towers, boilers, closed loops, and condensate lines with just one controller. An extensive assortment of integrated communications and data handling features are included that enable water treatment professional to provide more effective water management services to their customers.

Metering Pumps
The E-Class is the most innovative and comprehensive metering pump product line in the world. Over 50 years of pump experience and a commitment to superior mechanical design has led to development of many industry firsts, including 360 stroke-per-minute technology, IP67 waterproof construction, and the world's highest capacity solenoid metering pumps.

WIND WebMaster® Industrial Water Controllers
Walchem's WebMaster Industrial (WIND) Controller sets a new standard for Industrial Water Treatment Controllers. WIND has a flexible multi-I/O platform, a wide range of analytical sensor measurement capabilities, and an extensive assortment of integrated communications and data handling features.

WebAlert® Remote Monitor
Walchem's WebAlert is the first stand alone remote monitoring device that can web enable your installed equipment without having to replace or upgrade it.

ABOUT US

Walchem integrates its advanced sensing, instrumentation, fluid pumping and communications technologies to deliver reliable and innovative solutions to the global water treatment market

Our in-house engineering is driven by quality, technology and innovation. For more information on the entire Walchem product line, visit: www.walchem.com

nqa. ISO 9001 Registered
ANAB ACCREDITED

WALCHEM
An Iwaki America Company

Walchem, An Iwaki America Incorporated Company
Five Boynton Road Hopping Brook Park
Holliston, MA 01746 USA
Phone: 508-429-1110
Fax: 508-429-7433
www.walchem.com

180373.B1 Jun 2009

RGS*NX Battery Unit

6, 12 and 24 volts, NEMA-4X rated

LUMACELL

Harsh environment emergency lighting units:
The **RGS*NX** Series battery units are specifically designed for use in industrial facilities where equipment is exposed to dust, water, oil or corrosive substances. NEMA-4X standard to protect circuitry from harmful dust or liquid sprays, sealed and gasketed unit made of fiberglass reinforced polyester.

nexus®

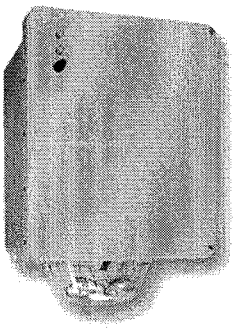
Made in Canada

NEMA-4X

Features

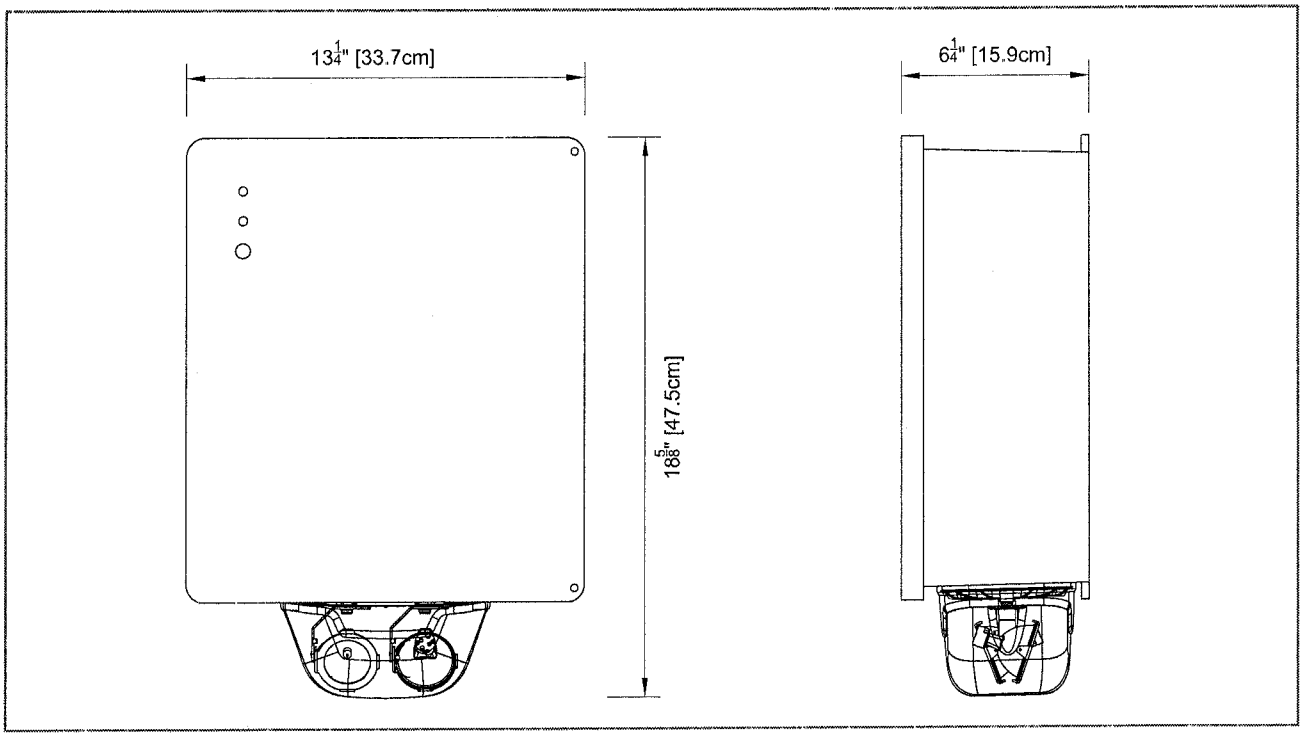
- Delivers great pathway illumination up to 70 feet, center to center (with M20WH lamp)
- Fully gasketed fiberglass reinforced polyester housing - NEMA 4X
- Solid-state pulse-type charger – current-limited, temperature-compensated, short-circuit proof and reverse-polarity protected.
- Unit comes standard with electronic lockout and brownout circuits
- Sealed dust-proof transfer relay, test switch and LED indicator lights
- Long-life, maintenance-free sealed lead acid battery
- Standard 120/347Vac input voltage with line cord kit
- Auto-test and diagnostic (optional)
- **NEXUS®** compatible (for more information on **NEXUS®**, please consult your sales representative)

Project/Location		Date
Contractor	Prepared by	
LUMACELL model		



RGS*NX SERIES

Dimensions



Wire Guard

460.0034-L Wall Mount

Continued >>

RGS*NX Battery Unit

6, 12 and 24 volts, NEMA-4X Rated

LUMACELL

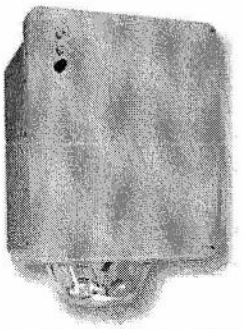
Typical Specification

Supply and install the **Lumacell** NEMA-4X Rated **RGS*NX Series** battery unit. Specifically designed for high abuse areas and wet locations, the fiberglass reinforced polyester housing shall be fully gasketed as well as the clear heavy-duty UV resistant polycarbonate lamp enclosure. The lamps shall be fully adjustable without tools and shall be high efficiency halogen or LED MR16. The Lumacell Smart Diagnostic Micro controller board shall supply the rated load for a minimum of a 1/2 hour to 87.5% of the rated battery voltage. The unit shall be rated 120V or 347V, 60 Hz and shall have an output of _____ volts.

The charger shall be fully computer tested and its charge voltage factory set to ± 1% tolerance. Chargers with field-adjusted potentiometers are not acceptable. A pulse-type charger shall be employed to promote long battery life and reduce the potential for grid corrosion. The charger shall provide a continuous high charge to recharge the battery, when the battery is at full capacity, the charger will shut-off. Periodically the charger shall provide a pulse of energy to keep the battery topped off. The Pulse charge shall be current limited and precisely regulated by a micro-processing circuit, which samples the battery in relation to its temperature, state or charge and input voltage fluctuations. The charger shall be current limited, temperature compensated, short-circuit proof and reverse polarity protected. The unit shall be furnished with an electronic lockout circuit, which will connect the battery when the AC circuit is activated, and an electronic brownout circuit, which will activate the emergency lights when utility power dips below 75% of nominal voltage. A low voltage battery protection circuit shall be provided and will disconnect the battery form the fused output circuit at the end of discharge. The unit shall self-test for 1 minute every 30 days, 10 minutes on the 6th month and 30 minutes every 12 months. The unit shall be capable of full recharge in compliance with CSA specifications. The unit shall be furnished with sealed dust tight relay, a test switch and diagnostic LED indicator lights to continuously monitor the status of the unit: Battery Failure, Battery Disconnected, Charger Failure, Lamp Failure, Service Alarm, AC "ON", Charger High Rate.

The unit shall be Lumacell model: _____.

Project/Location	kuqluktuk	Date	
Contractor	Lyfar	Prepared by	
LUMACELL model	RGS36NX M6W		



RGS*NX SERIES

Power Consumption and Unit Rating

Model	AC Specs		Wattage Capacity				
			30min	1h00	1h30	2h00	4h00
RGS36NX	120/347 Vac	0.10/0.04 Amp	36	21	15	12	6
RGS72NX		0.22/0.08 Amp	72	42	30	24	12
RGS108NX		0.22/0.08 Amp	108	63	45	36	18
RGS180NX		0.22/0.08 Amp	180	105	75	60	30
RG12S36NX	120/347 Vac	0.09/0.03 Amp	36	21	15	12	6
RG12S72NX		0.15/0.06 Amp	72	42	30	24	12
RG12S100NX		0.34/0.12 Amp	100	58	42	33	17
RG12S144NX		0.40/0.14 Amp	144	84	60	48	24
RG12S200NX		0.41/0.14 Amp	200	117	83	67	33
RG12S250NX		0.41/0.14 Amp	250	144	100	83	42
RG24S144NX	120/347 Vac	0.55/0.20 Amp	144	84	60	48	24
RG24S288NX		0.67/0.23 Amp	288	168	120	96	48
RG24S350NX	120/347 Vac	0.67/0.23 Amp	350	200	144	120	60

Ordering Information

Series	Capacity	Housing	# of Heads	Lamp Wattage	A.C. Voltage	Options
RGS= 6V	36= 36 watts 72= 72 watts 108= 108 watts 180= 180 watts	NX= fiberglass NEMA 4X	Blank= no head 1= one head 2= two heads	M6W= 6V6W MR16 M10W= 6V10W MR16 M12W= 12V12W MR16 M20W= 12V, 24V 20W MR16 M20HW= 12V, 20W high output LD7= 12V, 4W LED	Blank= 120/347Vac input ZC= 277Vac input	A= ammeter AT= autotest HTR= heater & thermostat 120V HTR3= heater & thermostat 347V LD= lamp disconnect LTS= light activated test switch NEX*= NEXUS® system interface (6 &12V only) RRT= remote test reciever T3= time delay 15 Min TMBB= A.C./D.C. terminal block TMBD= D.C. terminal block TMBK= A.C. terminal block V= voltmeter
RG12S= 12V	36= 36 watts 72= 72 watts 100= 100 watts 144= 144 watts 200= 200 watts 250= 250 watts					
RG24S= 24V	144= 144 watts 288= 288 watts 350= 350 watts					

*Not all options available with Nexus®. Please consult your sales representative.

EXAMPLE: RG24S350NX2M20W

Catalogue Numbering System

This information is presented only as an aid to understanding Catalogue numbers.

For Basic Assembled Enclosed Thermal Magnetic Circuit Breakers with Standard Line and Load Terminals

R	-	N	-	HLD	-	3	-	500		
S	-	N	-	FD	-	3	-	125	-	L
W	-	N	-	JD	-	3	-	250		
S		N		FDB		3		035		L

F - Flush, EEMAC 1A
S - Surface, EEMAC 1
R - Rain Tight, EEMAC 3R
J - Dust Tight, EEMAC 12
W - Water Tight, EEMAC 4/4X, 5

N: Neutral Assembly
Specify when Neutral Assembly is required

GHC, GCH, GD	2, 3	15 - 100
ED, EHD, EDC	2, 3	100 - 225
EHD	2, 3	15 - 100
FDB, FD, HFD, FDC	2, 3	15 - 225
JD, HJD, JDC	2, 3	70 - 250
DK	2, 3	100 - 400
KD, HKD, KDC	2, 3	100 - 400
LD, HLD	2, 3	300 - 600
LGE, LGS, LGH	2, 3	250 - 600
MDL, HMDL	2, 3	300 800

L: Line and Load Terminals.
Must be specified for F-Frame enclosed circuit breaker to form a complete catalogue number. (Not required for other breaker frames)

For specifying Enclosed Circuit Breakers with a complex catalolgue number, such as the thermal magnetic breaker c/w optional terminals and internal accessories or the electronics breakers c/w Digitrip 310 trip unit/Digitrip Optim trip unit, please utilize the Cutler-Hammer's Bid Manager pricing and configuration software.

By using the Standard products' Enclosed Circuit Breaker Takeoff and make selection according to the following parameter, the program will configure and generate a detailed product catalogue number base on the user's specification.

Service Voltage
Continuous Ampere Rating
Required KA Rating
Number of Poles
Type of Circuit Breaker Frame
Type of Trip Unit (Thermal Magnetic, Digitrip 310 / Digitrip Optim 550)
Fix or Adjustable Rating Plug
Standard or Optional Line / Load Terminals
Type of Internal Accessory (Left Pole)
Type of Internal Accessory (Right Pole)
Type of Enclosure
Neutral Assembly
Type of Rain Tight Hub and Size (EEMAC 3R Enclosure)

APPROVED

By Jesse Mailloux - Ryfan Industrial Electric at 8:13 am, Oct 21, 2010

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray ET, Williams Engr.

Date: 24/11/2010

WILLIAMS ENGINEERING CANADA

Example: Catalogue Number RNHKD3400FZ15K09P24A13S10

This catalogue number specifies a Factory Assembled Enclosed 400A HKD Electronic circuit breaker in 3 enclosure. This enclosed cicuit breaker includes the 3 Pole 400A HKD breaker frame, KES 400A Digitrip RMS [illegible] unit, 400A fixed rating plug, standard Line/Load terminals, 2a/2b auxiliary switches mounted in right pole with pigtail leads exit to rear, a 120Vac shunt trip mounted in left pole with pigtail leads exit to rear and the 400A Neutral kit N400.

The assembled enclosed circuit breakers are completely factory assembled and packaged in single shipping cartons. Each enclosed circuit breaker assembly includes the enclosure, breaker frame, trip unit and rating plug (where applicable), standard or optional line and load pressure terminals. Customer specified optional breaker accessories and neutral assembly will also be factory installed.

The assembled enclosed circuit breakers are CSA approved for use as Service Entrance Equipment when optional neutral assembly is installed.

Catalogue Numbering System

This information is presented only as an aid to understanding Catalogue numbers.

For Basic Assembled Enclosed Thermal Magnetic Circuit Breakers with Standard Line and Load Terminals

R	-	N	-	HLD	-	3	-	500		
S	-	N	-	FD	-	3	-	125	-	L
W	-	N	-	JD	-	3	-	250		
S		N		FDB		3		100		L

F - Flush, EEMAC 1A
S - Surface, EEMAC 1
R - Rain Tight, EEMAC 3R
J - Dust Tight, EEMAC 12
W - Water Tight, EEMAC 4/4X, 5

N: Neutral Assembly
Specify when Neutral Assembly is required

GHC, GCH, GD
ED, EHD, EDC
EHD
FDB, FD, HFD, FDC
JD, HJD, JDC
DK
KD, HKD, KDC
LD, HLD
LGE, LGS, LGH
MDL, HMDL

2, 3
2, 3
2, 3
2, 3
2, 3
2, 3
2, 3
2, 3
2, 3
2, 3

15 - 100
100 - 225
15 - 100
15 - 225
70 - 250
100 - 400
100 - 400
300 - 600
250 - 600
300 800

L: Line and Load Terminals.
Must be specified for F-Frame enclosed circuit breaker to form a complete catalogue number. (Not required for other breaker frames)

For specifying Enclosed Circuit Breakers with a complex catalolgue number, such as the thermal magnetic breaker c/w optional terminals and internal accessories or the electronics breakers c/w Digitrip 310 trip unit/Digitrip Optim trip unit, please utilize the Cutler-Hammer's Bid Manager pricing and configuration software.

By using the Standard products' Enclosed Circuit Breaker Takeoff and make selection according to the following parameter, the program will configure and generate a detailed product catalogue number base on the user's specification.

Service Voltage
Continuous Ampere Rating
Required KA Rating
Number of Poles
Type of Circuit Breaker Frame
Type of Trip Unit (Thermal Magnetic, Digitrip 310 / Digitrip Optim 550)
Fix or Adjustable Rating Plug
Standard or Optional Line / Load Terminals
Type of Internal Accessory (Left Pole)
Type of Internal Accessory (Right Pole)
Type of Enclosure
Neutral Assembly
Type of Rain Tight Hub and Size (EEMAC 3R Enclosure)

APPROVED
Reviewed (X)
By Jesse Mailloux - Ryfan Industrial Electric at 8:13 am, Oct 21, 2010
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir
Date: 24/11/2010
WILLIAMS ENGINEERING CANADA

Example: Catalogue Number RNHKD3400FZ15K09P24A13S10

This catalogue number specifies a Factory Assembled Enclosed 400A HKD Electronic circuit breaker in an EEMAC 3R enclosure. This enclosed cicuit breaker includes the 3 Pole 400A HKD breaker frame, KES 400A Digitrip RMS 310 LSI trip unit, 400A fixed rating plug, standard Line/Load terminals, 2a/2b auxiliary switches mounted in right pole with pigtail leads exit to rear, a 120Vac shunt trip mounted in left pole with pigtail leads exit to rear and the 400A Neutral kit N400.

The assembled enclosed circuit breakers are completely factory assembled and packaged in single shipping cartons. Each enclosed circuit breaker assembly includes the enclosure, breaker frame, trip unit and rating plug (where applicable), standard or optional line and load pressure terminals. Customer specified optional breaker accessories and neutral assembly will also be factory installed.

The assembled enclosed circuit breakers are CSA approved for use as Service Entrance Equipment when optional neutral assembly is installed.

Technical Data and Specifications

NEMA 1, 12, 12K, 3R

Note: Not to be used for construction purposes unless approved.

NEMA 1 Surface Mounted (See Figure 2)

Frame	Maximum Amperes	Dimensions in Inches (mm)						Approximate Weight in Lbs. (kg)
		A	B	C	D	E	F	
G	100	17.50 (444.5)	8.56 (217.4)	6.28 (159.5)	13.03 (331.0)	1.20 (30.5)	17.19 (436.6)	12 (5)
F ①	100	19.13 (485.9)	9.13 (231.9) ③	5.20 (132.1)	17.00 (431.8)	N/A ④	18.81 (477.8)	13 (6)
Earth Leakage (F)	100	23.25 (590.6)	8.56 (217.4)	6.28 (159.5)	18.75 (476.3)	1.20 (30.5)	22.94 (582.7)	15 (7)
F ②	225	23.25 (590.6)	8.56 (217.4)	6.28 (159.5)	18.75 (476.3)	1.20 (30.5)	22.94 (582.7)	15 (7)
J	250	34.70 (881.4)	10.92 (277.4)	7.20 (182.9)	30.00 (762.0)	1.88 (47.8)	34.39 (873.5)	31 (14)
K ⑤	400	38.81 (985.8)	11.06 (280.9)	10.94 (277.9)	34.00 (863.6)	9.28 (235.7)	38.50 (977.9)	53 (24)
LG	600	51.06 (1296.9)	21.87 (555.5)	9.96 (253.0)	51.63 (1311.5)	1.94 (49.3)	50.13 (1273.3)	90 (41)
Earth Leakage (LG)	600	51.06 (1296.9)	21.87 (555.5)	9.96 (253.0)	51.63 (1311.5)	1.94 (49.3)	50.13 (1273.3)	90 (41)
L	600	45.88 (1165.4)	14.31 (363.5)	12.38 (314.5)	46.56 (1182.6)	1.91 (48.5)	45.56 (1157.2)	81 (37)
M, N	1200	61.22 (1555.0)	21.44 (544.6)	15.41 (391.4)	61.84 (1570.7)	1.97 (50.0)	60.91 (1547.1)	178 (81)

① SFDN100 Series "B" released 9/15/01. (See Figure 1)
② Maximum wire size: 4/0.
③ Total width, including door clip is 9.95 inches (253 mm).
④ Single centered mounting hole provided.
⑤ Maximum wire size: 500 kcmil.

NEMA 1 Flush Mounted (See Figure 3)

Frame	Maximum Amperes	Dimensions in Inches (mm)						Approximate Weight in Lbs. (kg)
		A	B	C	D	E	F	
F	100	18.81 (477.8)	9.72 (246.9)	6.28 (159.5)	13.03 (331.0)	1.86 (47.2)	18.50 (469.9)	12 (5)
Earth Leakage (F)	100	24.56 (623.8)	9.72 (246.9)	6.28 (159.5)	18.75 (476.3)	1.86 (47.2)	24.25 (616.0)	15 (7)
F ⑥	225	24.56 (623.8)	9.72 (246.9)	6.28 (159.5)	18.75 (476.3)	1.86 (47.2)	24.25 (616.0)	15 (7)
J	250	36.02 (914.9)	12.23 (310.6)	7.20 (182.9)	30.00 (762.0)	1.88 (47.8)	35.70 (906.8)	32 (15)
K ⑦	400	40.13 (1019.3)	12.38 (314.5)	10.94 (277.9)	34.00 (863.6)	2.94 (74.7)	39.81 (1011.2)	53 (24)

⑥ Maximum wire size: 4/0.
⑦ Maximum wire size: 500 kcmil.

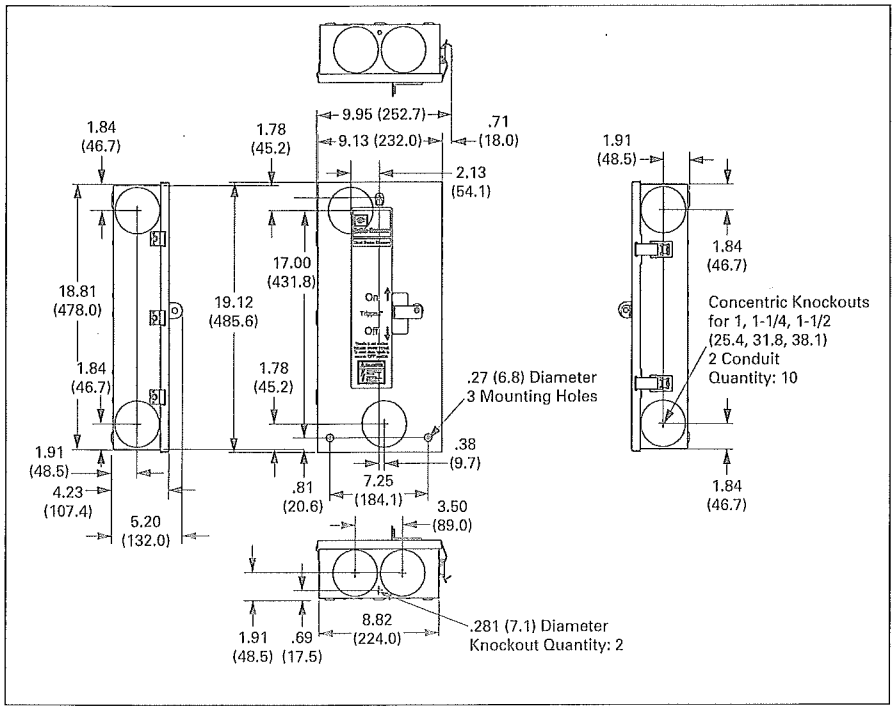


Figure 1. NEMA 1 Surface Mounted SFDN100 Series "B"

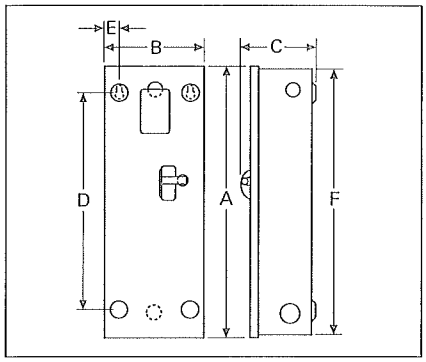


Figure 2. NEMA 1 Surface Mounted

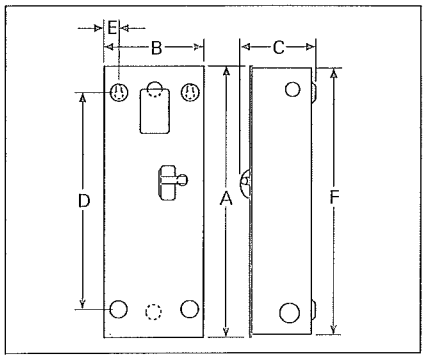
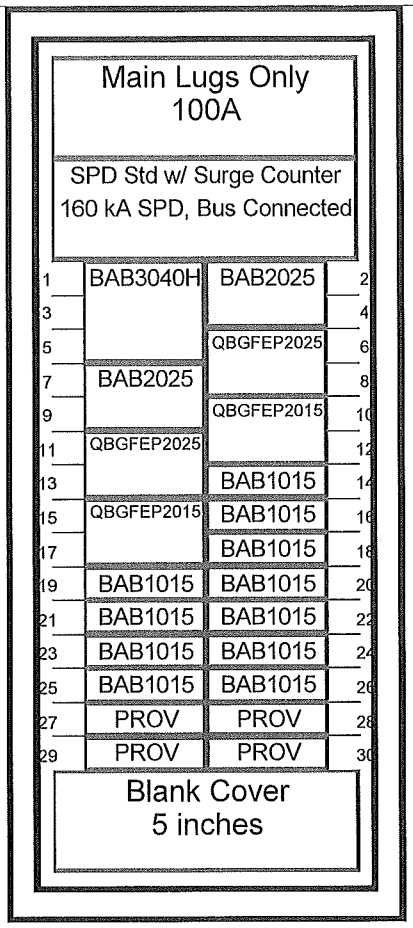


Figure 3. NEMA 1 Flush Mounted

Industrial Circuit Breakers

Circuit Breaker Type	Cont. Amp. Rating @ 40°C	No. Poles	Volts AC	Volts DC	Type of Trip ①	CSA/UL Listed Interrupting Ratings rms Symmetrical Amperes (kA)											
						AC Ratings Volts									DC ②		
						120	120/240	240	277	347	480Y/277	480	600Y/347	600	125	250	125/250
G-Frame																	
GHC	15 – 100	1	277	125	N.I.T.	65	—	—	14	—	—	—	—	—	14	—	—
GHC	15 – 100	2, 3	480Y/277	125/250	N.I.T.	—	—	65	—	—	14	—	—	—	—	—	14
GCH④	15 – 100	1	347	125	N.I.T.	65	—	—	14	10	—	—	—	—	14	—	—
GCH④	15 – 100	2, 3	600Y/347	125/250	N.I.T.	—	—	65	—	—	14	—	10	—	—	—	14
GD	15 – 50	2	480	125/250	N.I.T.	—	—	65	—	—	—	14	—	—	—	—	10
GD	15 – 100	3	480	250	N.I.T.	—	—	65	—	—	—	22	—	—	—	10	—
F-Frame																	
ED	100 – 225	2, 3	240	125	N.I.T.	—	—	65	—	—	—	—	—	—	10	—	—
EDH	100 – 225	2, 3	240	125	N.I.T.	—	—	100	—	—	—	—	—	—	10	—	—
EDC	100 – 225	2, 3	240	125	N.I.T.	—	—	200	—	—	—	—	—	—	10	—	—
EHD	15 – 100	1	277	125	N.I.T.	—	—	—	14	—	—	—	—	—	10	—	—
EHD	15 – 100	2, 3	480	250	N.I.T.	—	—	18	—	—	—	14	—	—	—	10	—
FDB	15 – 150	1	347	125	N.I.T.	—	—	—	—	14	—	—	—	—	10	—	—
FDB	15 – 225	2, 3	600	250	N.I.T.	—	—	18	—	—	—	14	—	14	—	10	—
FD	15 – 150	1	347	125	N.I.T.	—	—	—	25	18	—	—	—	—	10	—	—
FD	15 – 225	2, 3	600	250	N.I.T.	—	—	65	—	—	—	25	—	18	—	10	—
HFD③	15 – 30	1	347	125	N.I.T.	—	—	—	65	25	—	—	—	—	10	—	—
HFD	15 – 225	2,3	600	250	N.I.T.	—	—	100	—	—	—	65	—	25	—	22	—
FDC③	15 – 30	1	347	125	N.I.T.	—	—	—	—	30	—	—	—	—	10	—	—
FDC	15 – 225	2, 3	600	250	N.I.T.	—	—	200	—	—	—	100	—	35	—	22	—
J-Frame																	
JD	70 – 250	2, 3	600	250	I.T.	—	—	65	—			35		18	—	10	—
HJD	70 – 250	2, 3	600	250	I.T.	—	—	100	—			65		25	—	22	—
JDC	70 – 250	2, 3	600	250	I.T.	—	—	200	—			100		35	—	22	—
K-Frame																	
DK	250 – 400	2, 3	240	250	I.T.	—	—	65	—			—		—	—	10	—
KD	100 – 400	2, 3	600	250	I.T.	—	—	65	—			35		25	—	10	—
CKD	100 – 400	2, 3	600	250	I.T.	—	—	65	—			35		25	—	10	—
HKD	100 – 400	2, 3	600	250	I.T.	—	—	100	—			65		35	—	22	—
CHKD	100 – 400	2, 3	600	250	I.T.	—	—	100	—			65		35	—	22	—
KDC	100 – 400	2, 3	600	250	I.T.	—	—	200	—			100		50	—	22	—
LG-Frame																	
LGE	250 – 600	3, 4	600	250	I.T.	—	—	65	—			35		18	—	22	—
LGS	250 – 600	3, 4	600	250	I.T.	—	—	85	—			50		25	—	22	—
LGH	250 – 600	3, 4	600	250	I.T.	—	—	100	—			65		35	—	42	—
L-Frame																	
LD	300 – 600	2, 3	600	250	I.T.	—	—	65	—			35		25	—	22	—
HLD	300 – 600	2, 3	600	250	I.T.	—	—	100	—			65		35	—	25	—
MDL-Frame																	
MDL	300 – 800	2, 3	600	250	I.T.	—	—	65	—			50		25	—	22	—
HMDL	300 – 800	2, 3	600	250	I.T.	—	—	100	—			65		35	—	25	—
N-Frame																	
ND (800A Frame)	400 – 800	3	600	—	N.I.T.	—	—	65	—			50		25	—	—	—
ND (1200A Frame)	600 – 1200	3	600	—	N.I.T.	—	—	65	—			50		25	—	—	—
CND (800A Frame)	400 – 800	3	600	—	N.I.T.	—	—	65	—			50		25	—	—	—
HND (800A Frame)	400 – 800	3	600	—	N.I.T.	—	—	100	—			65		35	—	—	—
HND (1200A Frame)	600 – 1200	3	600	—	N.I.T.	—	—	100	—			65		35	—	—	—
CHND (800A Frame)	400 – 800	3	600	—	N.I.T.	—	—	100	—			65		35	—	—	—

① N.I.T. is non-interchangeable trip unit and I.T. is interchangeable trip unit.
② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250V DC.
③ Interrupting rating @ 347V AC are listed with CSA only. Not UL listed.
④ CSA listed only, Not UL listed.



General Information **(Section 1 of 1)**

Service Voltage:	208Y/120V 3Ph 4W	**Enclosure:**	Type 1
Bus Rating & Type:	100A Silver Plated Copper	**Neutral Rating:**	100A
Ground Bar:	Std. Bolted Aluminum, Al or Cu cable		
S.C. Rating:	10k A.I.C.Fully Rated		
Main Device Type:	Main Lugs Only - Top Cable Entry		
Main Terminals:	Mechanical - (1) #14-1/0 (Cu/Al)		
Neutral Terminals:	Mechanical - (1) #14-1/0 (Cu/Al)		
Box Catalog No.:	EZB2042RC		
Trim:	EZ Trim, Door in Door, Concealed Hardware (EZT2042S)		
	Surface Mounted		
Box Dimensions:	42." [1066.8mm]H x 20" [508.0mm]W x 5.75" [146.0mm]D		
Min. Gutter Size:	Top = 5.5" [139.7mm] Bottom = 5.5" [139.7mm] Left = 6.0" [152.4mm] Right = 6.0" [152.4mm]		

Panel ID Nameplate:
Type: No Nameplate

CSA Approved (LL47169) *****Non-Interchangeable Main Device*****

Trim Lock:Standard Lock & Key (Keyed WEM2)
Circuit Directory:Plastic Sleeve with Card
Entry Plate:No Plate

APPROVED

By Jesse Mailloux - Ryfan Industrial Electric at 8:14 am, Oct 21, 2010

Device Modifications:

Ref #	Description

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 24/11/2010

WILLIAMS ENGINEERING CANADA

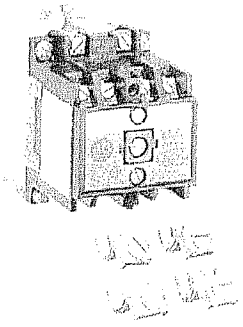
Notes:

Branch Devices

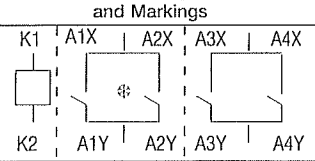
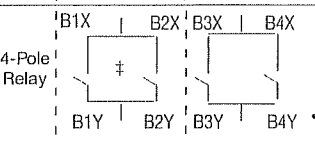
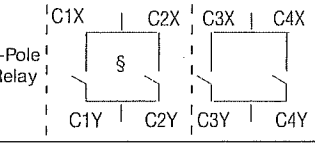
Qty	Poles	Trip	Frame	Amps	KAIC
11	1	15	BAB	100	10
2	2	25	BAB	100	10
1	3	40	BAB	100	10
2	2	15	QBGFEP	100	10
2	2	25	QBGFEP	100	10
4	1		PROV		

PREPARED BY: Macdonald, Don J	DATE: 10/19/10	Eaton Corporation	
APPROVED BY:	DATE: 10/19/10	JOB NAME: Kugluktuk Intake and Pumphouse	DESIGNATION: PH-opt.
VERSION: 7.2		TYPE: PRL1a	DRAWING TYPE: Customer Approval
NEG-ALT NUMBER: EN510818F002-0001	REVISION:	DWG SIZE: A	G.O.:
ITEM:	SHEET: 1 OF 1		

Electrically Held Relays
Bulletin 700-PH 35A Tandem Contact Cartridges*
AC-Operated Relays



Cat. No. 700-PH200

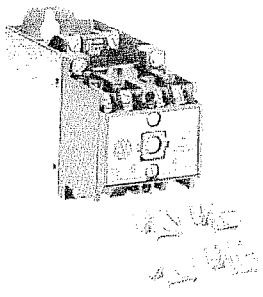
Contacts N.O.	Contacts N.C.	Contact Arrangement and Markings	Open Type Relay Rail Mount Cat. No.	Type 1➢ General Purpose Cat. No.
1	—		700-PH100⊗	700-PH101⊗
2	—		700-PH200⊗	700-PH201⊗
3	—		700-PH300⊗	700-PH301⊗
4	—		700-PH400⊗	700-PH401⊗
5	—		700-PH500⊗	700-PH501⊗
6	—		700-PH600⊗	700-PH601⊗

⊗AC Voltage Suffix Code

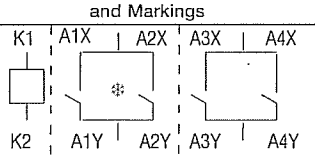
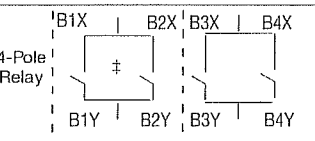
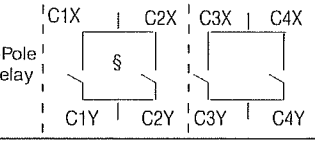
The Cat. No. as listed is incomplete. Select a voltage suffix code from the table below to complete the Cat. No. Example: **Cat. No. 700-PH100⊗** becomes **Cat. No. 700-PH100A48**. For other coil voltages, consult your local Rockwell Automation sales office or Allen-Bradley distributor.

Hz	24	48	110	110-115	115-120	120	127	200-208	220-230	230-240	277	347	380	415	440-480	460-480	500	575-600
50	B24	B48	A1⌘	B11✢	—	—	B27	—	B22	B2	—	—	B3	B41	B44	—	B50	—
60	A24	A48	—	—	A1⌘	B11✢	—	A20	A22	A2	A27	A35	—	—	—	A4	—	A6

DC-Operated Relays



Cat. No. 700DC-PH200

Contacts N.O.	Contacts N.C.	Contact Arrangement and Markings	Open Type Relay Rail Mount Cat. No.	Open Type DIN Rail Mount Cat. No.	Type 1➢ General Purpose Cat. No.
1	—		700DC-PH100⊗	700DC-PH100D⊗	700DC-PH101⊗
2	—		700DC-PH200⊗	700DC-PH200D⊗	700DC-PH201⊗
3	—		700DC-PH300⊗	700DC-PH300D⊗	700DC-PH301⊗
4	—		700DC-PH400⊗	700DC-PH400D⊗	700DC-PH401⊗
5	—		700DC-PH500⊗	700DC-PH500D⊗	700DC-PH501⊗
6	—		700DC-PH600⊗	700DC-PH600D⊗	—

⊗DC Voltage Suffix Code

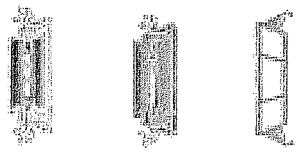
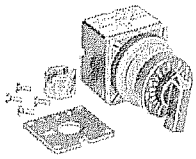
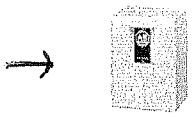
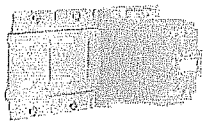
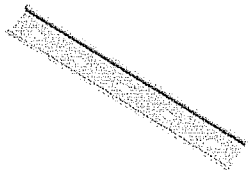
The Cat. No. as listed is incomplete. Select a voltage suffix code from the table below to complete the Cat. No. Example: **Cat. No. 700DC-PH200⊗** becomes **Cat. No. 700DC-PH200Z12**. For other coil voltages, consult your local Rockwell Automation sales office or Allen-Bradley distributor.

6	12	18	24	32	48	64	72	90	115-125	230-250	500-550	575-600
Z06	Z12	Z18	Z24	Z32	Z48	Z64	Z72	Z90	Z1	Z2	Z5	Z6

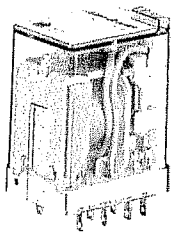
⌘ Optimized for 115...120V, 60 Hz. Operates satisfactorily at 110V, 50 Hz.
✢ Optimized for 110...115V, 50 Hz. Operates satisfactorily at 120V, 60 Hz.
* **Normally closed contacts**: The normally open contacts can easily be changed to normally closed in the field. Relays can be supplied with N.C. contacts.
❄ Location of contacts in 1-pole relays.
‡ Location of contacts in 3-pole relays: 2-pole relay plus the contact indicated.
§ Location of contacts in 5-pole relays: 4-pole relay plus the contact indicated.
➢ For Type 4/4X Enclosure replace 1 with 4, for Type 7 & 9 Enclosure replace 1 with 7 (Example, 700-PH401⊗ becomes 700-PH404).

Sealed Switch Timing Relays

Accessories

	Description	Cartridge Type	Color	Cat. No.
 *Cat. No. 700-CRT5* *Cat. No. 700-CRT6* *Cat. No. 700-CR9*	**Contact Cartridges** – These cartridges are used to add contacts to timing relays having unused slots. The N.O., N.C., and Dummy cartridges are interchangeable and can be used in timed or instantaneous contact slots. Dummy cartridges should be placed in unused cartridge slots to guard against entrance of foreign material.	N.O.	Gray	**700-CRT5**
		N.C.	Orange	**700-CRT6**
		Dummy Cartridge	Black	700-CR9
 *Cat. No. 800MR-N37*	**External Potentiometer** – The potentiometer units listed are recommended for timers with remote potentiometer provision. Refer to catalog section on Bulletin 800T or 800M for general construction features. **Connection Cable** – Use shielded twisted pair cable, maximum of 50 feet. Recommended cable (or equivalent): UL style 2517, having two #18 stranded conductors with aluminum mylar foil shield and #20 drain wire. Rated 150 °C, FR-1, 300 volts.	Oiltight∗		**800T-U90**
		Small Oiltight – Round❄‡		**800MR-N37**
		Small Oiltight – Square❄§		**800MS-N37**
	ATTENTION – If the recommended potentiometer and cable are not used, be certain that the potentiometer and cable wiring is insulated from ground and circuit common for 300V RMS or greater.			
	**Type 1 Enclosure** – Use for all Bulletin 700-P, -PH, and -PK relays except 10- and 12-pole DC relays or 5- and 6-pole DC Bulletin 700-PH relays.			700-N31
	**Relay Rail** Simplifies panel layout. These indexed strips are easily cut to the required length and bolted, riveted, or spot-welded in place. Relays are installed adjacent to one another on the mounting strip with the captive mounting screws provided. Rows of relays on Relay Rail form their own wiring trough. Can be used with the following relays: 700P, 700-PK, 700PH, 700S-P, 700N, 700-R, 700-RTC	Relays per Strip	Pkg. Quantity	
		4	5	**700-MP4**
		8	5	**700-MP8**
		12	5	**700-MP12**
		16	5	**700-MP16**
 *Cat. No. 199-DR1*	**DIN (#3) Symmetrical Rail** 35x7.5x1 m		10	**199-DR1**
	**DIN Rail Adapter** Can be used with the following relays: 700P, 700-PK, 700-PH, 700S-P, 700-N, 700-R, 700-RTC		1	**700-DRA**

∗ Legend plate, Cat. No. 800T-X609, must be specified when ordering.
❄ Add suitable 400 KΩ potentiometer.
‡ Does not include legend plate.
§ Does not include legend plate. Contact your local Rockwell Automation sales office or Allen-Bradley distributor.



Bulletin 700-HC

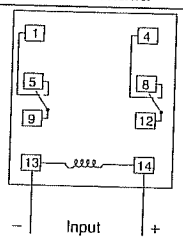
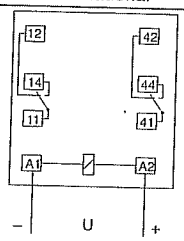
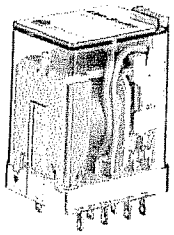
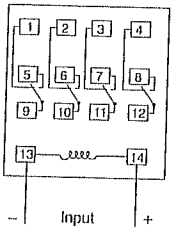
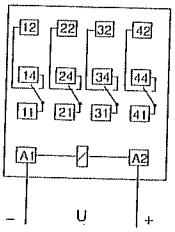
- 7 or 10 A contact ratings
- 2PDT or 4PDT
- Standard ON/OFF flag indicator
- Blade-style terminals
- Choice of standard silver nickel contacts, or silver nickel with gold-plated contacts for low-energy applications
- Options: LED, push-to-test with manual override option
- Tungsten UL Approvals
  4-Pole: 5A @ 24V DC
  2-Pole: 10A @ 24V DC

Table of Contents

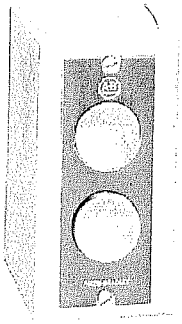
Standards Compliance and Certifications

See Specification table in this section, page 9-38.

Bulletin 700-HC Miniature Square Base with Blade Terminals

	Description	Contact Rating	Wiring Diagrams U.S./Canada	Wiring Diagrams International	Coil Voltage	Cat. No. * ❊
	2PDT 2-Pole 2 Form C Contacts: 10 A = AgNi Contacts	10 A C300 R300 Low energy rating; (10V, 10 mA)	 *700-HN128*	 *700-HN103* *700-HN104*	12V DC	700-HC22Z12
					24V DC	700-HC22Z24
					24V AC	700-HC22A24
					120V AC	700-HC22A1
					240V AC	700-HC22A2
	4PDT 4-Pole 4 Form C Contacts: 7A = AgNiAu Gold Plated Contacts	7 A Low energy rating; (10V, 1 mA)			6V AC	700-HC14A06
					12V AC	700-HC14A12
					24V AC	700-HC14A24
					120V AC	700-HC14A1
					240V AC	700-HC14A2
					6V DC	700-HC14Z06
					12V DC	700-HC14Z12
					24V DC	700-HC14Z24
					48V DC	700-HC14Z48
					110V DC	700-HC14Z1
	4PDT 4-Pole 4 Form C Contacts: 7A = AgNi Silver Contacts	7 A C300 R300 Low energy rating; (10V, 10 mA)	*700-HN128*	*700-HN103* *700-HN104*	6V AC	700-HC24A06
					12V AC	700-HC24A12
					24V AC	700-HC24A24
					120V AC	700-HC24A1 ←
					240V AC	700-HC24A2
					6V DC	700-HC24Z06
					12V DC	700-HC24Z12
					24V DC	700-HC24Z24
					48V DC	700-HC24Z48
					110V DC	700-HC24Z1

* LED Option: Add suffix **(-4)** to the selected Bulletin 700-HC Relay Cat. No. except for the 240V AC units, add **(-4L)**.
❊ Push-to-Test and LED Option: Add suffix **(-3-4)** to the selected Bulletin 700-HC Relay Cat. No., except for the 240V AC units, add **(-3-4L)**.



Bulletin 800S — Standard Duty Stations

Features — Bulletin 800S standard duty push button stations are used in control circuits. They offer compact size and dependable peformance.

NEMA Type 1 general purpose stations have been designed for greater operating flexibility and ease of wiring. The cover of the station contains the entire contact mechanism. Wiring terminals are located in the base. Spring type, silver plated contacts connect the two assemblies. This unique construction will speed up installation and maintenance. Operating buttons can be rotated 90 degrees to make them suitable for horizontal mounting. This change can be made in the field.

NEMA Type 4 — Enclosures are die cast aluminum. Standard stations are supplied with a 3/4 inch pipe tap at the bottom.

Table of Contents

Pilot Lights

- Push button stations with pilot lights can operate on either 120V or 240V by changing connections. A red pilot lens is supplied.

Selector Switches

- All two-position Bulletin 800S standard duty selector switch stations can be changed to three-position in the field, and the three-position selector switches can be changed to two-position. Instructions for changing are included with each station.
- In addition to the standard marking, all selector switches are supplied with adhesive backed metal legend plates, marked as follows: OFF-ON, FOR-REV, HAND-AUTO, OPEN-CLOSE, HIGH-LOW, SUMMER-WINTER, SUMMER-OFF-WINTER, HIGH-OFF-LOW, OPEN-OFF-CLOSE, FOR-OFF-REV, HAND-OFF-AUTO.

Complete Assembled Stations

Flush Mount Units fit a standard GEM or Handy Type Wall Box. Contact Symbol 3
Cat. No. 800S-2AS

Type 1 Flush Mount Unit* — Wall Box not included			
		Grey Painted Flush Plate	Stainless Steel Flush Plate
Legend Marking	Contact Symbol	Cat. No.	Cat. No.
START STOP	3	**800S-2AS**	800S-2ASQ

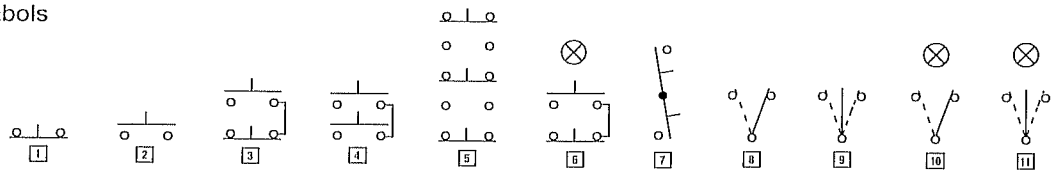
* Not rated for DC operation.

Cat. No. 800S-2SAP

Cat. No. 800S-2SCM

Momentary Contact Buttons and Pilot Light — 120V or 240V, Type 1.			Maintained Contact Buttons — Type 1		
Legend Marking	Contact Symbol	Cat. No.	Legend Marking	Contact Symbol	Cat. No.
No Legend START STOP	6	**800S-2SAP**	No Legend ON OFF	7	**800S-2SCM**
			No Legend START STOP	7	**800S-2SBM**

Contact Symbols

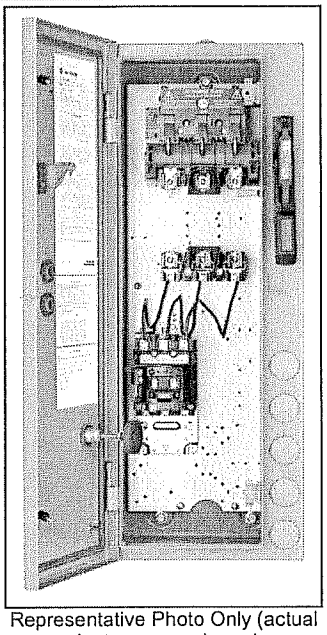


Rockwell Automation

APPROVED

By Jesse Mailloux - Ryfan Industrial Electric at 10:07 am, Nov 15, 2010

Configuration Results



Representative Photo Only (actual product may vary based on configuration selections)

Product: 512-CDCD-EC2D

Description: NEMA Combination Starter, Disconnect Type, NEMA 2, 600/110/120 VAC - 50/60Hz (CD), Type 3R/4/12 - Enclosure Code "D"

Selected Components

Selected Components

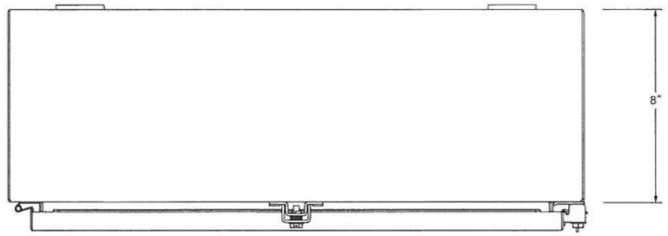
Catalog Number	Qty	Product Description	Unit Price (US$)	Supplementary Documents
512-CDCD-EC2D	1	NEMA Combination Starter, Disconnect Type, NEMA 2, 600/110/120 VAC - 50/60Hz (CD), Type 3R/4/12 - Enclosure Code "D"	$ 2,718.00	• Product Details and Certifications • Repair Parts List • Renewal Parts for Overload Relay Reset Button • Dimension Sheet • Repair Parts for Enclosure • Repair Parts for 25Hz Coil • Repair Parts for Control Circuit Terminal
		Estimated List Price *(Contact local RA Distributor for pricing)*	**$ 2,718.00**	

Modify Cancel

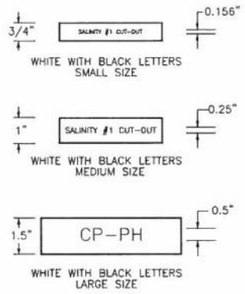
APPROVED

By Jesse Mailloux - Ryfan Industrial Electric at 10:15 am, Mar 09, 2011

DRAWING NO. 10-1908-1 REV. A



TOP VIEW



TYPICAL ENGRAVINGS

ITEM	QTY.	DESCRIPTION
1	1	HOFFMAN ENCLOSURE # 1418N4J8
2	2	ALLEN-BRADLEY PUSH BUTTON #800H-AR1D1 (GREEN)
3	2	ALLEN-BRADLEY PUSH BUTTON #800H-AR6D2 (RED)
4	2	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10G (GREEN)
5	3	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10R (RED)
6	1	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10A (YELLOW)
7	2	ALLEN-BRADLEY 2 POS. SELECTOR SWITCH #800H-HR2A
8	8	ALLEN-BRADLEY RELAY #700-HC24A1
9	8	ALLEN-BRADLEY RELAY BASE #700-HN128
10	12	ALLEN-BRADLEY LEGEND PLATE #800H-W100
11	2	ENM HOUR METER RESETABLE #T348N62D
12	LOT	WIREWAY 2" W X 2" H C/W COVER (62X62)
13	14	ENGRAVING - SMALL AND MEDIUM SIZE
14	3	ENGRAVING - LARGE SIZE
15	28	WEIDMUELLER WDU4 TERMINAL #102010
16	1	WEIDMUELLER WAP END PLATE #105000
17	2	WEIDMUELLER WEW35 END CLAMP #106120
18	56	WEIDMUELLER WS12/6 TERMINAL MARKER #16099
19	LOT	WEIDMUELLER BRIDGE #175827
20	LOT	WEIDMUELLER TS35 RAIL #38340
21	1	IISCO GROUND BAR #N820A108T
22	1	HOFFMAN HANDLE, KEY LOCKING # C-WKL
23	1	CSA

BILL OF MATERIAL

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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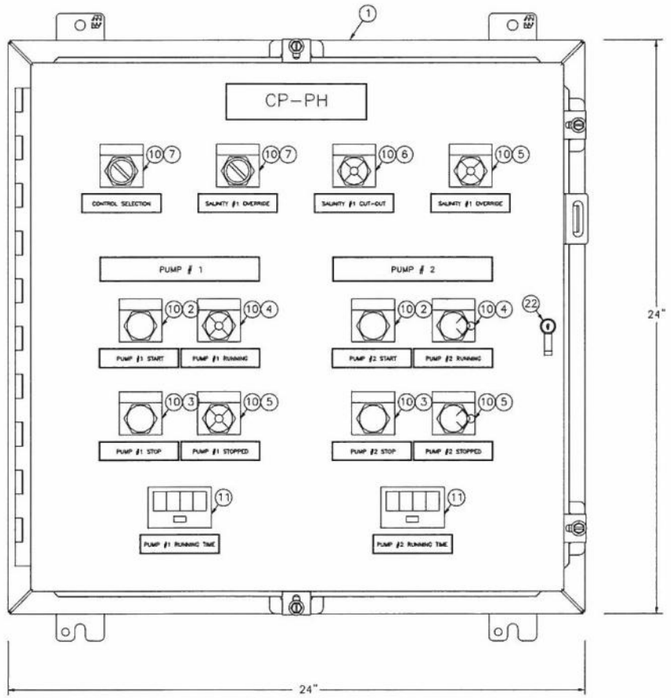
Per,

WILLIAMS ENGINEERING CANADA INC.

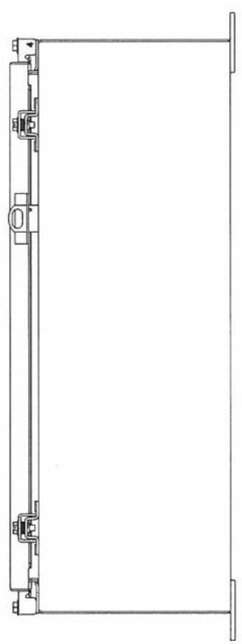
By: Jaehoon Lee, Williams Engineerir..

Date: 03/15/2011

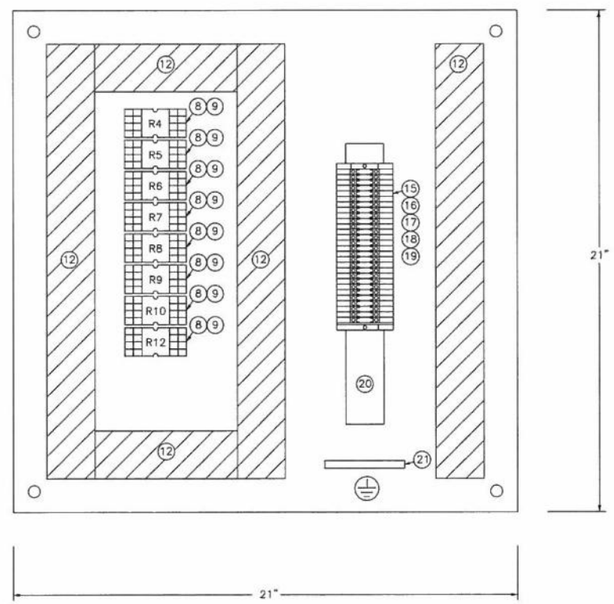
WILLIAMS ENGINEERING CANADA



FRONT VIEW



SIDE VIEW



INTERIOR BACK PLATE

SCALE INCHES 0 1 2 3 4 5

REV	ISSUE DATE Y	M	D	DESCRIPTION	DWN	CHK	ENG	APP	APP
A	11	01	31	SHOP DRAWING REVIEW	PCM				

G.T.K. ELECTRIC CONTROLS LTD.
Design & Manufacture of Electrical and Process Control Systems

DRAWING TITLE:
KUGLUKTUK, NU
WATER SUPPLY IMPROVEMENTS
PHASE 1
NEW INTAKE AND PUMPHOUSE ELECTRICAL PANELS
CP-PH PANEL LAYOUT AND BILL OF MATERIAL
SHEET 1 OF 5

DRAWING NO.	SHT. No.	REV
10-1908-1	1	A

PLOT SCALE X

8 7 6 5 4 3 2 1

DRAWING NO. 10-1908-2 | REV. A

CP-PH

LOCAL - REMOTE — L-SS1 — CONTROL SELECTION

OFF - ON — L-SS2 — SALINITY #1 OVERRIDE

ON (Y) — L-IL5 — SALINITY #1 CUT-OUT

ON (R) — L-IL6 — SALINITY #1 OVERRIDE

PUMP # 1

START (G) — L-PB1 — PUMP #1 START

RUNNING (G) — L-IL1 — PUMP #1 RUNNING

STOP (R) — L-PB2 — PUMP #1 STOP

STOPPED (R) — L-IL2 — PUMP #1 STOPPED

PUMP #1 RUNNING TIME

PUMP # 2

START (G) — L-PB3 — PUMP #2 START

RUNNING (G) — L-IL3 — PUMP #2 RUNNING

STOP (R) — L-PB4 — PUMP #2 STOP

STOPPED (R) — L-IL4 — PUMP #2 STOPPED

PUMP #2 RUNNING TIME

DOOR LAYOUT

N.T.S.

001	○	001
001	○	001
001	○	001
001	○	001
N	○	N
N	○	N
N	○	N
N	○	N
7	○	7
10	○	10
11	○	11
15	○	15
18	○	18
19	○	19
23	○	23
24	○	24
25	○	25
26	○	26
27	○	27
28	○	28
29	○	29
30	○	30
31	○	31
	○	SPARE
	○	SPARE
	○	SPARE
	○	SPARE
	○	SPARE

TERMINAL LAYOUT

N.T.S.

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
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Per,
WILLIAMS ENGINEERING CANADA INC.
By: Jaehoon Lee, Williams Engineerin
Date: 03/15/2011

WILLIAMS ENGINEERING CANADA

REV.	ISSUE Y	M	D	DESCRIPTION	DWN	CHK	ENG	APP	APP
A	11	01	31	SHOP DRAWING REVIEW	PCM				

G.T.K. ELECTRIC CONTROLS LTD.
Design & Manufacture of Electrical and Process Control Systems

DRAWING TITLE:
KUGLUTUK, NU
WATER SUPPLY IMPROVEMENTS
PHASE 1
CP-PH DOOR LAYOUT AND TERMINAL BLOCK LAYOUT
PHASE 1
SHEET 2 OF 5

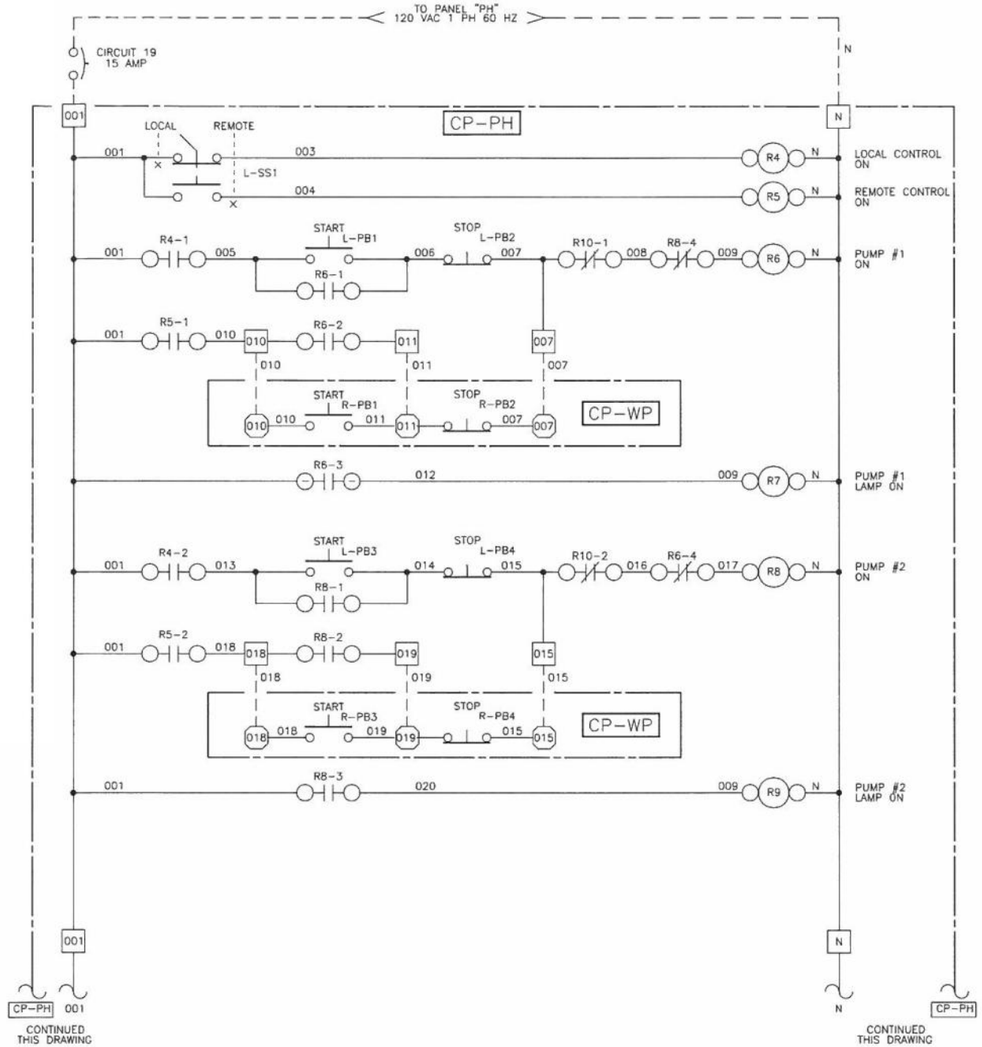
DRAWING NO.	SHT No.	REV.
10-1908-2	2	A

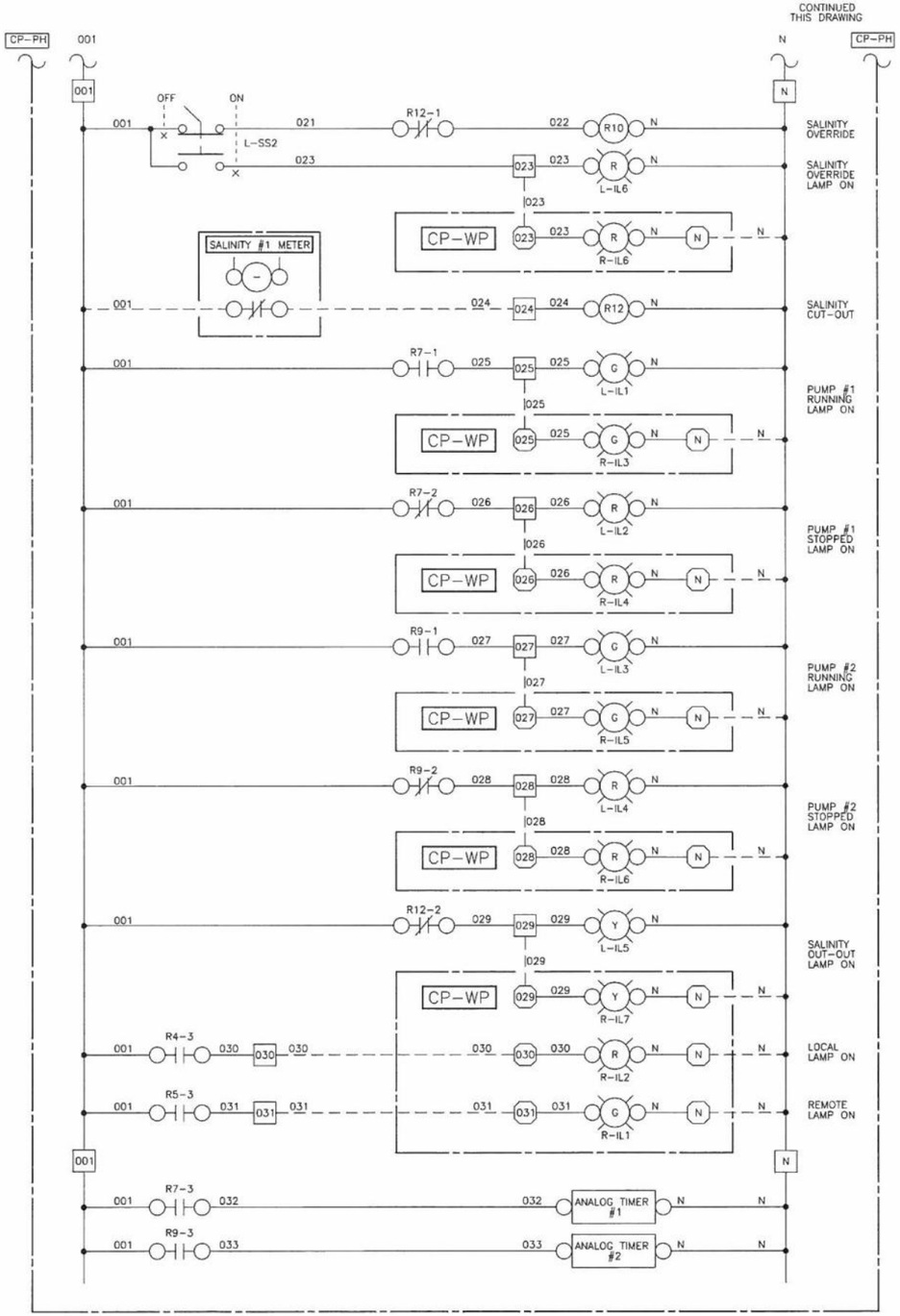
PLOT SCALE X

8 7 6 5 4 3 2 1

REV A

DRAWING NO. 10-1908-3





LEGEND

015 – TERMINAL IN LOCAL PANEL CP-PH

015 – TERMINAL IN LOCAL PANEL CP-WP

REV.	ISSUE DATE (Y M D)	DESCRIPTION	DWN	CHK	ENG	APP	APP
A	11 01 31	SHOP DRAWING REVIEW	PCM				

G.T.K. ELECTRIC CONTROLS LTD.
Design & Manufacture of Electrical and Process Control Systems

DRAWING TITLE:
KUGLUKTUK, NU
WATER SUPPLY IMPROVEMENTS
PHASE 1
NEW INTAKE AND PUMPHOUSE ELECTRICAL PANELS
CP-PH AND CP-WP ELECTRICAL SCHEMATIC
SHEET 3 OF 5

DRAWING NO.	SHT. No.	REV.
10-1908-3	3	A

PLOT SCALE X

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
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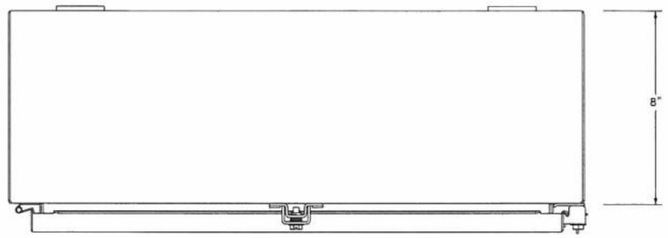
WILLIAMS ENGINEERING CANADA INC.

By: Jaehoon Lee, Williams Engineerir..

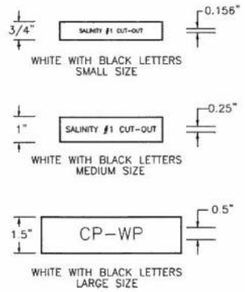
Date: 03/15/2011

WILLIAMS ENGINEERING CANADA

DRAWING NO. 10-1908-4 REV A



TOP VIEW



TYPICAL ENGRAVINGS

ITEM	QTY.	DESCRIPTION
1	1	HOFFMAN ENCLOSURE # 141BN4JB
2	2	ALLEN-BRADLEY PUSH BUTTON #800H-AR1D1 (GREEN)
3	2	ALLEN-BRADLEY PUSH BUTTON #800H-AR6D2 (RED)
4	3	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10G (GREEN)
5	4	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10R (RED)
6	1	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10A (YELLOW)
7	–	–
8	–	–
9	–	–
10	12	ALLEN-BRADLEY LEGEND PLATE #800H-W100
11	–	–
12	LOT	WIREWAY 2" W X 2" H C/W COVER (62X62)
13	12	ENGRAVING - SMALL AND MEDIUM SIZE
14	3	ENGRAVING - LARGE SIZE
15	23	WEIDMUELLER WDU4 TERMINAL #102010
16	1	WEIDMUELLER WAP END PLATE #105000
17	2	WEIDMUELLER WEW35 END CLAMP #106120
18	46	WEIDMUELLER WS12/6 TERMINAL MARKER #16099
19	LOT	WEIDMUELLER BRIDGE #175827
20	LOT	WEIDMUELLER TS35 RAIL #38340
21	1	IISCO GROUND BAR #N820A10BT
22	1	HOFFMAN HANDLE, KEY LOCKING # C-WKL
22	1	CSA

BILL OF MATERIAL

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Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
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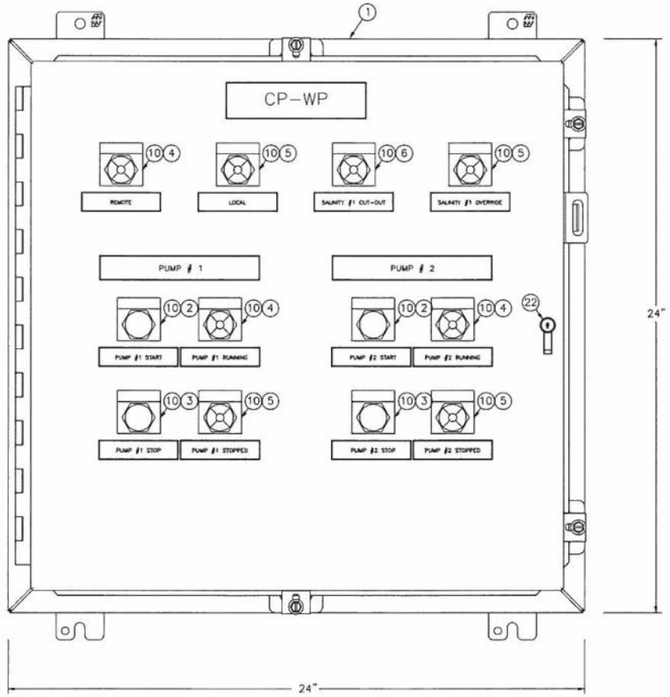
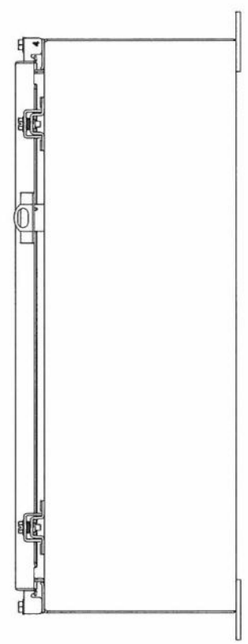
WILLIAMS ENGINEERING CANADA INC.
By: Jaehoon Lee, Williams Engineering
Date: 03/15/2011

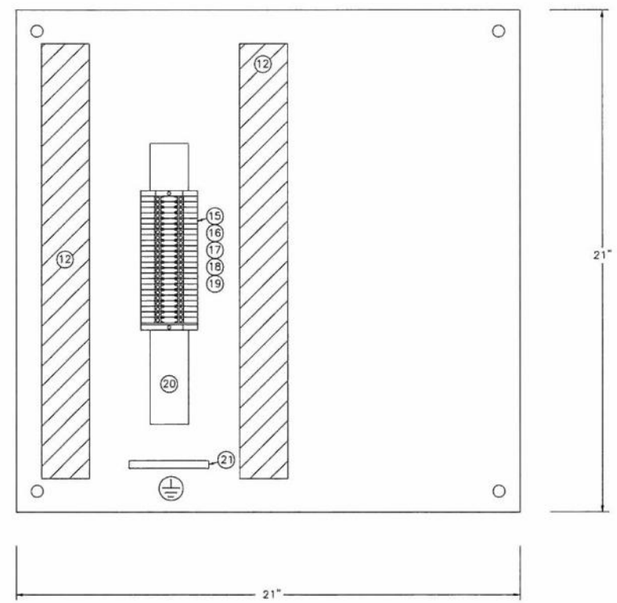
WILLIAMS ENGINEERING CANADA



FRONT VIEW



SIDE VIEW



INTERIOR BACK PLATE

SCALE INCHES 0 1 2 3 4 5

REV.	ISSUE DATE Y	M	D	DESCRIPTION	DWN	CHK	ENG	APP	APP
A	11	01	31	SHOP DRAWING REVIEW	PCM				

G.T.K. ELECTRIC CONTROLS LTD.
Design & Manufacture of Electrical and Process Control Systems

DRAWING TITLE
KUGLUKTUK, NU
WATER SUPPLY IMPROVEMENTS
PHASE 1
NEW INTAKE AND PUMPHOUSE ELECTRICAL PANELS
CP-WP PANEL LAYOUT AND BILL OF MATERIAL
SHEET 4 OF 5

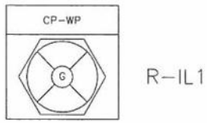
DRAWING NO.	SHT. No.	REV
10-1908-4	4	A

PLOT SCALE X

8 7 6 5 4 3 2 1

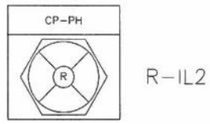
DRAWING NO. 10-1908-5 REV. A

CP-WP



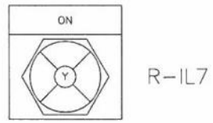
R-IL1

REMOTE



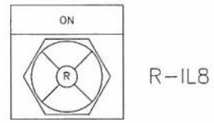
R-IL2

LOCAL



R-IL7

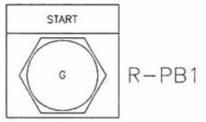
SALINITY #1 CUT-OUT



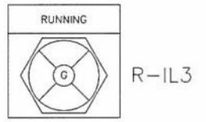
R-IL8

SALINITY #1 OVERRIDE

PUMP # 1

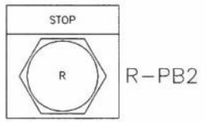


R-PB1

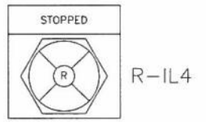


R-IL3

PUMP #1 START | PUMP #1 RUNNING



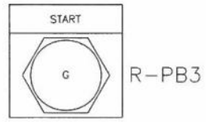
R-PB2



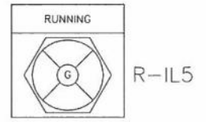
R-IL4

PUMP #1 STOP | PUMP #1 STOPPED

PUMP # 2

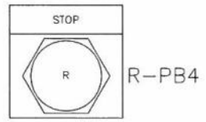


R-PB3

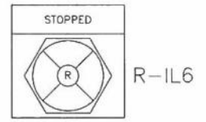


R-IL5

PUMP #2 START | PUMP #2 RUNNING



R-PB4



R-IL6

PUMP #2 STOP | PUMP #2 STOPPED

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Jaehoon Lee, Williams Engineeri.

Date: 03/15/2011

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													SPARE

TERMINAL LAYOUT

N.T.S.

REV.	ISSUE	DATE	DESCRIPTION	DWN	CHK	ENG	APP	APP
A	Y	11 01 31	SHOP DRAWING REVIEW	PCM				

G.T.K. ELECTRIC CONTROLS LTD.
Design & Manufacture of Electrical and Process Control Systems

DRAWING TITLE:
KUGLUTUK, NU
WATER SUPPLY IMPROVEMENTS
PHASE 1
CP-WP DOOR LAYOUT AND TERMINAL BLOCK LAYOUT
PHASE 1
SHEET 5 OF 5

DRAWING NO.	SHT. No.	REV
10-1908-5	5	A

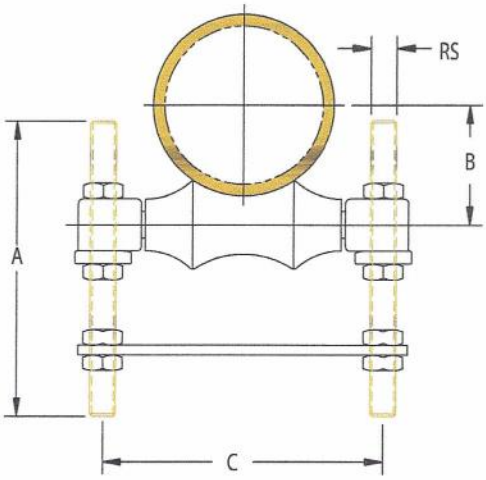
PLOT SCALE: X

8 7 6 5 4 3 2 1

PIPE ROLLER 620

Adjustable Pipe Roll Support

- Size Range: 2-1/2" thru 30"
- Surface Finish: Black
- Support pipe from a substructure or structural member where longitudinal movement may occur due to expansion or contraction and where vertical adjustment of up to 6" may be necessary
- Conforms with Federal Specification WW-H-171 (Type 42), Manufacturers Standardization Society ANSI/MSS-SP-58 (Type 41); install in accordance with ANSI/MSS-SP-69



NOTE: Roll and sockets are cast iron and axle is carbon steel, available with Electro-zinc plated finish by special order

Part Number	Pipe Size	RS	A	B	C	Max. Rec. Load (lbs)
6200250PL	2-1/2"	1/2"	12"	1-7/8"	4-7/8"	660
6200300PL	3"	1/2"	12"	2-1/4"	5-5/8"	700
6200350PL	3-1/2"	1/2"	12"	2-5/8"	6-1/8"	750
6200400PL	4"	5/8"	12"	2-7/8"	6-11/16"	750
6200500PL	5"	5/8"	12"	3-1/2"	7-15/16"	750
6200600PL	6"	3/4"	12"	4"	9-9/16"	1070
6200800PL	8"	7/8"	12"	5-1/4"	12"	1350
6201000PL	10"	7/8"	12"	6-5/16"	14"	1730
6201200PL	12"	7/8"	12"	7-7/16"	15-3/4"	2400
6201400PL	14"	1"	12"	8-3/8"	17-5/8"	3130
6201600PL	16"	1"	18"	9-7/16"	19-5/16"	3970
6201800PL	18"	1"	18"	10-7/16"	21-5/8"	4200
6202000PL	20"	1-1/4"	18"	11-1/2"	24-1/8"	4550
6202400PL	24"	1-1/2"	24"	13-15/16"	28-3/8"	6060
6203000PL	30"	1-1/2"	24"	17-1/4"	35-3/8"	7290

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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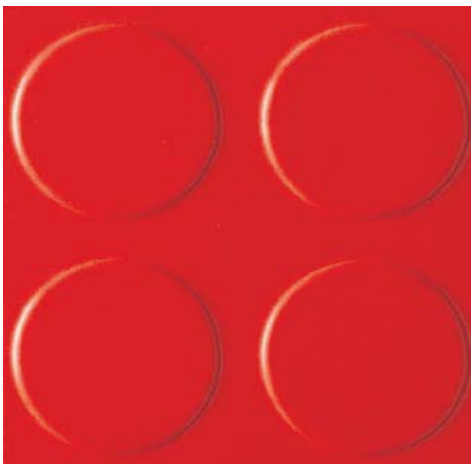
Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 22/10/2010

WILLIAMS ENGINEERING CANADA



BR

(STUDDED RUBBER TILES)

ACTiVA™ Rubber Flooring

Technical Data Sheet

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

Date: 08/04/2011

WILLIAMS ENGINEERING CANADA

Product Specifications

Feature	Standard	Results	Notes
Safety			
Halogen Free		Yes	
Asbestos Free		Yes	
This product does not contain PVC, cadmium, formaldehyde, chlorine, fluorine or bromine, which could be highly toxic and corrosive in case of fire.			
Fire and Smoke Behaviour			
Critical Heat Flux Critical Radiant Flux	ASISO 9239.1-2003	≥ 11 kw/m^2	
Smoke Value	ASISO9239.1-2003	16 min	
Toxicity of Smoke	Boeing Safety Standard BSS 7239	ppm level (Complies)	
Mechanical Features			
Hardness	ASTM D-2240	≥ 85 Shore A	
Dimensional Stability	DIN 51962	< 0.3 % No variation	
Indentation	ASTM F-36	≤ 0.20 mm	
Abrasion Resistance	DIN 53516	≤ 160 mm^3	
Elongation	ASTM D412	~150 %	
Tensile Strength	ASTM D-412	≥ 800 psi	
Slip Resistance	ASTM D-2047-82	≥0.60	Complies with ADA
Resistance to Elements Over Time			
Colour Fastness	DIN 53389	5 - 7	
Water Retention	ASTM D471	≤ 1 %	
Chemical Resistance	DIN 51958	Good	See Chart
Cigarette Burn Resistance	DIN 51961	Yes	Visual Judgment
Acoustical Features			
Acoustical Insulation	DIN 52210	~ 10 dB	Noise abetment
Electrical Features			
Insulation	DIN 53596	≥ 10^{10} ohm	Insulating
Static Generation	DIN 54345	<2 kV	Antistatic
Composition			
ACTiVA Rubber flooring products are made of 100% synthetic rubber (SBR - Styrene Butadiene Rubber), the finest quality minerals, organic stabilsing agents, vulcanising agents, antioxidants and quality pigments. They DO NOT CONTAIN re-ground rubber, coarse mineral aggregates, fillers, sand or any material known to pose a health hazard in any of the phases of the manufacturing and use cycle.			

Product Description

The original PIRELLI design and the worldwide best seller.

Homogeneous Rubber Flooring tile made of 100% synthetic rubber.

Features

- Easy Maintenance
- Slip Resistant
- Sound Absorbent
- High Abrasion Resistance
- Highly Resilient

Environmental & Safety

Product FREE from:
Halogens, Antimony, Arsenic, Barium, Lead, Cadmium, Chromium, PVC, Volatile elements, DOP's, Formaldehyde, Asbestos and Heavy metals.

Manufactured in compliance with ISO 14001

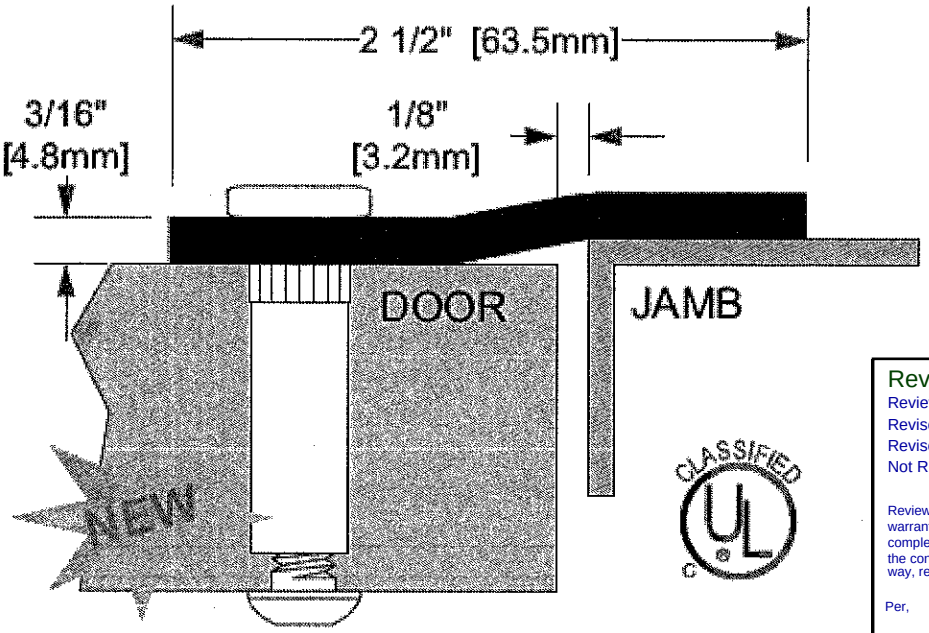
Information

- Tile Size : 50 x 50 cm
- Thickness : 3.0mm
- Limited Wear Warranty: 10 Years
- Colour s: 24 Standard
  Custom Colours are available upon request
- Recommended Adhesives:
  Two-part PU
  **Please consult our office for detail.*

PRF (NZ) Pty Ltd.
6 Findlay Street
Ellerslie, Auckland
P: (09) 579 2890 F:(09) 579 2892
www.rubberflooring.co.nz

W7

Product Details PDF



SECURITY ASTRAGAL

PRIMED C.R. STEEL c/w SECURITY SLEEVE

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

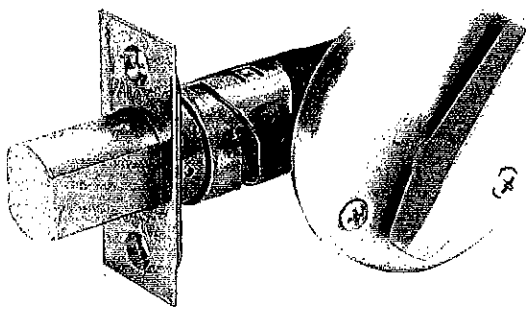
By: Kevin Rattray EIT, Williams Engir

Date: 04/05/2011

WILLIAMS ENGINEERING CANADA

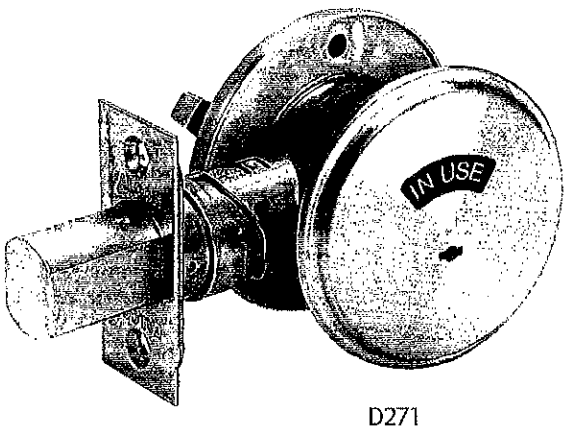
DOORTECH'S ARE WELDED TO THE DOOR RATHER THAN BOLTED.

Deadbolt thrown or retracted by turn unit only. No outside trim. Bolt automatically deadlocks when fully thrown.
ANSI/BHMA E2192



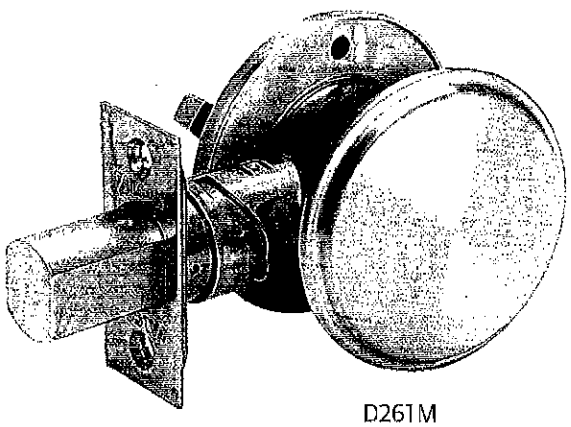
D261

Deadbolt thrown or retracted by turn unit only. Occupancy indicator on outside (reads either "in use" or "vacant" with color coding). Bolt automatically deadlocks when fully thrown. Emergency key supplied.



D271

Deadbolt thrown or retracted by turn unit only. Outside blank rose. Bolt automatically deadlocks when fully thrown.
ANSI/BHMA E01112



D261M

SCHLAGE®

P513-610

Single Cylinder Deadbolt
B660/760/860
B661/761/861

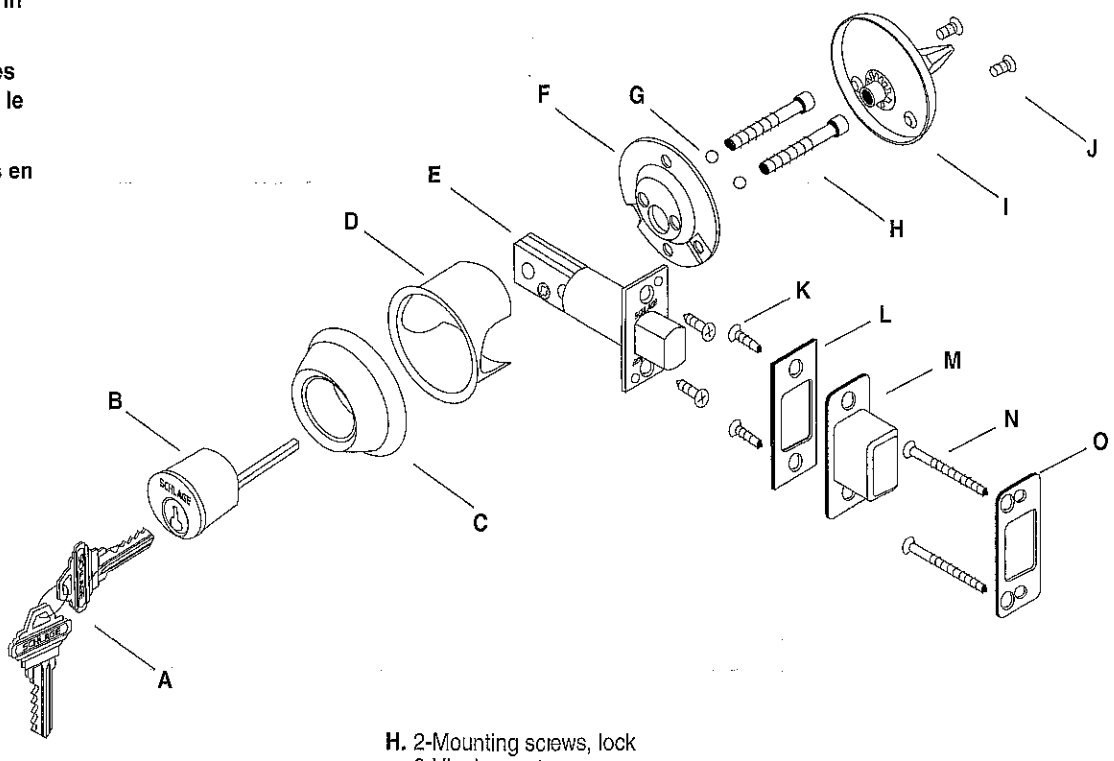
B-Series

Installation Instructions

Parts contained in package

Pièces détachées contenues dans le paquet

Piezas incluidas en el paquete



A. 2-Keys
2-Clés
2- Llaves

B. 1-Cylinder
1-Cylindre
1-Cilindro

C. 1-Trim ring
1-Anneau de garniture
1-Aro de guarnición

D. 1-Metal shield
1-Gaine de sécurité
1- Rodela metálica

E. 1-Deadbolt
1-Pêne dormant
1-Cerrojo de seguridad

F. 1-Mounting plate
1-Plaque support
1-Placa de montaje

G. 2-Hardened steel balls
2-Billes en acier trempé
2-Bolas de acero templado

H. 2-Mounting screws, lock
2-Vis de montage pour verrou
2-Tornillos de montaje para la cerradura

I. 1-Thumbturn (B660) or
1-Rose (B661)
1-Le tourniquet (B660) ou
1-Rosette (B661)
1-Perno mariposa (B660) ó
1-Roseta (B661)

J. 2-Mounting screws, rose
2-Vis de montage pour rosette
2-Tornillos de montaje para la roseta

K. 4-Screws, bolt and strike
4-Vis, pêne et gâche
4-Tornillos, pasador y recibidor

L. 1-Strike
1-Gâche (affleurante)
1-Placa fija

M. 1-Strike box
1-Boîtier de gâche
1-Recibidor

N. 2-3" (76mm) mounting screws
2-Vis de montage (76 mm)
2-Tornillos de montaje de 76 mm

O. 1-Wood frame reinforcer
1-Plaque de renfort pour cadre en bois
1-Reforzador para marco de madera

1

Mark door with template

a. Place template on door (high edge of beveled (slanted) door). Mark for two holes.

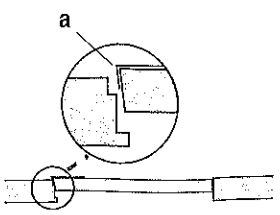
b. Heightline.

c. Center of door thickness.

Tracez le gabarit sur la porte

a. Placez le gabarit sur la porte (du côté de l'arête supérieure sur une porte à chanfrein). Tracez deux trous.

b. Ligne de hauteur.



3

Install deadbolt

a. Bolt must be retracted. If necessary, use screwdriver to turn cam and retract bolt.

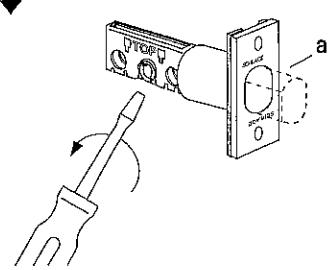
b. Trace around faceplate.

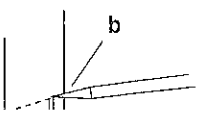
c. Chisel out wood for flat fit against door.

d. Fasten with screws.

Installez le pêne dormant

a. Rétractez le pêne. Si nécessaire, faites tourner la came à l'aide d'un tournevis pour rétracter le pêne.

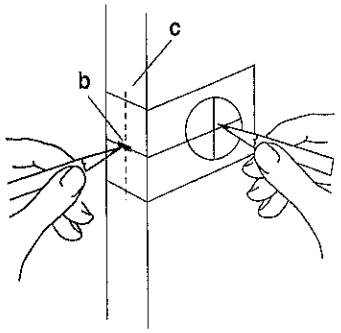




porte.

Marque la puerta con la plantilla

a. Coloque la plantilla sobre la puerta (sobre el borde alto de la puerta biselada o inclinada). Marque los puntos para dos agujeros.
b. La línea de altura.
c. El centro del espesor de la puerta.



2

Drill (2) holes

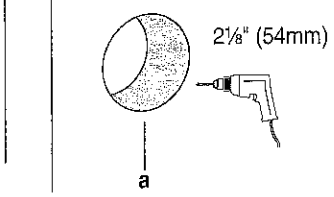
a. Drill a 2⅛" (54mm) hole through door face (from both sides to avoid damaging wood). **Note:** Do not use metal shield in existing 1½" (38mm) hole installations.
b. Drill a 1" (25mm) hole in door edge or 1⅛" (27mm) for circular bolt. Drill ⅜" (10mm) deeper as shown.

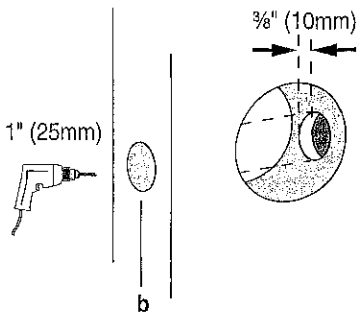
Percez les (2) trous

a. Forez un trou de 54 mm à travers la porte (percez des deux côtés pour ne pas endommager la porte). **Remarque:** Pour un trou de 38 mm existant, n'utilisez pas la gaine de sécurité fournie.
b. Forez un trou de 25 mm dans l'épaisseur de la porte ou de 27 mm pour un verrou circulaire. Forez 10 mm plus profond comme indiqué sur le schéma.

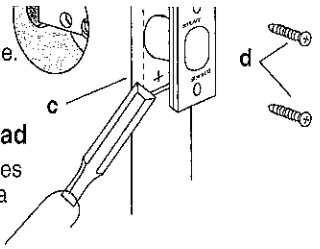
Taladre (2) agujeros

a. Taladre un agujero de 54 mm en el frente de la puerta (taladre desde ambos lados para evitar que se estropee la madera). **Nota:** Si utiliza un agujero previamente taladrado de 38 mm, no haga uso de la rodela metálica incluida.
b. Taladre un agujero de 25 mm en el borde de la puerta o 27 mm para el pasador circular. Taladre 10 mm más de profundidad, según se ve en la ilustración.





c. Buriner le bois afin de permettre l'encastrement de la têtière affleurante.
d. Vissez les deux vis.



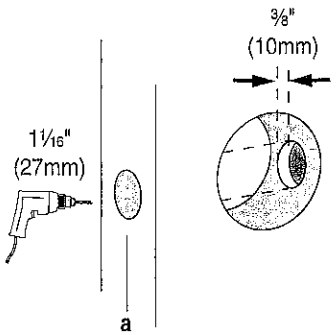
Instalación del cerrojo de seguridad

a. El pasador debe estar descorrido. Si es necesario, utilice un desarmador para girar la leva y descorrer el pasador.
b. Trace el contorno de la placa.
c. Cincele el área marcada para que la placa se asiente al ras de la puerta.
d. Asegure la placa con tornillos.

Install circular drive-in deadbolt

(optional as ordered)

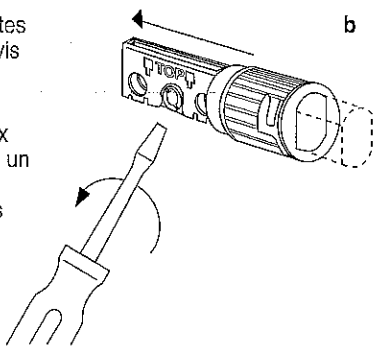
a. Drill a 1⅛" (27mm) hole in door edge. Drill ⅜" (10mm) deeper as shown.
b. Bolt must be retracted. If necessary, use screwdriver to turn cam and retract bolt.
c. Insert bolt as far as it will go (bolt sides must be vertical). Place wood block against retracted bolt and gently tap until flat against door edge.



Installez le pêne dormant circulaire

(optionnel en fonction de la commande)

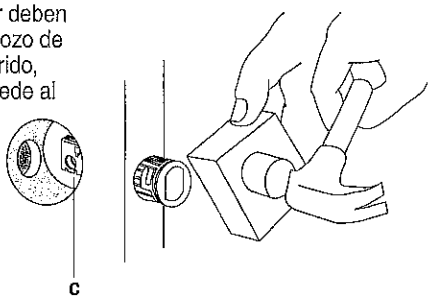
a. Forez un trou de 27 mm dans l'épaisseur de la porte. Forez 10 mm plus profond comme indiqué sur le schéma.
b. Rétractez le pêne. Si nécessaire, faites tourner la came à l'aide d'un tournevis pour rétracter le pêne.
c. Insérez le pêne dans le trou aussi profondément que possible (les deux côtés doivent être verticaux). Placez un bloc de bois sur le pêne en position rétractée et donnez des petits coups de marteau afin d'encastrer le pêne.



Instale el cerrojo circular de seguridad

(según el pedido del cliente)

a. Taladre un agujero de 27 mm en el borde de la puerta. Taladre 10 mm más de profundidad, según se ve en la ilustración.
b. El pasador debe estar descorrido. Si es necesario, utilice un desarmador para girar la leva y descorrer el pasador.
c. Inserte el pasador lo más que se pueda. (Ambos lados del pasador deben mantenerse verticales.) Con un trozo de madera contra el pasador descorrido, martillee levemente hasta que quede al ras con el borde de la puerta.



4

Prepare door jamb

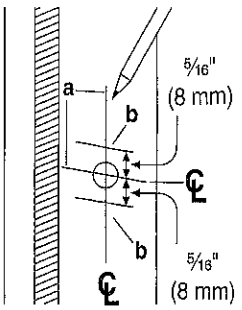
a. Locate exact centerline of bolt and mark centerline on jamb.

b. Mark drill points 5/16" (8 mm) above and below centerline.

c. Drill two overlapping 1" (25 mm) holes 1⅛" (29 mm) deep. Clean out hole for bolt.

d. Place strike box in hole. Place strike over strike box and use it as pattern for cutout.

e. Chisel ¼" (6mm) deep.



Préparez le jambage de la porte

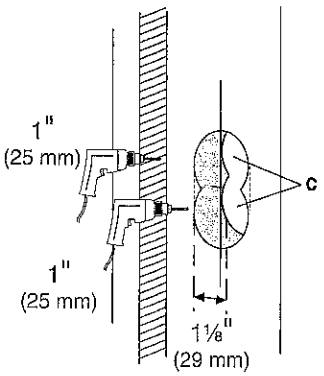
a. Trouvez la ligne verticale du pêne en marquant l'emplacement où le pêne vient frapper contre le jambage.

b. Tracez les points de forage 8 mm au-dessus et au-dessous de la ligne centrale (horizontale).

c. Percez deux trous de 25 mm de diamètre se chevauchant verticalement et de 29 mm de profondeur. Nettoyez le trou pour que le pêne puisse s'y loger facilement.

d. Insérez le boîtier de gâche dans le trou. Placez temporairement la gâche sur le boîtier et tracez le contour de la gâche pour buriner le jambage avant d'encastrer la gâche affleurante.

e. Burinez à une profondeur de 6 mm.



Prepare la jamba de la puerta

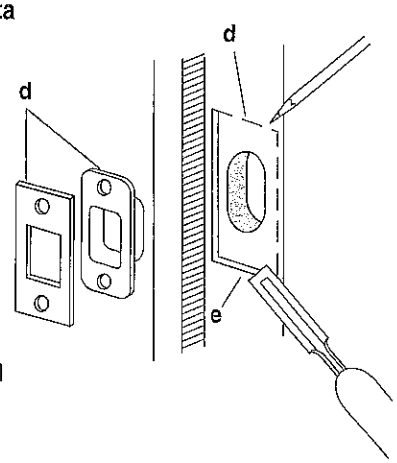
a. Ubique la línea central del pasador y marque la línea central en la jamba de la puerta.

b. Marque los puntos para taladrar 8 mm arriba y abajo de la línea central.

c. Taladre dos agujeros superpuestos de 25 mm a una profundidad de 29 mm. Limpie el agujero para colocar el pasador.

d. Coloque el recibidor dentro del agujero. Coloque la placa fija sobre el recibidor y utilícela como molde para marcar donde va a cincelar.

e. Cincele a una profundidad de 6 mm.



6

Install lock

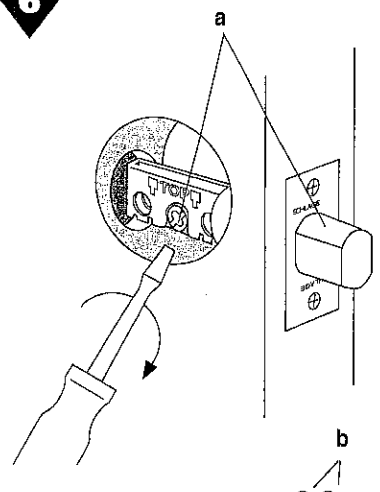
a. First extend bolt.

b. Place steel balls in screw holes as shown.

c. Place metal shield in hole. **Note:** Do not use metal shield in existing 1½" (38mm) hole installations.

d. Place cylinder and ring onto door with cylinder bar through slot in deadbolt cam.

e. Place inside mounting plate in position, insert mounting screws.



Installez le verrou

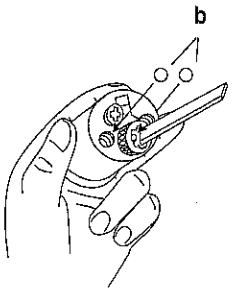
a. Mettez le pêne en position verrouillée.

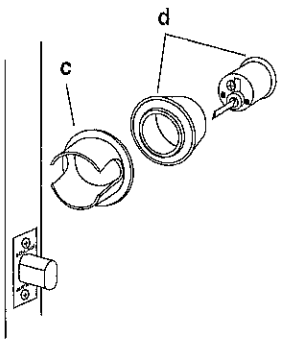
b. Insérez les billes en acier dans les trous des vis comme indiqué sur le schéma.

c. Placez la gaine de sécurité dans le trou. **Remarque:** S'il existe déjà un trou de 38 mm, ne pas utiliser la gaine de sécurité fournie.

d. Placez le cylindre et l'anneau de fourniture sur la porte, la barre du cylindre passant par la fente de la came du pêne dormant.

e. Mettez la plaque support intérieure en place et vissez les vis de montage.





Instale la cerradura

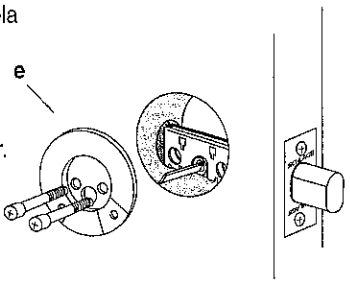
a. Primero descorra el pasador.

b. Coloque los balines en los agujeros de los tornillos según la ilustración.

c. Coloque la rodela metálica en el agujero. **Nota:** Si utiliza un agujero previamente taladrado de 38 mm, no haga uso de la rodela metálica incluida.

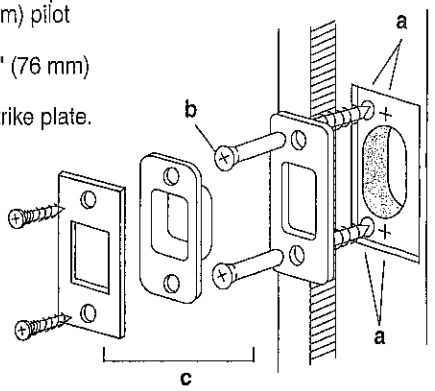
d. Coloque el cilindro y el aro de guarnición uniéndolos a la puerta con la barra del cilindro insertada en la ranura de la leva del pasador.

e. Coloque dentro de la placa de montaje en su posición y apriete los tornillos de montaje.



Install strike assembly

a. Place reinforcer in cutout with screw holes toward door stop. Mark and drill 3/16" (5 mm) pilot holes.
b. Install reinforcer with 3" (76 mm) wood screws.
c. Install strike box and strike plate.



Installez les pièces de la gâche

a. Placez la plaque de renfort dans la partie creusée, les trous de vis orientés vers le chambranle de la porte. Tracez et forez des trous pilotes de 5 mm.
b. Installez la plaque de renfort avec des vis à bois de 76 mm.
c. Mettez le boîtier de la gâche et la gâche affleurante en place.

Instale el conjunto de piezas del recibidor

a. Coloque el reforzador en el área cincelada con los agujeros de los tornillos hacia el tope de la puerta. Marque y taladre los agujeros piloto de 5 mm.
b. Instale el reforzador con tornillos para madera de 76 mm.
c. Instale el recibidor y la placa fija.

Install thumbturn

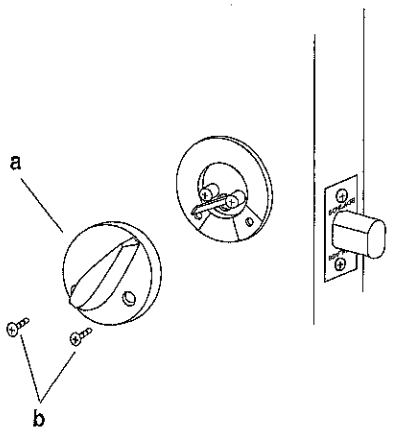
a. Engage thumbturn with cylinder bar as shown.
b. Fasten mounting plate with screws. Test operation of lock with keys and thumbturn.

Installez le tourniquet

a. Insérez le tourniquet sur la barre du cylindre comme indiqué sur le schéma.
b. Fixez la rosette à l'aide des vis. Vérifiez le bon fonctionnement de la serrure à l'aide de la clé et du verrou poucier.

Instale del perno mariposa

a. Enganche el perno mariposa con la barra del cilindro según se ve en la ilustración.
b. Apriete la roseta con tornillos. Ensaye el funcionamiento de la cerradura con las llaves y el perno mariposa.



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FALCON®

Instrucciones de instalación

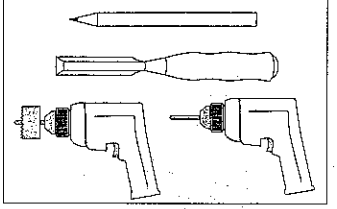
Installation Instructions
W-Series with Levers

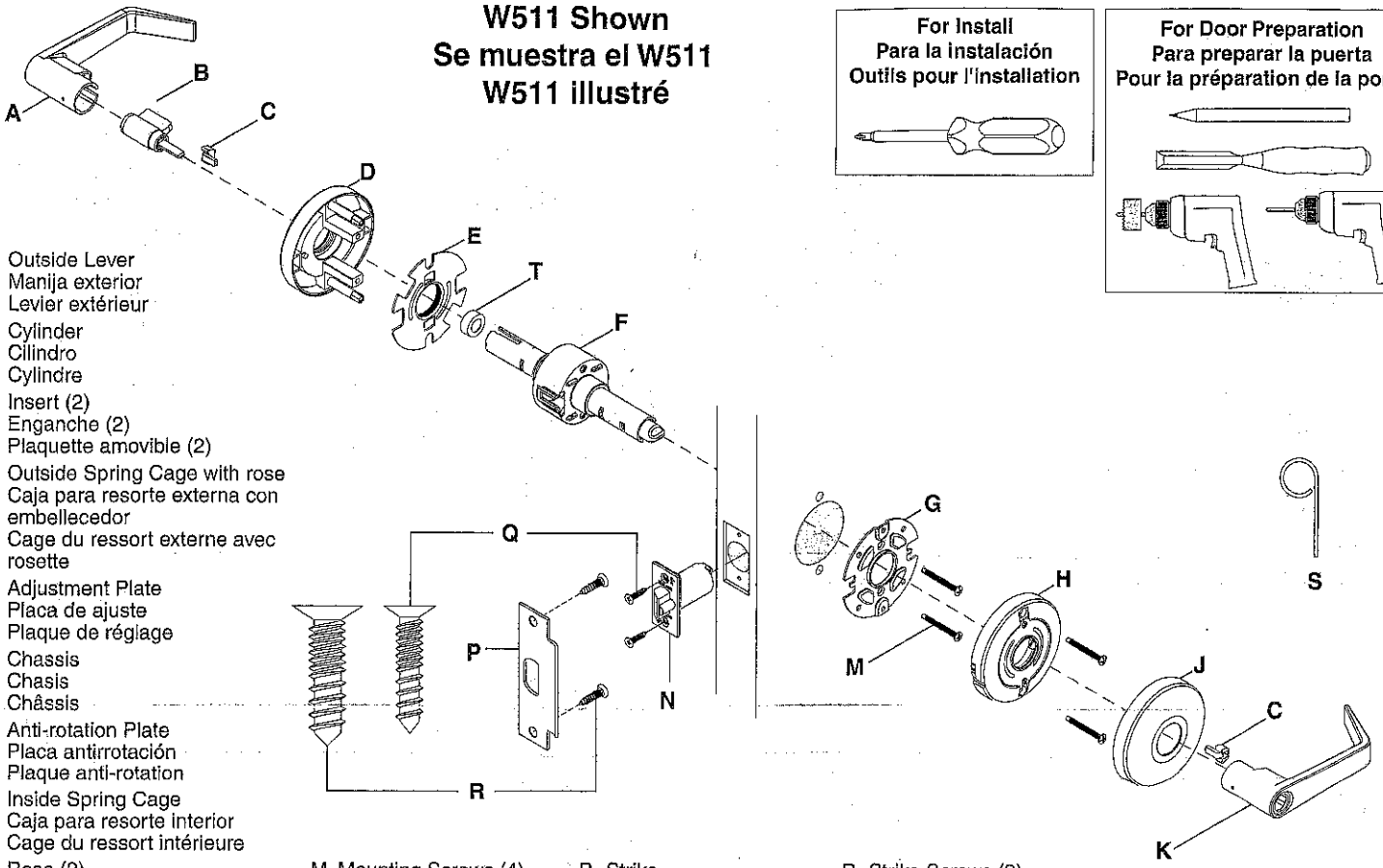
Notice d'installation

W511 Shown
Se muestra el W511
W511 illustré

For Install
Para la instalación
Outils pour l'installation

For Door Preparation
Para preparar la puerta
Pour la préparation de la porte





A. Outside Lever
Manija exterior
Levier extérieur

B. Cylinder
Cilindro
Cylindre

C. Insert (2)
Enganche (2)
Plaquette amovible (2)

D. Outside Spring Cage with rose
Caja para resorte externa con embellecedor
Cage du ressort externe avec rosette

E. Adjustment Plate
Placa de ajuste
Plaque de réglage

F. Chassis
Chasis
Châssis

G. Anti-rotation Plate
Placa antirrotación
Plaque anti-rotation

H. Inside Spring Cage
Caja para resorte interior
Cage du ressort intérieure

J. Rose (2)
Embellecedor (2)
Rosette (2)

K. Inside Lever
Manija interior
Levier intérieur

M. Mounting Screws (4)
Tornillos de montaje (4)
Vis de montage (4)

N. Latch
Pestillo
Verrou

P. Strike
Placa hembra
Gâche

Q. Latch Screws (2)
Tornillos del pestillo (2)
Vis du verrou (2)

R. Strike Screws (2)
Tornillos de la placa hembra (2)
Vis de la gâche (2)

S. Pin Wrench
Llave para pasador
Clé à ergot

T. Cup
Taza
Tasse

Instale la cerradura — Install Lock — Installer le serrure

1 Use Template to Check Door Holes

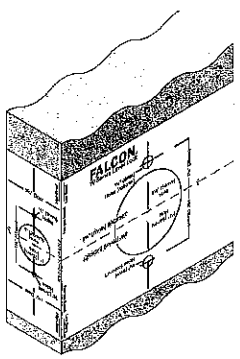
Note: If door holes do not match template, see DOOR PREP section

Use la plantilla para verificar los agujeros de la puerta

Nota: Si los agujeros de la puerta no coinciden con la plantilla, consulte la sección PREP DE LA PUERTA

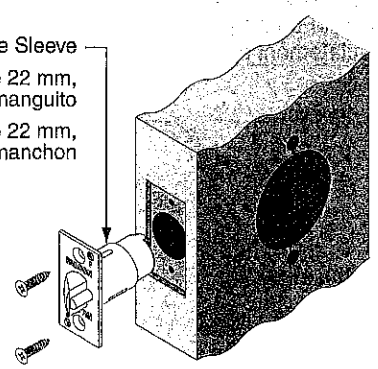
Utiliser le gabarit pour vérifier les trous de porte

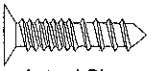
Note: Si les trous de porte ne correspondent pas au gabarit, voir la section PRÉPARATION DE LA PORTE



2 Install Latch
Instale el pestillo
Installer le verrou

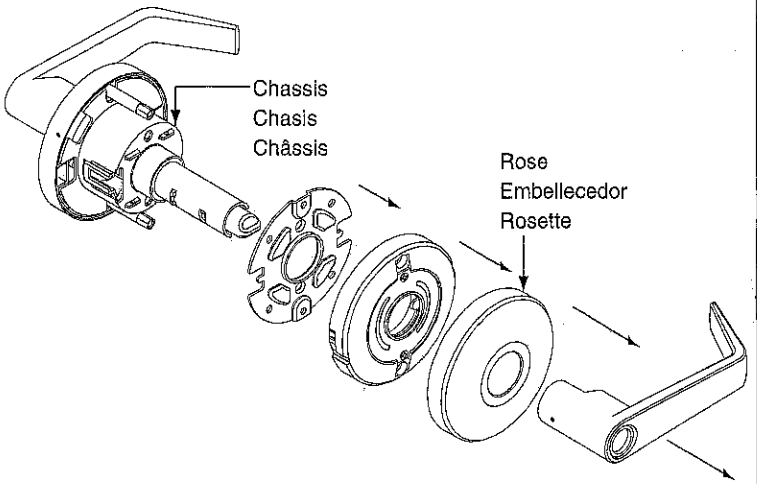
For 7/8" (22 mm) Hole, Remove Sleeve
Para un agujero de 22 mm, retire el manguito
Pour un trou de 22 mm, retirer le manchon





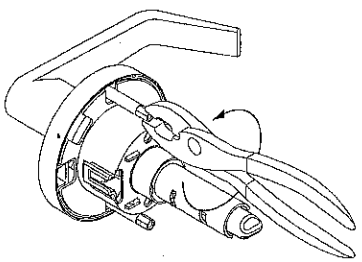
Actual Size
Tamaño real
Taille réelle

3 Remove Assembly from Box
Retire el conjunto desde la caja
Retirer l'ensemble de la boîte

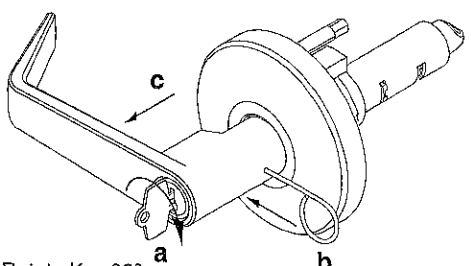


4 If Needed, Mounting Posts Can Be Removed
Si necesario, los postes de montaje pueden retirarse
Si nécessaire, les poteaux de montage peuvent être retirés

For maximum performance, use mounting posts
Para obtener un resultado óptimo, utilice postes de montaje
Pour de meilleurs résultats, utiliser les poteaux de montage



5 If Needed, Remove Outside Lever
Si necesario, retire la manija exterior
Si nécessaire, retirer le levier extérieur



Rotate Key 90°
Girar la llave 90°
Tourner la clé à 90°

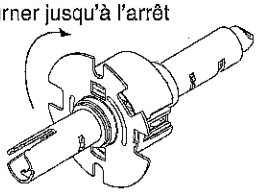
6 If Needed, Adjust Chassis
Chassis is factory set for 1¾" (44 mm) door

Si necesario, ajuste el chasis
El chasis está fijado en fábrica para una puerta de 44 mm

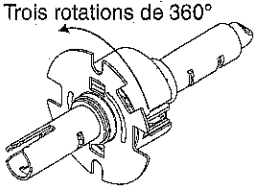
Si nécessaire, régler le châssis
Le châssis est réglé en usine pour une porte de 44 mm

For 1⅜" (35 mm) thick door
Para una puerta de 35 mm de espesor
Pour une porte de 35 mm d'épaisseur

a
Rotate until stops
Gire hasta que se detenga
Tourner jusqu'à l'arrêt



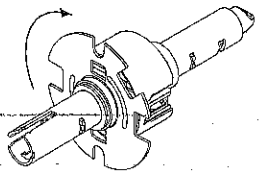
b
Three 360° rotations
Tres giros de 360°
Trois rotations de 360°



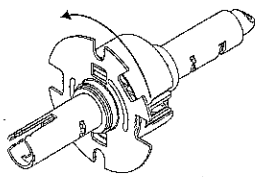
OR O OU

For 1¾" (44 mm) thick door
Para una puerta de 44 mm de espesor
Pour une porte de 44 mm d'épaisseur

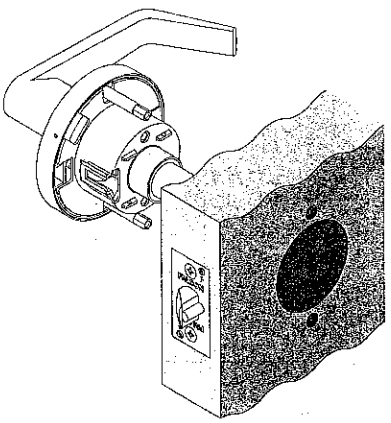
a
Rotate until stops
Gire hasta que se detenga
Tourner jusqu'à l'arrêt

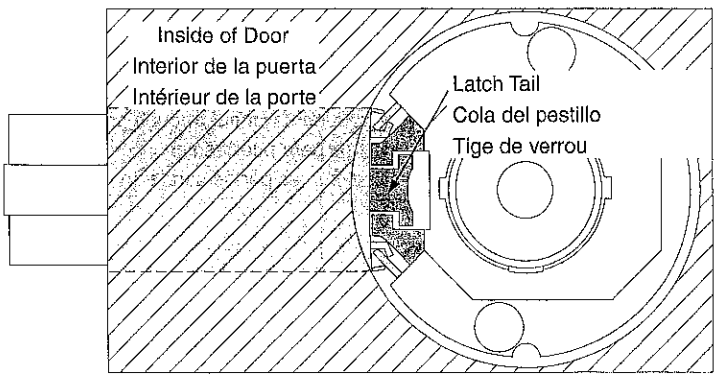


b
Nine 360° rotations
Nueve giros de 360°
Neuf rotations de 360°



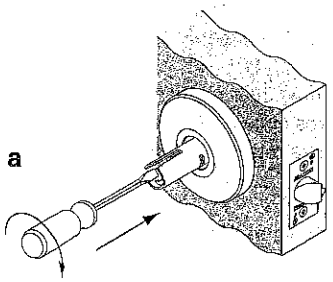
7 Install Outside Chassis Assembly
Instale el conjunto del chasis exterior
Installer le châssis extérieur



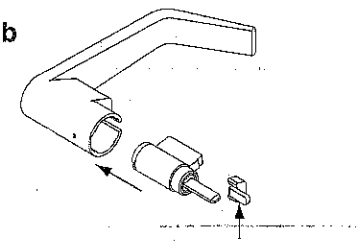


8 If Needed, Install Cylinder and Outside Lever
Si necesario, instale el cilindro y la manija exterior
Si nécessaire, installer le cylindre et le levier extérieur

For W561 Only
Para W561 solamente
Pour W561 seulement

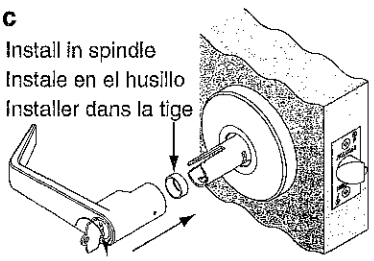


Rotate cam until it stops
Gire la leva hasta que se detenga
Tourner la came jusqu'à l'arrêt



Must be installed
Se debe instalar
Doit être installé

c
Install in spindle
Instale en el husillo
Installer dans la tige

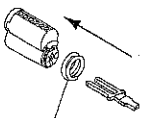


Rotate key 90°
Gire la llave 90°
Tourner la clé à 90°

OR O OU

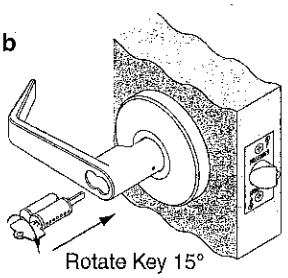
SFIC

a



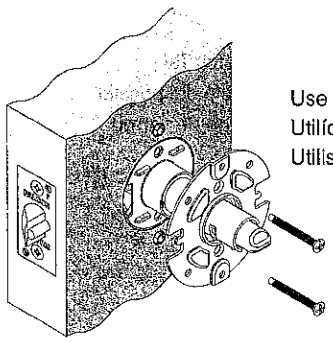
For 6-Pin Cylinder Only
Solamente para el cilindro de 6 pasadores
Pour cylindre à six goupilles seulement

b



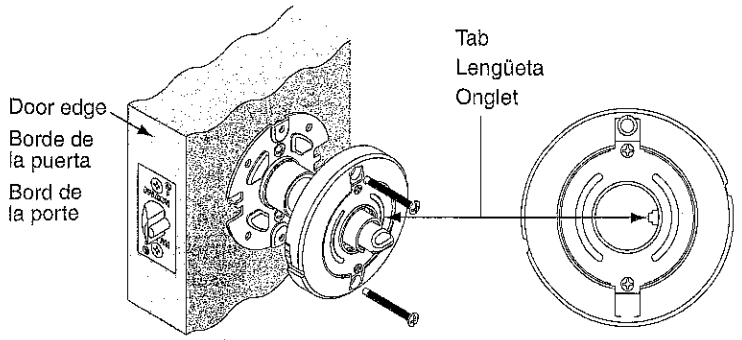
Rotate Key 15°
Gire la llave 15°
Tourner la clé à 15°

9 Install Anti-Rotation Plate
Instale la placa antirrotación
Installer la plaque anti-rotation

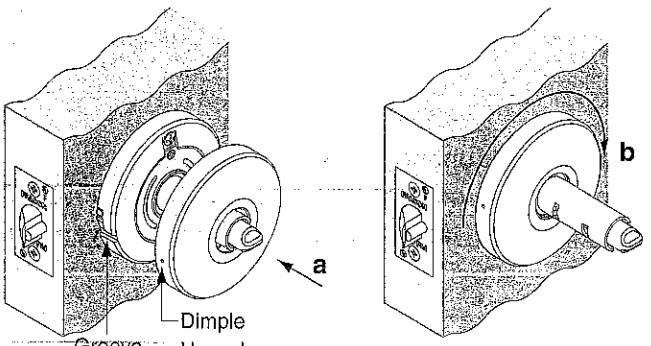


Use for doors without through holes
Utilícese para puertas sin orificios pasantes
Utiliser sur les portes sans trous traversants

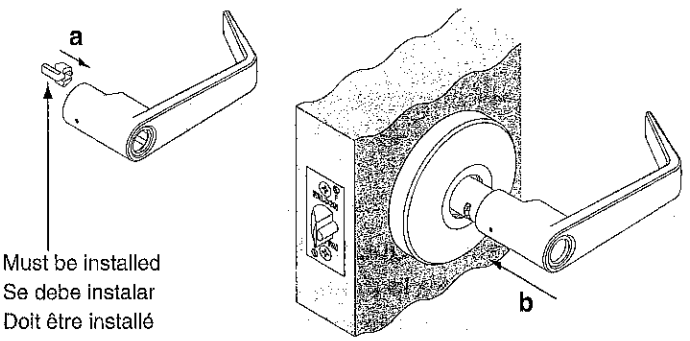
10 Install Inside Spring Cage
Instale caja para resorte interior
Installer la cage du ressort intérieur



11 Install Inside Rose
Instale el embellecedor interior
Installer la rosette intérieur

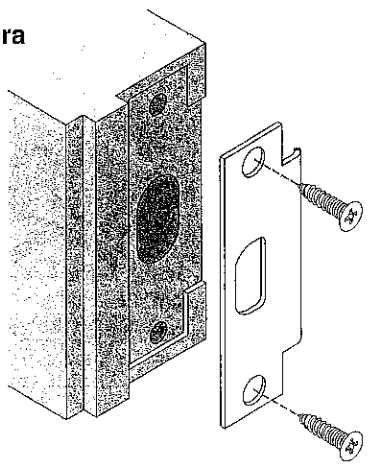


12 Install Inside Lever
Instale la manija interior
Installer le levier intérieur

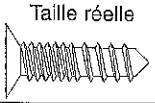


Must be installed
Se debe instalar
Doit être installé

13 Install Strike
Instale la placa hembra
Installer la gâche

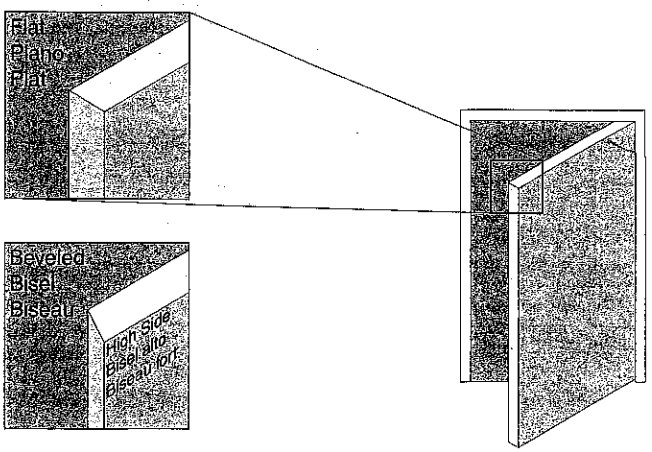


Actual Size
Tamaño real
Taille réelle

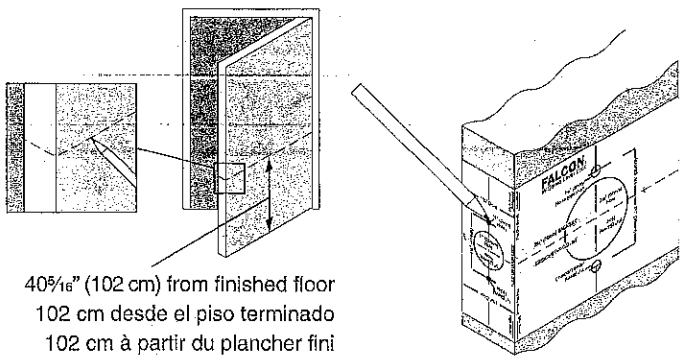


Preparación de la puerta | Door Preparation | Préparation de la porte

A Determine Bevel
Determine el bisel
Définir le biseau



B Mark Centerline and Points for Drilling
Marque la línea central y los puntos para taladrar
Marquer la ligne centrale et les points pour forer

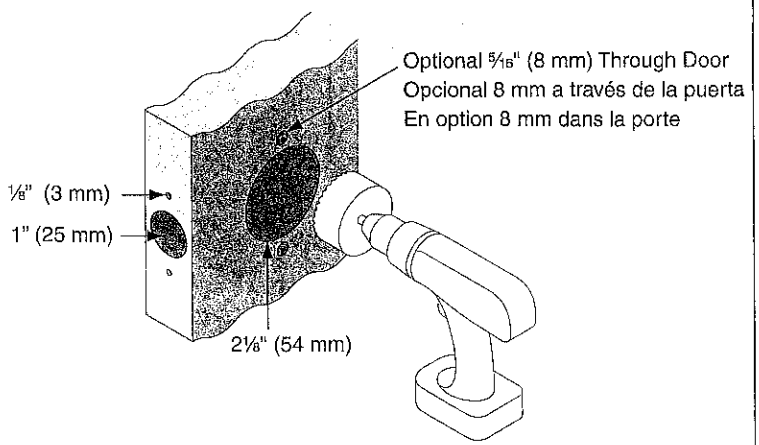


40 5/16" (102 cm) from finished floor
102 cm desde el piso terminado
102 cm à partir du plancher fini

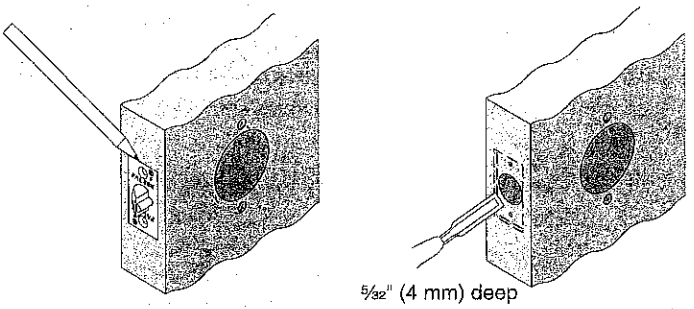
C Drill Holes
NOTE: Drill from both sides to avoid splintering

Taladre los agujeros
NOTA: Taladre desde ambos lados para evitar la formación de astillas

Forer les trous
Note: Forer à partir des deux côtés pour éviter l'éclatement du bois



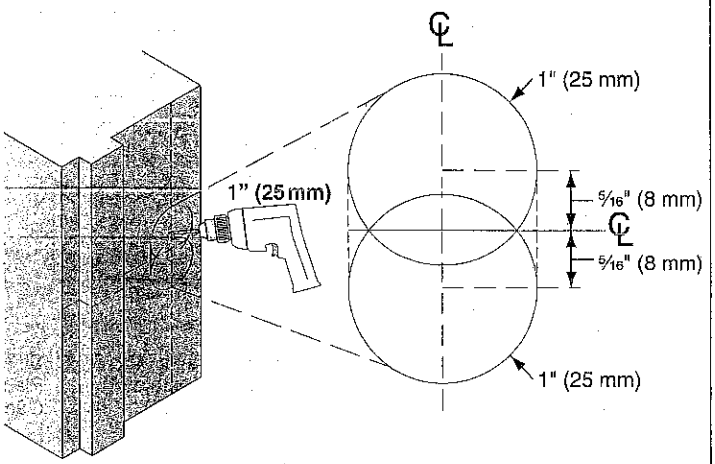
D Mortise Cutout for Latch
Mortaje para el pestillo
Mortaiser pour le verrou



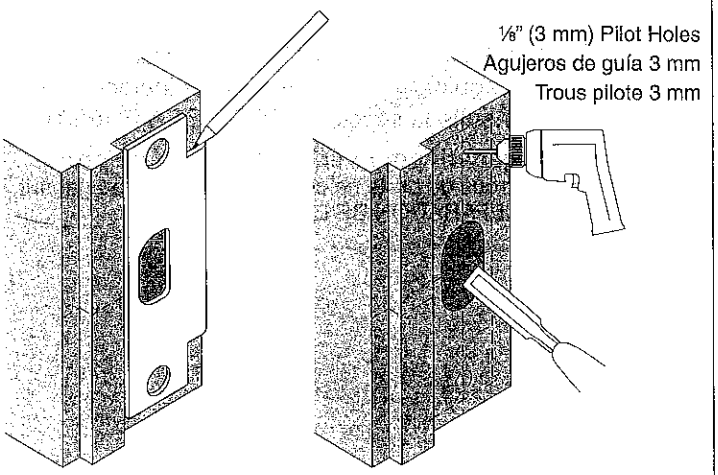
Faceplate
Placa delantera
Têtière

5/32" (4 mm) deep
4 mm de profundidad
4 mm de profondeur

E Drill Holes for Strike
Taladre los agujeros para la placa hembra
Forer les trous pour la gâche



F Mortise for Strike
Mortaje para la placa hembra
Mortaiser pour la gâche



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03

MACCAFERRI

PRODUCT INSTALLATION GU

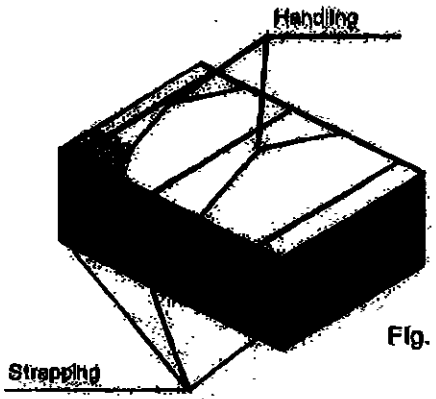

Fig. 1

Maccaferri gabions are delivered to the job site in bundles. They are compressed and strapped in the factory for easier shipping and handling.

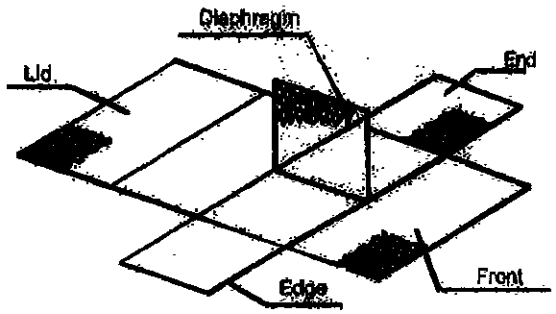

Fig. 2

1. Open and unfold the gabions one by one on a flat, hard surface. Eliminate all folds due to the packaging.

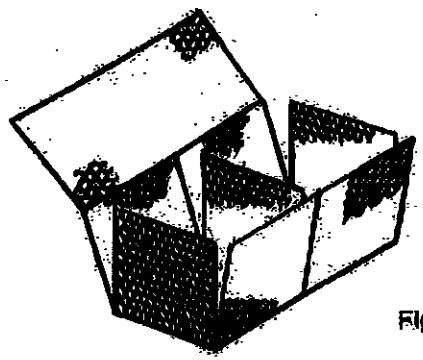

Fig. 3

2. Pull up the sides and the diaphragms to form an open box. Be sure the top of face and side panels are at the same level.

3. Fold by hand the end of the reinforcing wire of the main unit and the diaphragms allowing the gabion to stand by itself.

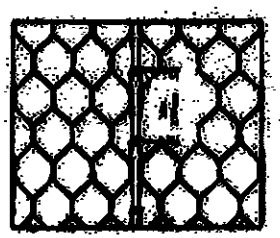

Fig. 4

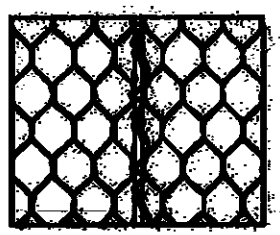

Fig. 5

Fig. 6

The fasteners have a diameter of 50 mm open and 20 mm closed.

4. Edges are joined together, using the appropriate lacing techniques.

MANUAL: continuous wire looped tightly around every other mesh opening, alternating single and double loops (Fig. 5). Galvanized lacing wire is used for galvanized gabions and PVC coated lacing wire is used for PVC coated gabions.

MECHANICAL: using a pneumatic or hand power tool and "C" shaped fasteners (galvanized fasteners for galvanized gabions and stainless steel fasteners for PVC gabions). For continuity and strength, the recommended spacing is every mesh opening, and not to exceed 150mm (Fig. 4).

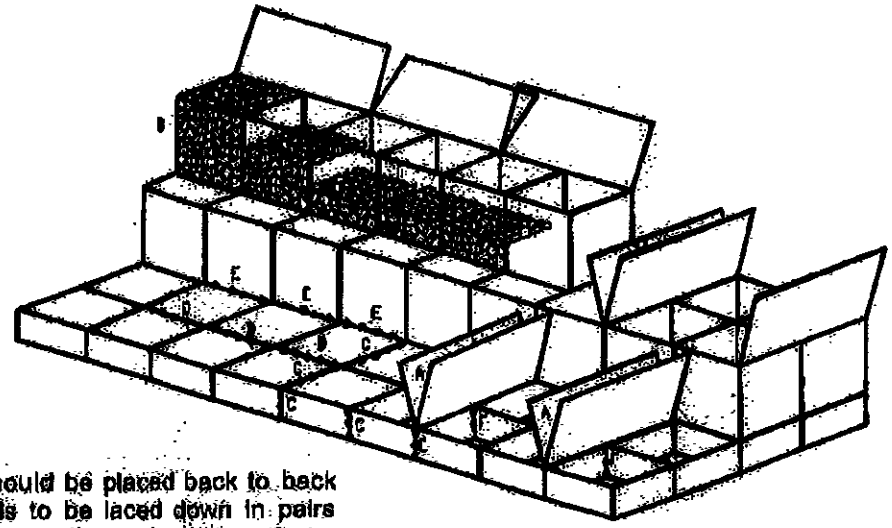

Fig. 7

A – Units should be placed back to back to enable lids to be laced down in pairs and also to facilitate dumping of the stone.
B – Unit after fill-up
C – Lacing together of the units.
D – Lacing the lids to the diaphragms.
E – Lacing the upper gabion to the lower gabion.
F – Lacing the diaphragms together.

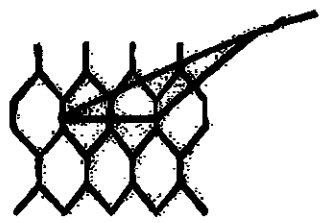

Fig. 10

The connecting wire must grip at least two mesh openings.

5. Installing a few gabions empty at the proper location, we place them side by side and back to back. Lace them together tightly at the contact edges. The rows above and below should be laced together at the edges. It is suggested to stretch the gabions in the row, prior to filling.

6. Fill the gabions while stretched during the entire operation.

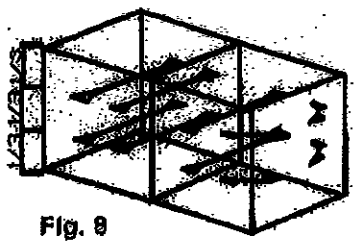

Fig. 8

Fig. 9

At the extremities, extra connecting wire should be installed at 45 degrees to the adjacent faces.

7. The connecting wires are placed at the 1/3 and 2/3 levels for the gabions 1.00m high and half-height for the gabions 0.50m high.

8. Lace the lids two by two, attaching the edges to the gabion's selvedge wire. A crow bar or a steel bar can be used to facilitate lid closure.

MACCAFERRI
Website: www.maccaferri-canada.com

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MACCAFERRI

TECHNICAL DATA SHEET

Rev: 02 Issue Date 09.07.2008

SI

GABIONS
GALVANIZED

Gabions are baskets made of 8x10 double twisted steel woven wire mesh, as per ASTM A975-97 (Figs. 1, 2). Gabions are filled with stones at the project site to form flexible, permeable, monolithic structures such as retaining walls, channel linings, and weirs for erosion control projects.
The steel wire used in the manufacture of the gabion is heavily zinc coated soft temper steel. The standard specifications of mesh-wire are shown in Table 2.
The gabion is divided into cells by means of diaphragms positioned at approximately 1 m centers (Fig.1). In order to reinforce the structure, all mesh panel edges are selvedged with a wire having a greater diameter (Table 3). Dimensions and sizes of galvanized gabions are shown in Table 1.

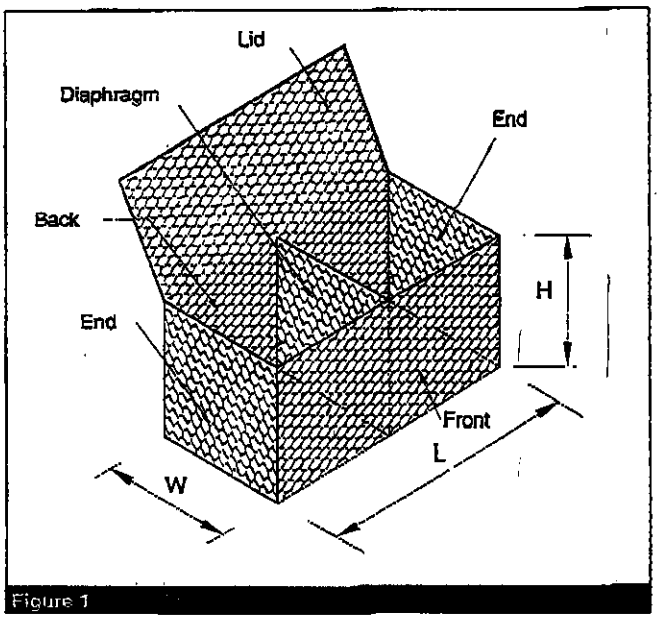


Figure 1

Wire

All tests on wire must be performed prior to manufacturing the mesh. All wire should comply with ASTM A975-97, style 3 coating and galvanized. Wire used for the manufacture of Gabions and the lacing wire, shall have a maximum tensile strength of 515 MPa as per ASTM A641-03, soft temper steel.

Woven Wire Mesh Type 8x10

The mesh and wire characteristics shall be in accordance with ASTM A975-97 Table 1, Mesh type 8x10. The nominal mesh opening D = 83 mm as per Fig. 2.

The minimum mesh properties for strength and flexibility should be in accordance with the following:

- *Mesh Tensile Strength* shall be 51.1 kN/m minimum when tested in accordance with ASTM A975 section 13.1.1
- *Punch Test* resistance shall be a minimum of 26.7 kN when tested in compliance with ASTM A975 section 13.1.4 .
- *Connection to Selvedges* should be 17.5 kN/m when tested in accordance with ASTM A975.

The tolerance on the opening of mesh 'D' being the distance between the axis of two consecutive twists, is according to ASTM A975-97

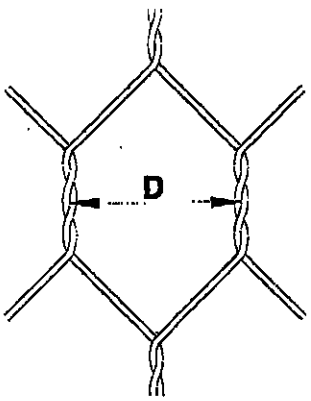


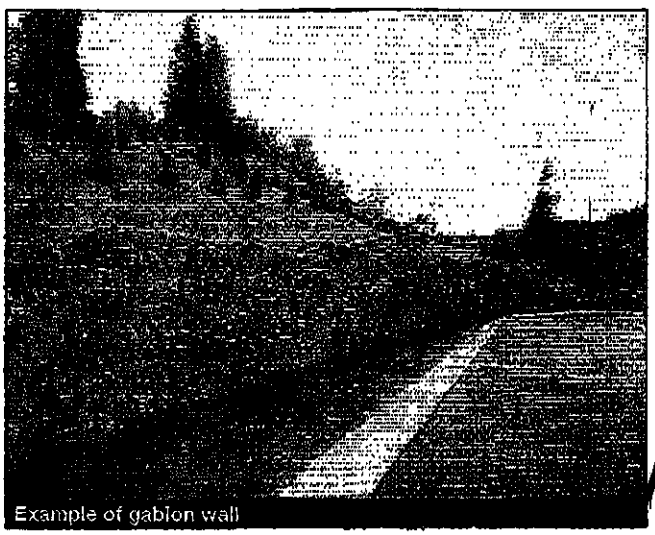
Figure 2

Lacing Operations

Lacing operations are made by using lacing wire specified in Table 3 and described in Fig. 3. Galvanized steel ring fasteners can be used instead of lacing wire (Fig. 4 and Fig. 5).

Galvanized steel rings for galvanized gabions shall be in accordance with ASTM A975 section 6.3.

Spacing of the rings shall be in accordance with ASTM A975 Table 2, Panel to Panel connection, Pull-Apart Resistance. In any case, ring fasteners spacing shall not exceed 150 mm (Fig. 3).


Example of gabion wall

1. Table of sizes for gabions

L=Length m (ft)	W=Width m (ft)	H=Height m (ft)	# of cells
2	1	1	2
3	1	1	3
4	1	1	4
2	1	0.5	2
3	1	0.5	3
4	1	0.5	4
2	1	0.3	2
3	1	0.3	3
4	1	0.3	4

All sizes and dimensions are nominal.
Tolerances of ± 5% of the width, height, and length of the gabions shall be permitted.

Assembly and installation

Lacing operations can be made by using lacing wire or stainless steel fasteners. With stainless steel fasteners, the ring can be placed using automatic or manual tools (Fig. 5.). The maximum spacing of the fasteners is determine by ASTM A975 Table 2, Pull Apart Resistance test. For full details please see the Gabion Product Installation Guide.

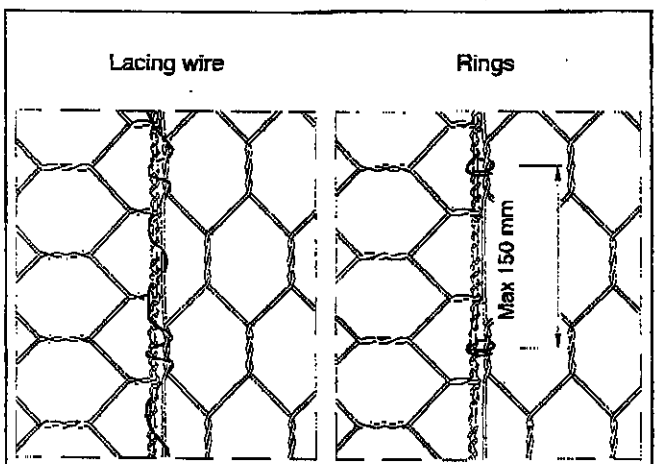


Figure 3

2. Standard Mesh-Wire

Type	D mm	Tolerance	Wire Diam.
8x10/ ZN	83	±10%	3.05

3. Standard wire diameters

		Lacing Wire	Mesh Wire	Selvedge Wire
Mesh Diameter	ø mm	2.20	3.05	3.90
Wire Tolerance	(±) ø mm	0.10	0.10	0.10
Minimum Quantity/Zinc	g/m²	214	259	275

Quantity Request
When requesting a quotation, please specify:

- No. of units,
- size of units (length x width x height, see Fig.1),
- type of mesh,
- type of coating.

EXAMPLE: No. 100 gabions 2x1x1m - Mesh type 8x10 - Wire diam. 3.05 mm - galvanized.

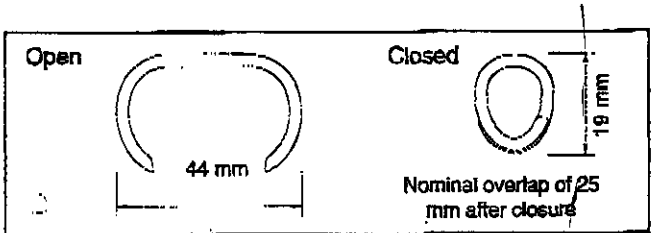
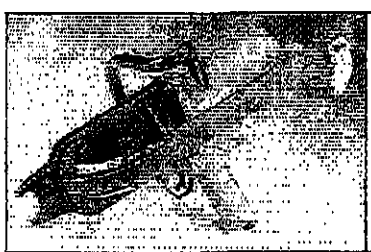


Figure 4



A Pneumatic Spenax tool

Figure 5

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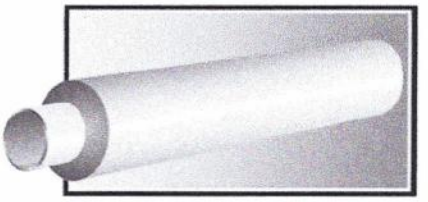
URECON
PRE-INSULATED PIPE

Submittal Data



High Density Polyethylene Pipe (I.P.S. dims)

General

Pipe shall be high density polyethylene manufactured of PE 3408 materials as per ASTM F-714. The product shall comply with AWWA Standard C-901 (12mm-75mm *(1 ½ in.-3 in.)*) and C906 (100mm-1600mm *(4 in.-63 in.)*). The product shall also comply with NSF Standard 61 and/or Standard 14, and must be certified by the NSF for portable water.

Material

Materials used for the manufacture of high density polyethylene pipe and fittings shall comply with all requirements for Type III, Class C, Category 5, Grade P34 according to ASTM D1248, and have a PPI recommended designation of PE3408. Pipe shall further meet ASTM D3350 General Cell Classification of 345444C. The raw material shall contain a minimum of 2%, well dispersed, carbon black. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification and from the same raw material supplier. The pipe manufacturer shall provide, upon request, an outline of quality control procedures performed on polyethylene system components. The pipe shall have product traceability; this shall be accomplished by the inclusion of a product code into the printline of all products.

The printline shall notate the manufacturer, the date of manufacture, the lot and supplier of raw material, the location of manufacture, and the production shift on which the product was produced.

Joining Methods

Wherever possible the polyethylene pipe should be joined by the method of thermal butt-fusion, as outlined in ASTM-D2657, Heat Joining Polyolefin Pipe and Fittings. Butt-fusion joining of pipe and fittings shall be performed in accordance with the procedures recommended by the manufacturer. The polyethylene pipe may be adapted to fittings or other systems by means of an assembly consisting of a polyethylene stub-end butt-fused to the pipe, a back up flange of ductile iron made to Class 150, ANSI B16.5 dimensional standards with bolts of compatible material and suitable gasket. In all cases, the bolts shall be drawn up evenly and in line. No pipe or fittings shall be joined by fusion by any contractor unless he/she is adequately trained and qualified in the techniques involved. Polyethylene pipes of the same outside diameter but different wall thickness shall be joined by means of a flange assembly as designated above. Mechanical fittings acceptable for use with polyethylene pipe shall follow the recommendations of the mechanical fittings manufacturer.

HIGH DENSITY POLYETHYLENE PIPE

Nom. Pipe Size	Nom. Outside Diam.	DR 32.5			DR 26			DR 21			DR 17			DR 15.5			
		Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	
3	3.500				3.214	0.135	0.62	3.146	0.167	0.76	3.063	0.206	0.93	3.021	0.226	1.01	
4	4.500				4.133	0.173	1.03	4.046	0.214	1.26	3.938	0.265	1.54	3.885	0.290	1.67	
5	5.563				5.109	0.214	1.57	5.001	0.265	1.93	4.870	0.327	2.35	4.802	0.359	2.56	
6	6.625	6.193	0.204	1.80	6.084	0.255	2.23	5.957	0.315	2.73	5.798	0.390	3.33	5.720	0.427	3.63	
7	7.125	6.661	0.219	2.08	6.544	0.274	2.58	6.406	0.339	3.16	6.237	0.419	3.85	6.150	0.460	4.20	
8	8.625	8.063	0.265	3.05	7.921	0.332	3.78	7.754	0.411	4.63	7.550	0.507	5.65	7.446	0.556	6.15	
10	10.750	10.048	0.331	4.73	9.874	0.413	5.87	9.665	0.512	7.19	9.410	0.632	8.77	9.279	0.694	9.56	
12	12.750	11.919	0.392	6.66	11.711	0.490	8.26	11.463	0.607	10.11	11.160	0.750	12.34	11.005	0.823	13.44	
13	13.375	12.502	0.412	7.33	12.285	0.514	9.08	12.025	0.637	11.13	11.707	0.787	13.57	11.545	0.863	14.80	
14	14.000	13.086	0.431	8.03	12.859	0.538	9.95	12.586	0.667	12.19	12.253	0.824	14.88	12.086	0.903	16.21	
16	16.000	14.957	0.492	10.48	14.696	0.615	13.00	14.385	0.762	15.93	14.005	0.941	19.43	13.812	1.032	21.17	
18	18.000	16.826	0.554	13.27	16.533	0.692	16.44	16.183	0.857	20.16	15.755	1.059	24.59	15.539	1.161	26.80	
20	20.000	18.696	0.615	16.39	18.370	0.769	20.31	17.982	0.952	24.89	17.507	1.176	30.36	17.265	1.290	33.08	
22	22.000	20.565	0.677	19.82	20.206	0.846	24.57	19.778	1.048	30.11	19.257	1.294	36.73	18.992	1.419	40.03	
24	24.000	22.435	0.738	23.60	22.043	0.923	29.24	21.577	1.143	35.84	21.007	1.412	43.72	20.718	1.548	47.64	
28	28.000	26.173	0.862	32.11	25.717	1.077	39.80	25.174	1.333	48.78	24.508	1.647	59.51	24.171	1.806	64.84	
32	31.594	29.541	0.969	40.74	29.024	1.213	50.58	28.415	1.500	61.93	27.663	1.854	75.60	27.288	2.031	82.30	
36	36.000	33.651	1.108	53.09	33.064	1.385	65.80	32.366	1.714	80.63	31.510	2.118	98.36				
40	39.469	36.898	1.213	63.72	36.255	1.516	78.97	35.496	1.874	96.66							
42	42.000	39.261	1.292	72.24	38.576	1.615	89.55	37.760	2.000	109.76							
48	47.382	44.302	1.453	91.64	43.526	1.819	113.76	42.616	2.248	139.20							
55	55.295	51.698	1.697	124.91	50.805	2.118	154.63	49.728	2.626	189.75							
63	63.209	59.102	1.937	163.00	58.076	2.421	202.05										

Nom. Pipe Size	Nom. Outside Diam.	DR 13.5			DR 11			DR 9			DR 7.3			DR 6.3			
		Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	Nom. Inside Diam.	Min. Wall Thick.	Nom. Weight (lb./ft.)	
3	3.500	2.951	0.259	1.15	2.826	0.318	1.38	2.675	0.389	1.65	2.485	0.479	1.97				
4	4.500	3.794	0.333	1.90	3.633	0.409	2.29	3.440	0.500	2.73	3.194	0.616	3.26	2.986	0.714	3.68	
5	5.563	4.690	0.412	2.91	4.490	0.506	3.50	4.253	0.618	4.17	3.948	0.762	4.99	3.691	0.883	5.62	
6	6.625	5.584	0.491	4.12	5.349	0.602	4.96	5.065	0.736	5.92	4.700	0.908	7.07	4.395	1.052	7.97	
7	7.125	6.006	0.528	4.77	5.751	0.648	5.74	5.446	0.792	6.85	5.056	0.976	8.18	4.727	1.131	9.22	
8	8.625	7.270	0.639	6.99	6.963	0.784	8.41	6.594	0.958	10.03	6.119	1.182	11.99	5.723	1.369	13.51	
10	10.750	9.062	0.796	10.86	8.679	0.977	13.06	8.219	1.194	15.59	7.627	1.473	18.62	7.133	1.706	20.99	
12	12.750	10.749	0.944	15.27	10.293	1.159	18.38	9.746	1.417	21.93	9.046	1.747	26.19	8.459	2.024	29.53	
13	13.375	11.274	0.991	16.80	10.797	1.216	20.22	10.225	1.486	24.13	9.491	1.832	28.83				
14	14.000	11.802	1.037	18.41	11.301	1.273	22.16	10.701	1.556	26.44	9.934	1.918	31.58				
16	16.000	13.488	1.185	24.04	12.915	1.455	28.94	12.231	1.778	34.53	11.353	2.192	41.25				
18	18.000	15.174	1.333	30.43	14.532	1.636	36.62	13.760	2.000	43.71							
20	20.000	16.860	1.481	37.57	16.146	1.818	45.21	15.289	2.222	53.95							
22	22.000	18.544	1.630	45.46	17.760	2.000	54.71										
24	24.000	20.231	1.778	54.11	19.374	2.182	65.11										
28	28.000	23.603	2.074	73.64	22.605	2.545	88.62										
32																	
36																	
40																	
42																	
48																	
55																	
63																	

NPS and Metric Dimensions are in accordance with ASTM F714-85 and ISO 161.
Nominal Weight calculations are based on Plastic Pipe Institute (PPI) Report #TR-7.
Other diameters and DR's are available upon request.

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir
Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

Fittings

Both pipe and fittings shall carry the same pressure rating. All fittings shall be pressure rated to match the system piping to which they are joined. At the fusion, the outside diameter and minimum wall thickness of the fitting shall meet the outside diameter and minimum wall thickness specifications of ASTM F714 for the same size of pipe. All fittings shall be properly derated according to manufacturers written recommendations, and clearly labeled on the fitting as such. Manufacturer shall have a written specification for all standard fittings which establishes Quality Control criteria and tolerances.

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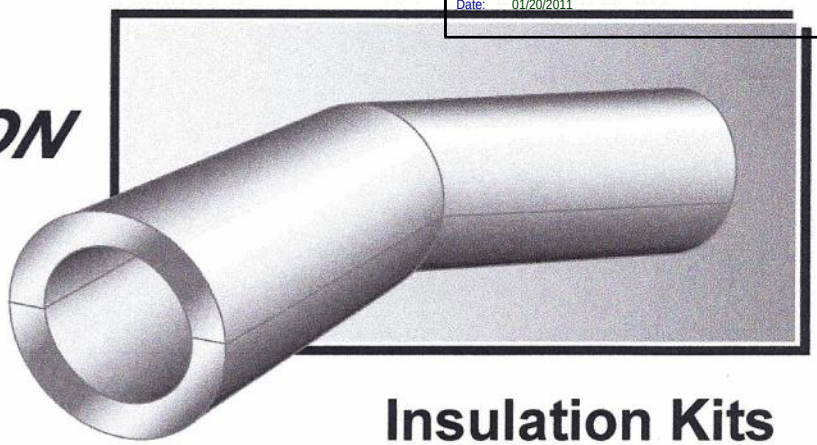
Local Representative

WEB SITE: www.urecon.com

Submittal Data

URECON
PRE-INSULATED PIPE



Insulation Kits
with polymer coating

Urecon factory fabricated insulation kits are easy to field install and provide equivalent insulation value as that of the pre-insulated pipe. Kits are fabricated for standard dimensional steel, PVC, CPVC, copper, and HDPE fittings. Non standard kits are also available if required. Specify the type of fittings being insulated when ordering. (Urecon can supply bare pipe fittings in addition to insulation if desired).

Our superior quality kits are manufactured from closed cell polyurethane or polyisocyanurate foam and are coated with a polymer outer jacket. They are a wise choice for applications where moisture resistance is essential.

Application:

Urecon form fitting insulation kits are ideally suited for the above or below ground insulation of chilled, domestic hot and process water piping up to a maximum service temperature of 86^{0}C *(185^{0}F)*.

Kit Components:

- Polyurethane or polyisocyanurate inner form fitting insulation halfshells.
- Polymer coating on all surfaces.
- Silicone caulking for the seam between halfshells.
- 100mm or 150mm *(4 in or 6 in)* wide polyethylene adhesive backed butyl mastic tape shall be provided to provide a waterproof seal between the insulated pipe and kit.
- For above ground with metal Spiwrap jacket: kit includes a metal cover consistent with the pipe jacket*.

Insulation:

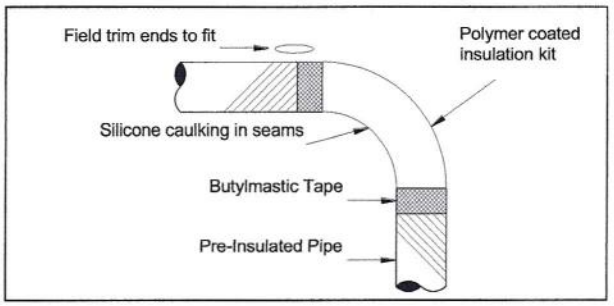
- Rigid polyisocyanurate or polyurethane foam.
- Density: (ASTM D 1622) 27 to 32 kg/m^3 *(1.7 to 2 lbs/ft^3)*.
- Compressive Strength: (ASTM D 1621) 131 to 158 kPa *(19 to 23 lbs/in^2)*.
- Closed Cell Content: 90% minimum.
- Water Absorption: 4% by volume.
- K factor: (ASTM C 518) 0,027 W/m^{0}C *(0.19 Btu. In/ft^2.hr.0F)*.
- Thickness: shall match pipe insulation.

Polymer coating:

- Two component high density polyurethane coating, gray or black in color.
- Density: 1170 kg/m^3 *(73 lbs/ft^3)*.
- Durometer D scale 60.
- Tensile strength: 11,000 kPa *(1610 lbs/in^2)*.
- Tear strength: 26,5 N/mm *(151 lbs/in.)*.
- Thickness: flash coat interior surface, 0,7 mm *(20 mils.)* exterior surface; Urecon BL-20-20EP.

Butyl mastic tape:

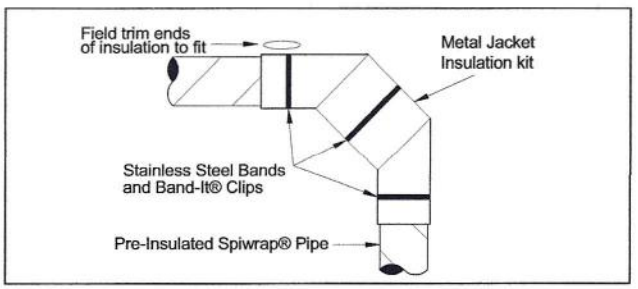
- To seal seams between pre-insulated pipe and kit.
- Width: 100mm *(4 in)*.or 150mm *(6 in)*.
- Backing: Low density Polyethylene.
- Adhesive: Butyl rubber and resin.
- Thickness: 0,90 mm *(35 mils)*.
- Meets AWWA C-209 Standard.
- Note: Butyl mastic tape not required for above ground application with metal covers.



Fitting kit configurations:

Urecon insulation kits are manufactured to suit the fitting and accommodate the factory insulation cut-back on the adjacent pipes.
These are:

- Butt-welded steel @ 150mm *(6 in.)*
- All solvent weld or Bell x Spigot jointed pipe @ spigot insertion depth.
- Butt-fused HDPE @ 225mm *(9 in.)*
- Soldered copper @ 75mm *(3 in.)* for up to 37mm *(1½ in.)*, and 150 mm *(6 in.)* for 50 mm *(2 in.)* and larger.



****Metal Cover:***

- Two piece pre-formed metal with extension legs to suit.
- All metal overlaps shall be 50mm *(2 in.)* minimum and shall be field installed in such a way as to shed water.
- Stainless steel straps and Band-it® clips.
- Note: Butyl mastic tape not required for above ground application with metal covers.

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Local Representative

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

URECON PRE-INSULATED PIPE

Submittal Data

Insulation Kits for Spiwrap® System

Urecon factory fabricated insulation kits are easy to field install and provide equivalent insulation value to that of the pre-insulated pipe. Kits are fabricated for standard dimensional steel, PVC, CPVC, copper, and HDPE fittings. Non standard kits are also available if required. Specify the type of fittings being insulated when ordering. (Urecon can supply bare pipe fittings in addition to insulation if desired).

Our superior quality kits are manufactured from closed cell polyurethane or polyisocyanurate foam and include a metal cover consistent with the pipe jacket.

Application:

Urecon form fitting insulation kits are ideally suited to compliment our above ground Spiwrap® system up to a maximum service temperature of 149^{0}C *(300^{0}F).*

Kit Components:

- Polyurethane or polyisocyanurate inner form fitting insulation half shells.
- Split metal cover consistent with the jacket material on the pipe.
- Stainless steel bands and Band-it® clips.

Insulation:

- Rigid polyisocyanurate or polyurethane foam.
- Density:(ASTM D 1622) 27 to 32 kg/m^3*(1.7 to 2 lbs/ft^3).*
- Compressive Strength: (ASTM D 1621) 131 to 158 kPa *(19 to 23 lbs/in^2).*
- Closed Cell Content: 90% minimum.
- Water Absorption:4% by volume.
- K factor:(ASTM C 518) 0,027 W/m^{0}C *(0.19 Btu. In/ft^2.hr.0F).*
- Thickness: shall match pipe insulation.

Metal Cover:

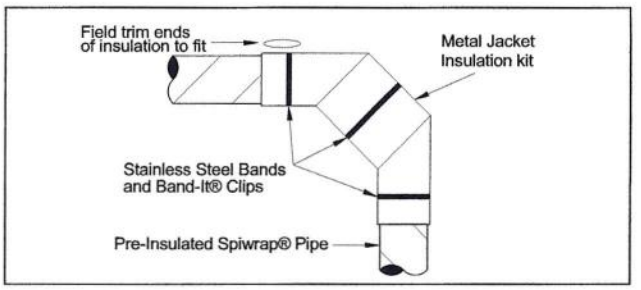
- Two piece pre-formed metal with extension legs to suit.
- All metal overlaps shall be 50mm *(2 in.)* minimum and shall be field installed in such a way as to shed water.
- Stainless steel straps and Band-it® clips.

Fitting kit configurations:

Urecon insulation kits are manufactured to suit the fitting and accommodate the factory insulation cut-back on the adjacent pipes.

These are:

- Butt-welded steel @ 150mm *(6 in.)*
- All solvent weld or Bell x Spigot jointed pipe @ spigot insertion depth.
- Butt-fused HDPE @225mm *(9 in.)*
- Soldered copper @ 75mm *(3 in.)* for up to 37mm *(1½ in.)*, and 150 mm *(6 in.)* for 50 mm *(2 in.)* and larger.
- Solvent weld PVC or CPVC @ flush with bell end and insertion depth on spigot end.
- Gasket joint PVC, CPVC or Ductile iron are usually mechanically re-strained when used above ground. The cut-back provided varies with the method of restraint used.



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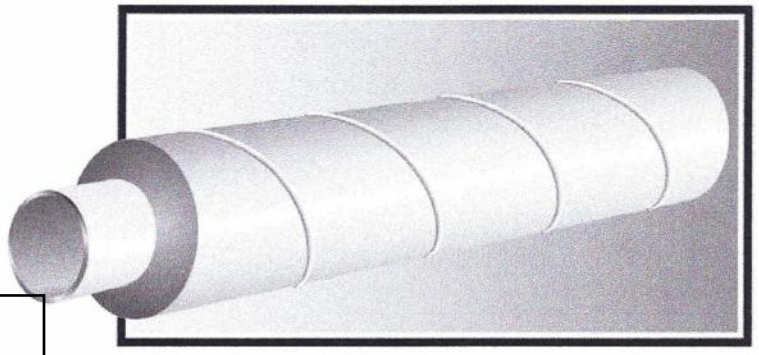
URECON

PRE-INSULATED PIPE



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Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray EIT, Williams Engir.

Date: 26/10/2010

Standard Spiwrap® system
for pipe with plain ends

Urecon's "U.I.P."® factory insulation piping process and related ISO-9000 quality control procedures assure you of the highest quality product on the market today. A galvanized steel, aluminum or stainless steel locked seam metal jacket protects the system once the "U.I.P."® foam has cured.

Application:

Urecon's Spiwrap® pre-insulated piping system is suitable for

- Above ground chilled water lines in warmer climates
- Above ground lines for freeze protection of bridge crossings, mining and industrial lines.

Core Pipe:

All types of plain end pipe may be factory insulated with the "U.I.P."® process; refer to the attached pipe manufacturer's data sheet for information on the core pipe(s) chosen for this project.

Pipe Preparation:

Pipe and jacket interior shall be cleaned of surface dust and dirt to insure a positive bond of the foam to the entire pipe surface. The pipe and jacket may be treated by sand blasting, steam cleaning or the application of a chemical foam-bonding compound if deemed necessary by Urecon.

Insulation:

- Material, rigid polyurethane foam, factory applied.
- Thickness: as required, refer to accompanying thickness chart.
- Density: (ASTM D 1622) 35 to 46 kg/m^3 *(2.2 to 3.0 lbs/ft^3).*
- Closed cell content: (ASTM D 2856) 90%,minimum.
- Water absorption: (ASTM D 2842) 4.0% by volume .
- Thermal conductivity: (ASTM C518) 0,020 to 0,026 W/m ^{0}C *(0.14 to 0.17 Btu • in/ft^2 •hr • ^{0}F).*

System Properties:

- System compressive strength: (modified ASTM D 1621 with locked seam jacket) approximately 1379 kPa *(200 lbs/in^2),* varies with gauge, type of jacket material and pipe diameter.
- Temperature limitations:
  - in service*, -45^0 to 85^{0}C*(-49^0 to 185^{0}F)*

Outer Jacket:

The outer protective jacket shall be supplied with 4-ply lock seam as indicated on the following chart:

Jacket Material	Gauge*				
	18	20	22	24	26
Galvanized Steel			X		
Aluminum					
Stainless Steel					

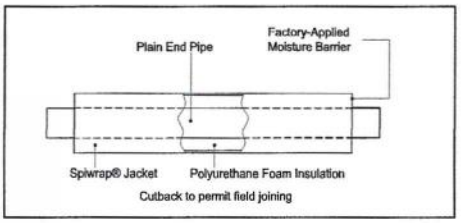
Plain End Joints:

The pipe is provided with the appropriate cut-backs to allow for joining in the field. These are typically:

- Butt-welded steel @ 150mm *(6 in.)*
- Butt-fused HDPE @ 225mm *(9 in.)*
- Soldered copper @ 75mm 150mm *(6 in.)* for up to 37mm *(1 ½ in.)*, and 225mm *(9 in.)* for 50mm *(2 in.)* and larger.

Joint insulation kits consist of a preformed set of urethane or polyisocyanurate foam half shells and metal jacket consistent with the pipe jacket secured with stainless steel straps and Band-it® clips to suit. All metal overlaps shall be 50mm (2 in.) minimum and shall be field positioned in such a way as to shed water.

Fittings:
Refer to the accompanying data sheet 'Insulation Kits for Spiwrap® system' for details.



Spiwrap® System*													
		25mm *(1")*				35mm *(1 ½")*				50mm *(2")*			
Pipe Size		Jacket Size		Foam		Jacket Size		Foam		Jacket Size		Foam	
in	mm	*in*	mm	*in*	mm	*in*	mm	*in*	mm	*in*	mm	*in*	mm
1/2"	12	*x*	x	*x*	x	*4.0*	100	*1.580*	40	*5.0*	127	*2.080*	53
3/4"	19	*x*	x	*x*	x	*4.0*	100	*1.475*	37	*5.0*	127	*1.975*	50
1"	25	*4.0*	100	*1.343*	34	*5.0*	127	*1.843*	47	*6.0*	152	*2.343*	60
1 1/4"	32	*4.0*	100	*1.170*	30	*5.0*	127	*1.670*	42	*6.0*	152	*2.170*	55
1 1/2"	38	*4.0*	100	*1.050*	26	*5.0*	127	*1.550*	39	*6.0*	152	*2.050*	52
2"	50	*5.0*	127	*1.313*	33	*6.0*	152	*1.813*	46	*7.0*	178	*2.313*	59
2 1/2"	64	*5.0*	127	*1.063*	27	*6.0*	152	*1.563*	40	*7.0*	178	*2.063*	52
3"	76	*6.0*	152	*1.250*	32	*7.0*	178	*1.750*	44	*8.0*	203	*2.250*	57
4"	100	*7.0*	178	*1.250*	32	*8.0*	203	*1.750*	44	*9.0*	229	*2.250*	57
5"	127	*8.0*	203	*1.219*	31	*9.0*	229	*1.719*	44	*10.0*	254	*2.219*	56
6"	150	*9.0*	229	*1.188*	30	*10.0*	254	*1.688*	43	*11.0*	279	*2.188*	55
8"	200	*11.0*	279	*1.188*	30	*12.0*	305	*1.688*	43	*13.0*	330	*2.188*	55
10"	254	*13.0*	330	*1.125*	29	*14.0*	356	*1.625*	41	*15.0*	381	*2.125*	54
12"	305	*15.0*	381	*1.125*	29	*16.0*	406	*1.625*	41	*17.0*	432	*2.625*	67
14"	14.0	*16.0*	406	*1.000*	25	*x*	x	*x*	x	*18.0*	457	*2.000*	51
16"	16.0	*18.0*	457	*1.000*	25	*x*	x	*x*	x	*20.0*	508	*2.000*	51
18"	457	*20.0*	508	*1.000*	25	*x*	x	*x*	x	*22.0*	559	*2.000*	51
20"	508	*22.0*	559	*1.000*	25	*x*	x	*x*	x	*24.0*	607	*2.000*	51
22"	559	*24.0*	607	*1.000*	25	*x*	x	*x*	x	*26.0*	660	*2.000*	51
24"	607	*26.0*	660	*1.000*	25	*x*	x	*x*	x	*28.00*	711	*2.000*	51

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Submittal Data

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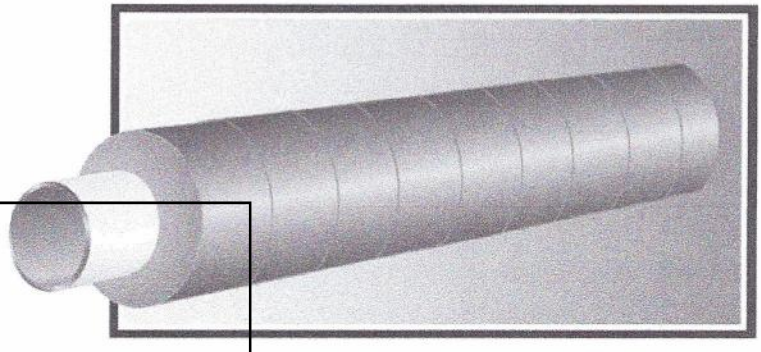
PRE-INSULATED PIPE



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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir .

Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

U.I.P.® system
Below grade applications for pipe with plain ends

Urecon's "U.I.P."® factory insulation piping process and related ISO-9000 quality control procedures assure you of the highest quality product on the market today. This unique, time proven, void free process allows us to visually inspect the urethane foam insulation prior to jacket application. A gray or UV inhibited black polyethylene jacket protects the system once the "U.I.P."® foam has cured.

Application:
Urecon's standard "U.I.P."® pre-insulated piping system is suitable for

- underground chilled water lines in warmer climates
- underground potable water or sewer lines to prevent freezing in colder regions.
- underground warm water lines to 86^{0}C *(185^{0}F)*
- temporary above ground lines (black jacket).

Core Pipe:
All types of plain end pipe may be factory insulated with the "U.I.P."® process; refer to the attached pipe manufacturer's data sheet for information on the core pipe(s) chosen for this project.

Pipe Preparation:
Pipe shall be cleaned of surface dust and dirt to insure a positive bond of the foam to the entire pipe surface. The pipes may be treated by sand blasting or the application of a chemical foam-bonding compound if deemed necessary by Urecon.

Insulation:

- Material, rigid polyurethane foam, factory applied.
- Thickness: as required, refer to accompanying thickness chart.
- Density: (ASTM D 1622) 35 to 46 kg/m^3 *(2.2 to 3.0 lbs/ft^3)*.
- Closed cell content: (ASTM D 2856) 90%,minimum.
- Water absorption: (ASTM D 2842) 4.0% by volume .
- Thermal conductivity: (ASTM C518) 0,020 to 0,026 W/m ^{0}C *(0.14 to 0.17 Btu • in/ft^2 •hr • ^{0}F)*.

System Properties:

- System compressive strength: (modified ASTM D 1621 with 50 mil jacket) approximately 414 to 552 kPa *(60-80 lbs/in^2)*, varies with pipe diameter.
- b) Temperature limitations:
  - in service, -45^0 to 86^{0}C*(-49^0 to 185^{0}F)*
  - installation, to -34^0 C *(-30^{0}F)*

Outer Jacket on Pipe Insulation:
The outer protective jacket shall consist of custom blended black polyethylene, 1,27 mm *(50 mils)* thick, UV inhibited factory applied. The jacket shall have a modified butyl rubber adhesive to ensure positive adhesion to the foam insulation and shall be applied hot in two counterwound and overlapping layers each 0,64 mm (*25 mils*) thick to ensure a waterproof bond throughout its entire length. Exposed ends of insulation shall be coated with an approved waterproofing sealant prior to leaving the factory, when required.

Outer Jacket Characteristics:

- jacket material: gray or black (UV inhibited) polyethylene
- sealant: butyl rubber, resin
- jacket thickness: 1,27 mm *(50 mils)*
- minimum elongation: (ASTM D 1000) 300%, 6 month test
- tensile strength: (ASTM D-1000) 8,93 kg/cm *(38 lbs/in)*

Plain End Joints:
The pipe is provided with the appropriate cut-backs to allow for joining in the field. These are typically:

- butt-welded steel @ 150mm *(6 in.)*
- butt-fused HDPE @ 225mm *(9 in.)*

- soldered copper @ 150mm *(6 in.)* for up to 37mm *(1 ½ in.)*, and 225mm *(9 in.)* for 50mm *(2 in.)* and larger.

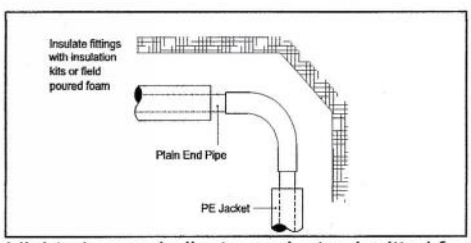
Joint insulation kits consist of a preformed set of urethane or polyisocyanurate foam half shells and adequate butyl mastic tape.

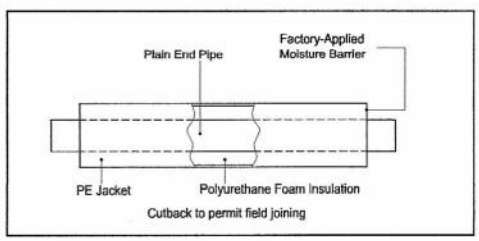
- width: 100mm *(4 in.)* or 150mm *(6 in.)*.
- backing: Low density polyethylene.
- adhesive: Butyl rubber and resin.
- thickness: 0,90mm *(35 mils)*.
- meets AWWA C-209 standard.

Fittings:

May be supplied factory insulated if the fitting has long tangential legs (such as with fabricated Steel fittings) or insulation kits may be provided for field installation. These kits match the thickness of the insulation on the pipe complete with extension legs to suit the cut-back on the pipe. Refer to Urecon's 'Submittal Data for Insulation Kits' for details.

UIP® System													
		25mm *(1")*				35mm *(1 ½")*				50mm *(2")*			
Pipe Size		OD		Foam		OD		Foam		OD		Foam	
In	mm	*in*	mm	*in*	mm	*in*	Mm	*In*	mm	*in*	mm	*in*	mm
½"	12	*3.00*	76	*1.1*	28	*3.67*	93	*1.4*	36	*5.25*	133	*2.2*	56
¾"	19	*3.35*	85	*1.2*	30	*4.25*	108	*1.6*	41	*5.25*	133	*2.1*	53
1"	25	*3.75*	95	*1.2*	30	*4.50*	114	*1.7*	43	*5.25*	133	*2.1*	53
1 1/4"	32	*4.00*	102	*1.2*	30	*4.50*	114	*1.4*	36	*5.50*	140	*1.9*	48
1 1/2"	38	*4.25*	108	*1.2*	30	*5.00*	127	*1.6*	41	*6.13*	156	*2.1*	53
2"	51	*4.63*	118	*1.1*	28	*5.75*	146	*1.7*	43	*6.50*	165	*2.1*	53
2 1/2"	64	*5.13*	130	*1.1*	28	*6.13*	156	*1.6*	41	*6.75*	171	*1.9*	48
3"	76	*5.75*	146	*1.2*	30	*6.75*	171	*1.7*	43	*7.75*	197	*2.2*	56
4"	102	*6.75*	171	*1.1*	28	*7.75*	197	*1.6*	41	*8.75*	222	*2.2*	56
5"	127	*8.00*	203	*1.2*	30	*8.75*	222	*1.6*	41	*10.00*	254	*2.2*	56
6"	152	*9.00*	229	*1.2*	30	*10.00*	254	*1.7*	43	*11.00*	279	*2.2*	56
8"	203	*11.00*	279	*1.2*	30	*12.00*	305	*1.7*	43	*13.25*	337	*2.3*	58
10"	254	*13.75*	349	*1.5*	38	*14.00*	356	*1.6*	41	*15.50*	394	*2.4*	61
12"	305	*15.70*	399	*1.5*	38	*16.00*	406	*1.6*	41	*17.50*	445	*2.4*	61
14"	356	*x*	x	*x*	x	*17.75*	450	*1.9*	48	*18.80*	478	*2.4*	61
16"	406	*x*	x	*x*	x	*19.75*	502	*1.9*	48	*21.00*	533	*2.5*	64
18"	457	*x*	x	*x*	x	*x*	x	*x*	x	*23.00*	584	*2.5*	64
20"	508	*x*	x	*xx*	x	*x*	x	*x*	x	*25.00*	635	*2.5*	64





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URECON
PRE-INSULATED PIPE

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Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir
Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

DETAILED SPECIFICATION

UIP® half-shells

1) General

The urethane foam half-shells shall be manufactured using the U.I.P.® insulation process in accordance to ISO 9001-2000 Standards, or approved equal.

2) Insulation

a) Material, rigid polyurethane foam.
b) Thickness: nominal 37 mm *(1 1/2 in),* or as required.
c) Density: (ASTM D 1622) 35 to 46 kg/m^3 *(2.2 to 3.0 lbs/ft^3).*
d) Closed cell content: (ASTM D 2856) 90%, minimum.
e) Water absorption: (ASTM C 272) 2.0% by volume .
f) Thermal conductivity: (ASTM C518) 0,020 to 0,026 W/m ^{0}C *(0.14 to 0.17 Btu • in/ft^2 •hr • ^{0}F).*
g) Temperature limitations: -45° to 93^{0}C *(-49^0 to 200°F).*

3) Packaging

The product is typically supplied in 1.52 m (*5 ft.*) lengths bundled and wrapped in a UV protective sheath. Other lengths are available on request.

4) Outer Jacket on Pipe Insulation

The UIP® half shells are provided with a mirror smooth outer urethane 'skin' that allows for greater ease of field installation of the final outer jacket required. For below ground applications the jacket of choice is typically 0,305mm (*12 mil*) PE hand-roll tape spirally applied with a 50% overlap; refer to Submittal data #257 for more detail on this product.

5) Insulation kits for fittings

Urethane half-shell covers are available for all types of fittings to match the insulation system used on the pipe.

Note: -Physical characteristics are nominal and may vary depending on pipe type and diameter. (Revised Feb. 2010)

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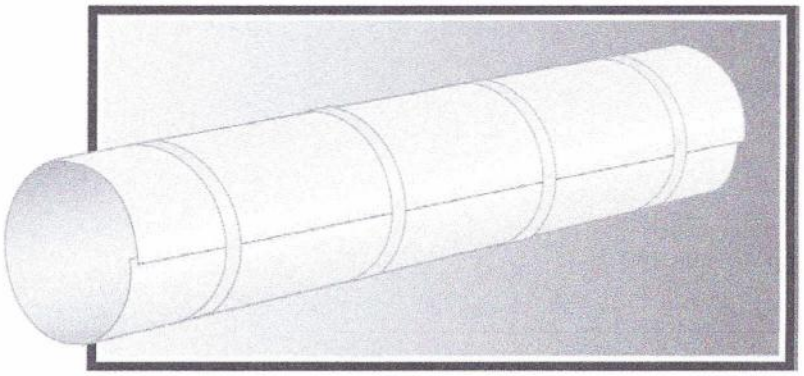
PRE-INSULATED PIPE



Cut and rolled galvanized steel (field applied)

Urecon's products and related ISO-9000 quality control procedures assure you of the highest quality product on the market today.

Application:
Urecon's cut and rolled galvanized steel field applied jacket is suitable where factory insulating the pipe is either not possible or practical. This would include

- Above ground hot water lines
- Above ground chilled water lines in warmer climates
- Above ground lines for freeze protection of bridge crossings, mining and industrial lines
- Any above ground application where a short section of pipeline may require additional mechanical protection

Metal jacket:

The protective metal jacket for the pipe shall be supplied to site cut and rolled to a diameter that yields 50 mm (*2 in*) overlap circumferentially once installed. In the field this lap should be positioned in such a way as to shed water, and each piece shall lap the next by 50 mm (*2 in*). The jacket shall be supplied with stainless steel bands and crimp seals (or Band-It® clips if removable /reusable is required) .

Cut and rolled galvanized steel field applied submittal data sheet cont'd.

Gauge	Thick-ness (mm)	Thick-ness (inches)	Lbs/sq ft	Kgs/sq m
14	1.994	0.0785	3.281	16.01
16	1.613	0.0635	2.656	12.96
18	1.311	0.0516	1.8974	10.52
20	1.006	0.0396	1.4486	8.08
22	0.8534	0.0336	1.2038	6.86
24	0.7010	0.0276	0.9590	5.64
26	0.5512	0.0217	0.7591	4.42

*Highlighted areas indicate product submitted for this project.

Fittings:
Refer to the accompanying data sheet 'Insulation Kits for Spiwrap® system' for details.

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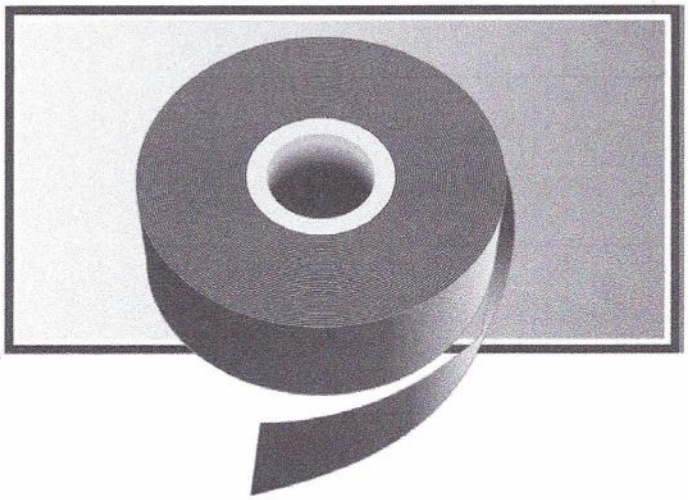
URECON
PRE-INSULATED PIPE



Polyethylene hand roll tape

Renwrap #300 is a general purpose pipeline utility tape for use over Urecon's polyurethane or polyisocyanurate foam half shells in the field. When properly applied it provides a watertight jacket along with mechanical protection of the insulation. This pressure sensitive product can be applied over a wide range of temperatures and exhibits very good adhesion to itself and / or the adjacent factory insulated P.E. jacket.

Product Properties

- Thickness: 0,305mm (*12 mil*)
- Color: black or gray (southern climates only).
- Backing: low density polyethylene
- Adhesive: synthetic rubber and resin
- Widths:
- 0,50mm X 30 meters/roll (*2 in X 100 ft*)...24/case
- 100mm X 30 meters/roll (*4 in X 100 ft*)...12 rolls /case
- 150mm X 30 meters/roll (*6 in X 100 ft*)...8 rolls/case

Installation

The 50mm (*2 in*) product should be used (and be reserved for) over insulated fittings and any other compound curve areas. If the ambient temperature is below freezing, the tape should be pre-warmed prior to application for ease of application.

The total applied thickness is dependant on the engineer and / or the specification for the project. As a general rule, Urecon recommends applying the product in two counter wound layers allowing a 50% overlap onto itself in both directions; the resultant jacket being 1,22mm (*48 mil*) thick.

Adequate tension should be applied to the tape to provide approximately 3.2mm (*1/8 in*) 'neck down' during application.

Polyethylene Hand roll tape
submittal data sheet cont'd.

Physical Properties	***metric***	***imperial***
Total thickness[1]	0,305mm	12 mils
Backing thickness[1]	0,203mm	8 mils
Adhesive thickness[1]	0,102	4 mils
Tensile strength[1]	4.46 kg/cm width	25 lb/in width
Elongation[1]	150%	150%
Adhesion to backing[1]	0,56 kg/cm width	50 oz/in
Dielectric strength[1]	13 KV	13KV
Insulation resistance[2]	1,000,000 Mega ohms	1,000,000 Mega ohms
Water Vapor transmission rate	< 0.03 g/100 cm^2/ 24 hr.	< 0.2 g/100 in^2/24 hr.
Temperature range	-34° C to 71° C	-30° F to 160° F

[1]=ASTM D 1000 [2]=ASTM D 257 [3]=ASTM E 398
Note: Values listed are averages and should not be used as maximums or minimums.

CANADA

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WEB SITE: www.urecon.com

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Registered Company

UNITED STATES

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Local Representative

Submittal Data

Mastic – Sealant

Short Form Specifications

The solvent based asphaltic mastic vapour barrier coating is designed to give superior protection against water ingress. The mastic shall be supplied by Urecon in 20 liter *(5 US Gal.)* pails for field application on exposed urethane foam.

Product Description and Application

The mastic sealant is black in color and contains petroleum solvents (complete physical properties listed below). The mastic can be brushed, hand applied or trowel applied (recommended 0.625 mm *(1/16")* thick) direct to the exposed urethane insulation

Physical properties of mastic - Sealant

Color	Drying Times - Based on 21°C *(70°F)* at 50% RH	Density	Water Vapour Permeability	Flash Point	Min. Application Temp.	Service Temperature
Black	Touch Dry: 4 hrs Firm Dry: 48 hours	1.07kg/liter *(8.9 lbs/US Gal.)*	1.2 ng/Pa.m^2.s *(0.018 – 0.020 perms)*	39°C *(100°F)*	5°C *(40°F)*	Minus 30°C – 95°C *(minus 22°F – 250°F)*

Limitations

It will not freeze, but warming of the product in cold weather is necessary before application. It should not be applied on damp or frosty surfaces. There is a solvent odor, and the mastic may attack some plastic foams; test before using.

Standards, Tests & Approvals

The mastic conforms to ASTM E96 on water vapour permeance 1.2ng/Pa.m^2.s *(.018 - .020 perms)*

Precautions

Contains flammable solvents. Do not allow any ignition sources (i.e. smoking, welding, etc.) in the working area. Also allow for proper ventilation, as there is a strong solvent odor. Product is harmful if swallowed.

Warning: The mastic does contain flammable solvents, which may constitute a fire hazard if improperly used.

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Local Representative

WEB SITE: www.urecon.com

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Per,

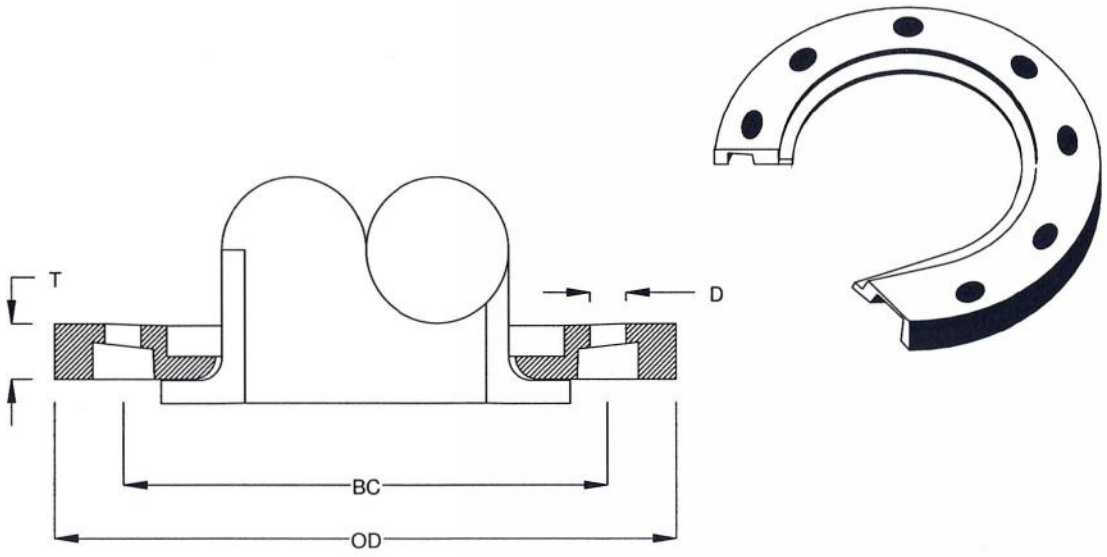
WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

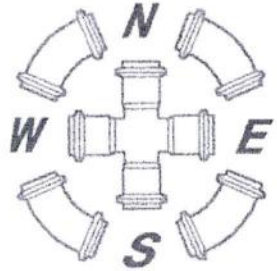
SIZE	BC	BOLT DIAM	#OF BOLTS	T
2"	4.75	0.75	4	0.75
3"	6.0	0.75	4	0.94
4"	7.5	0.75	8	0.94
6"	9.5	0.88	8	1.0
8"	11.75	0.88	8	1.12
10"	14.25	1.0	12	1.19
12"	17.0	1.0	12	1.25
14"	18.75	1.13	12	1.38
16"	21.25	1.13	16	1.44
18"	22.75	1.25	16	1.56
20"	25.0	1.25	20	1.69
24"	29.5	1.38	20	1.88



Flange adapters in diameters 14" and greater shall be equipped with an epoxy coated ductile iron backing ring rings coated with: RAL037 epoxy powder containing: --epoxy resin (#604), polyester resin, titanium dioxide, solidifier, and others, heated to 450 degrees to a thickness of 7-12 mil

DISCLAIMER - PLEASE READ

Due to various factors affecting production, all dimensions are approximate. Dimensions an apperance are subject to change without notice due to design or production modifications. Angle tolerance for elbows is =/- 2 degrees. All fittings are subject to Specified Fittings "Standard Terms and Conditions." A copy of this drawing must accompany all purchase orders for this fitting. All other dimensions are to tolerances of +/- 1"



SPECIFIED FITTINGS
164 WEST SMITH RD.
BELLINGHAM WA 98226
888-734-8846
888-734-8258 (fax)

TITLE

EPOXY COATED
DUCTILE IRON FLANGE
BACKING RINGS

SIZE	CAGE CODE	DWG NO	REV
A4			

SCALE NOT TO SCALE

SHEET

Conventional Fusion: Allowable Operating Pressures

The following charts represent the Allowable Operating Pressure for fittings manufactured from three grades of polyethylene resin used in our products. These values represent the most common Standard Dimension Ratios (SDR) used in the industries that we service and are further divided based on the design factors determined by each of their related governing authorities.

- .32 for natural gas distribution systems regardless of resin used
- .50 for water applications for PE3408 resins
- .63 for water applications for PE4710 resins

All design factors are assuming a standard operating temperature of 73° F

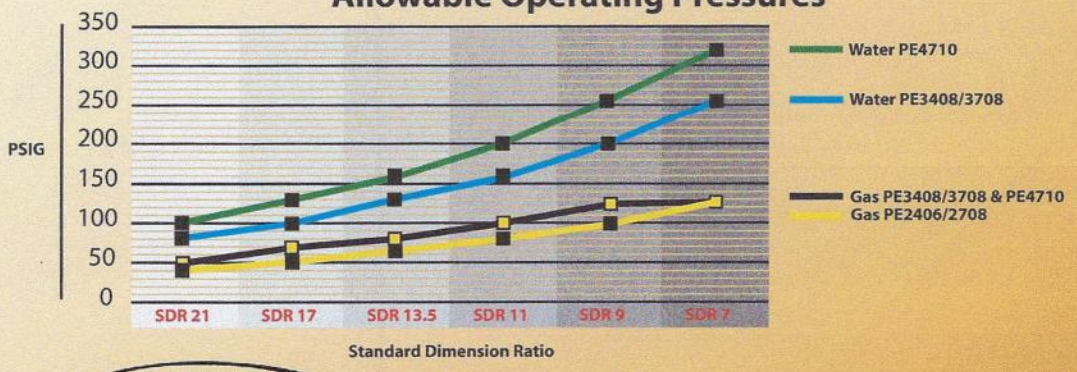
NOTE: For other fluids, temperatures, chemicals and environmental considerations additional design factors may be required. (i.e. Canadian gas utilities use a .40 design factor for their natural gas applications.)

DOT Allowable Operating Pressure for Natural Gas Plastic Pipe Systems			
.32 design factor @ 73° F			
SDR	PE2406/PE2708 **DOT Allowable**	PE3408 **DOT Allowable**	PE4710 **DOT Allowable**
21	40	50	50
17	50	64	64
13.5	64	80	80
11	80	100	100
9	100	125**	125**
7	125**	125**	125**

** **DOT Regulations only allow a 125 psig max for natural gas plastic pipe systems regardless of the materials Maximum Allowable Operating Pressure (MAOP).**

Allowable Operating Pressure for Municipal & Industrial Applications		
SDR	PE3408 **.50 design factor @ 73° F**	PE4710 **.63 design factor @ 73° F**
21	80	100
17	100	130
13.5	130	160
11	160	200
9	200	255
7	265	335

Allowable Operating Pressures



NOTE: Operating Pressure for Conventional Tapping Tees and Conventional Branch Saddles are determined by the material used, the outlet SDR and the governing regulations.

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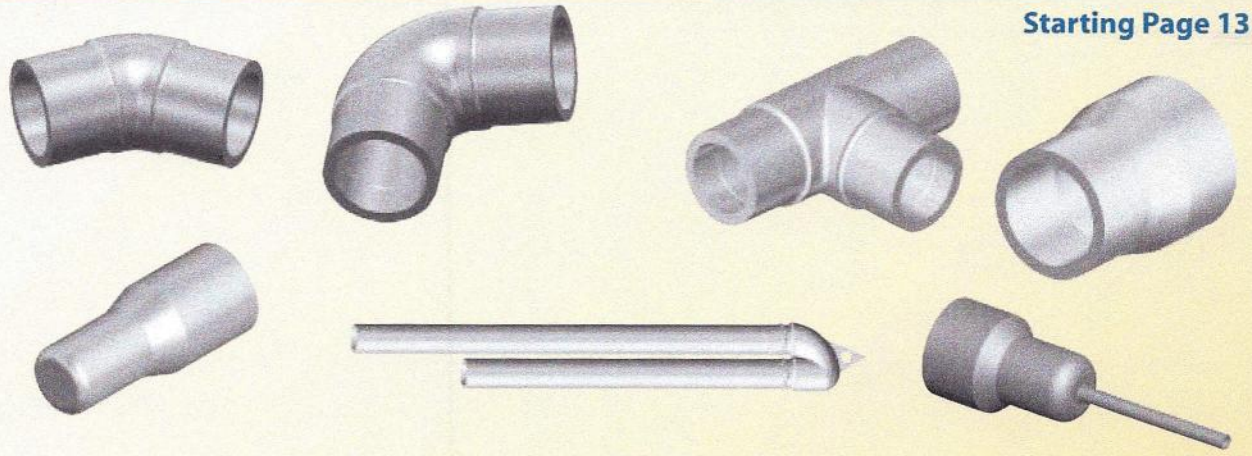
Conventional Fusion: Butt Fusion Fittings

Starting Page 13



Central's Molded PE2406/PE2708 Butt fittings are manufactured and tested to the requirements of ASTM D2513 and ASTM D3261 and are sized for use with pipe conforming to ASTM D2513 and with Butt fittings conforming to ASTM D3261. Central's PE2406 /PE2708 Butt fittings are molded from a virgin yellow medium density resin in accordance with the material specifications listed in ASTM D3350 with a designation of PE2406/PE2708. All Central Plastics PE2406/ PE2708 Butt Fittings are compatible for heat fusion with any pipe or fitting manufactured from a like or similar resin. Central's PE2406/PE2708 fittings have been qualified for fusion using PPI generic fusion procedures.

Central's Molded PE3408/PE4710 Butt fittings are manufactured and tested to the requirements of ASTM D2513, ASTM D3261, and ANSI/AWWA C906 for use with outside diameter controlled pipe and fittings conforming to ASTM D2513, ASTM D3035, ASTM F-714. Central's PE3408/PE4710 Butt fittings are molded from an NSF listed resin in accordance with the material specifications listed in ASTM D3350 with a designation of PE3408/PE4710. Central Plastics PE3408/PE4710 Butt fittings are manufactured and tested to the requirements of ASTM D2513 and ASTM D3261 (where applicable) and are compatible for heat fusion with any pipe and or fitting manufactured from a like or similar resin. Central's PE3408/PE4710 fittings have been qualified for fusion using PPI generic fusion procedures.

FEATURES:

- Pressure rated for natural gas and potable water applications.
- IAPMO Approved (where applicable).
- CSA Approved (where applicable).
- PE3408/PE4710 FM Approved (where applicable).
- PE3408/PE4710 fittings are tested to the requirements of AWWA C906.
- Can be joined by butt, socket , electrofusion or mechanical methods.
- Can be heat fused with all conventional and electrofusion fusion methods.

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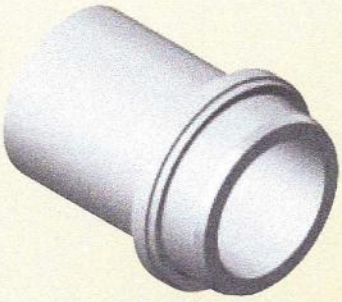
Conventional Fusion: PE Adapters

Starting Page 80

Flange Adapter



MJ Adapter

Gasketed Adapter

Central's PE3408/PE4710 Flange Adapters and MJ Adapters are manufactured and tested to the requirements of ASTM D3261 and ASTM D3261 and ANSI/AWWA C906 for use with pipe conforming to ASTM D2513/3035, F-714 and with Butt fittings conforming to ASTM D3261 as applicable. Central's PE3408/PE4710 Flange Adapters and MJ Adapters are molded from an NSF listed resin in accordance with the material specifications listed in ASTM D3350. All Central Plastic's PE3408/PE4710 Flange Adapters and MJ Adapters are compatible for heat fusion with any pipe or fitting manufactured from a like or similar resin.

FEATURES:

- Pressure rated for municipal and trial applications.
- PE3408/PE4710 FM Approved (where applicable).
- PE3408/PE4710 fittings are tested to the requirements of AWWA C906.
- Can be heat fused using conventional and electrofusion fusion methods.
- Can be beveled for butterfly valves when requested.
- MJ Adapters can be provided with stiffeners when requested.

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Butt Fittings: 90° Butt Elbow

Reviewed	(X)
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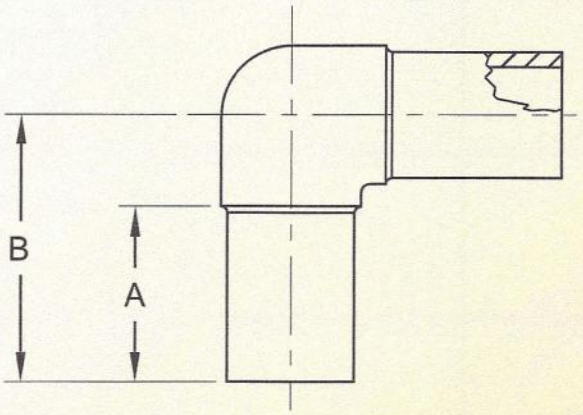
By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011



90° CTS & IPS ELBOW DIMENSIONS

Nominal Size	A	B	L
3/4" IPS	2.63	4.00	*
1" CTS	2.25	3.69	*
1" IPS	2.63	4.00	*
1-1/4" IPS	2.63	4.00	*
1-1/2" IPS	2.63	4.00	*
2" IPS	2.81	4.50	*
3" IPS	3.00	5.13	*
4" IPS	3.00	5.75	*
6" IPS	4.38	9.00	*
8" IPS	6.00	12.00	*
10" IPS	6.00	13.25	*
12" IPS	7.50	15.88	*

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Call for availability of other sizes and dimensions.

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Butt Fittings: 90° Butt Elbow

(PE3408/PE4710) 90° IPS BUTT ELBOWS					
Size	SDR	Part Number	Pack Qty.	Wt.	AWWA
3/4" IPS	DR 11	10004109	100	0.15	YES
3/4" IPS	DR 9.3	10004110	100	0.15	YES
1" IPS	DR 11	10004111	100	0.14	YES
1" IPS	DR 9.3	10003813	100	0.19	YES
1-1/4" IPS	DR 11	10002945	100	0.26	YES
1-1/4" IPS	DR 9.3	10004112	100	0.29	YES
1-1/2" IPS	DR 11	10004113	40	0.34	YES
1-1/2" IPS	DR 9.3	10004114	80	0.37	YES
2" IPS	DR 17	10004130	10	0.59	YES
2" IPS	DR 11	10002946	10	0.74	YES
2" IPS	DR 9/9.3	10004131	10	0.66	YES
3" IPS	DR 17	10004132	10	1.54	YES
3" IPS	DR 11	10002947	10	1.75	YES
3" IPS	DR 9/9.3	10004133	10	1.67	YES
4" IPS	DR 17	10003465	10	3.15	YES
4" IPS	DR 11	10001630	10	3.61	YES
4" IPS	DR 9/9.3	10004137	10	3.12	YES
6" IPS	DR 17	10004143	2	9.96	YES
6" IPS	DR 11	10002948	2	9.76	YES
6" IPS	DR 9/9.3	10004148	2	9.37	YES
6" IPS	DR 9	10004146	2	9.75	YES
8" IPS	DR 17	10004153	2	21.10	YES
8" IPS	DR 11	10002949	2	21.40	YES
8" IPS	DR 9	10004155	2	20.20	YES
10" IPS	DR 17	10004119	1	33.00	YES
10" IPS	DR 11	10004116	1	35.80	YES
10" IPS	DR 9	10004121	1	43.50	YES
12" IPS	DR 17	10004127	1	56.50	YES
12" IPS	DR 11	10003853	1	59.70	YES
12" IPS	DR 9	10003928	1	71.00	YES

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Call for availability of other sizes and dimensions.

Butt Fittings: Butt Tee

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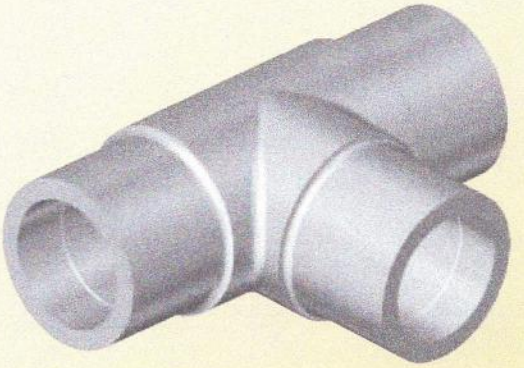

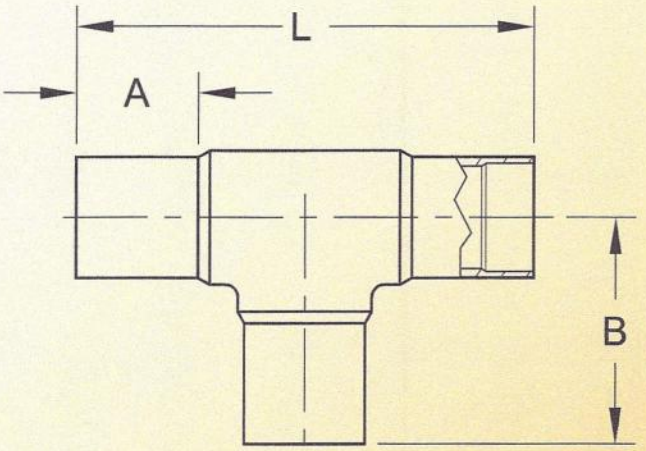

CTS & IPS BUTT TEE DIMENSIONS

Nominal Size	A	B	L
3/4" CTS	1.75	2.85	5.70
3/4" IPS	1.75	3.06	6.12
1" CTS	2.25	3.62	7.25
1" IPS	1.75	3.19	6.38
1-1/4" IPS	1.88	3.38	6.76
1-1/2" IPS	2.30	4.25	8.50
2" IPS	2.54	4.61	9.28
3" IPS	2.90	5.13	10.26
4" IPS	2.90	5.60	11.20
6" IPS	4.38	9.00	18.00
8" IPS	6.00	12.00	24.00
10" IPS	6.00	13.25	26.50
10" IPS	6.00	13.25	26.50
12" IPS	7.50	15.88	31.75

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Call for availability of other sizes and dimensions.

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Butt Fittings: Butt Tee

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Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

(PE3408/PE4710) CTS & IPS BUTT TEES

Size	SDR	Part Number	Pack Qty.	Wt.	AWWA
1/2" CTS	.090 WALL	10004229	100	0.08	YES
3/4" IPS	DR 11	10003969	100	0.13	YES
1" CTS	.101 WALL	10002906	50	0.18	-
1" IPS	DR 11	10003838	100	0.19	YES
1-1/4" IPS	DR 11	10003815	50	0.42	YES
1-1/2" IPS	DR 11	10004230	40	0.49	YES
1-1/2" IPS	DR 9.3	10003931	40	0.49	YES
2" IPS	DR 11	10002956	10	0.99	YES
2" IPS	DR 9.3/9.3	10004250	10	0.91	YES
3" IPS	DR 17	10004252	10	2.01	YES
3" IPS	DR 11	10002957	10	2.30	YES
3" IPS	DR 9/9.3	10004253	10	2.31	YES
4" IPS	DR 17	10003478	8	4.50	YES
4" IPS	DR 11	10000853	8	4.50	YES
4" IPS	DR 9	10002073	10	5.40	YES
6" IPS	DR 17	10004261	1	13.50	YES
6" IPS	DR 11	10002958	1	14.13	YES
6" IPS	DR 9	10004263	1	15.10	YES
8" IPS	DR 17	10004270	1	29.90	YES
8" IPS	DR 11	10002959	1	30.51	YES
8" IPS	DR 9	10004273	1	28.00	YES
10" IPS	DR 17	10004237	1	46.50	YES
10" IPS	DR 11	10004233	1	56.50	YES
10" IPS	DR 9	10004238	1	59.00	YES
12" IPS	DR 17	10004246	1	74.50	YES
12" IPS	DR 11	10004242	1	79.30	YES
12" IPS	DR 9	10004247	1	82.30	YES

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Call for availability of other sizes and dimensions.

Butt Fittings: Butt Reducers

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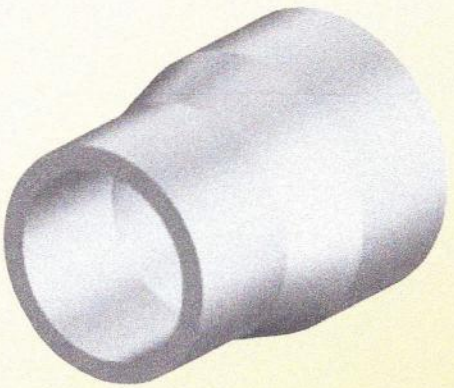

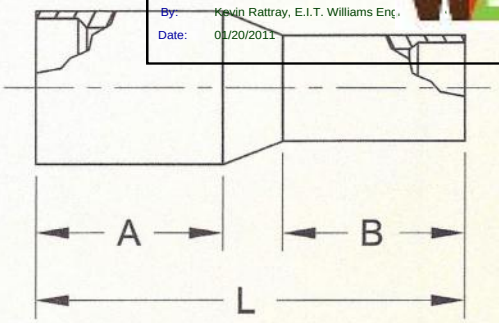

CTS BUTT REDUCER DIMENSIONS

Nominal Size	A	B	L
1" CTS X 1/2" CTS	1.79	2.00	4.00
1 IPS X 1/2" CTS	1.44	1.80	4.50
1 IPS X 3/4" CTS	1.50	1.80	4.50
1 IPS X 1" CTS	1.60	2.25	4.50
1-1/4 CTS X 1" IPS	1.50	2.00	3.84
1-1/4 IPS X 1-1/4" CTS	2.50	2.50	5.75
2" IPS X 1-1/4" CTS	2.49	2.88	6.31
2" IPS X 1-1/2" CTS	2.19	2.29	5.00
2" IPS X 2" CTS	2.75	3.00	6.00
2" IPS X 2" CTS	2.75	3.00	6.00

IPS BUTT REDUCER DIMENSIONS

Nominal Size	A	B	L
1 X 1/2"	1.50	1.25	4.00
1 X 3/4"	1.50	1.75	4.50
1-1/4" X 1"	1.86	1.92	4.25
1-1/2" X 3/4"	2.50	2.40	5.69
1-1/2" X 1"	2.50	2.28	5.75
2" X 1"	2.49	2.88	6.31
2" X 1-1/4"	3.15	2.56	6.44
2" X 1-1/2"	2.50	2.72	6.00
3" X 2"	3.22	2.50	6.65
4" X 2"	3.00	3.00	11.87
4" X 2"	2.75	2.75	7.16
4" X 3"	3.13	3.13	8.62
6" X 4"	4.22	3.75	9.13
8" X 6"	5.00	4.64	10.70
10" X 8"	6.00	5.95	16.00
12" X 10"	6.00	6.00	16.00

Call for availability of other sizes and dimensions.

Butt Fittings: Butt Reducers

(PE3408/PE4710) CTS & IPS REDUCERS					
Size	SDR	Part Number	Pack Qty.	Wt.	AWWA
3/4" IPS X 3/4" CTS	DR 11 X .090 WALL	10004186	100	0.03	-
1" CTS X 1/2" CTS	.101 WALL X .090 WALL	10004187	100	0.04	YES
1" IPS X 3/4" CTS	DR 11 X .090 WALL	10004188	100	0.07	YES
1" IPS X 1/2" CTS	DR 9.3 X .090 WALL	10004189	50	0.09	YES
1" IPS X 1/2" IPS	DR 9.3	10004190	100	0.07	YES
1" IPS X 3/4" IPS	DR 9.3	10004192	100	0.09	YES
1" IPS X 3/4" CTS	DR 9.3 X .090 WALL	10004191	100	0.09	YES
1" IPS X 1" CTS	DR 9.3 X .121 WALL	10004194	100	0.10	YES
1-1/4" CTS X 1" IPS	.090 WALL X DR 9.3	10003945	100	0.07	YES
1-1/4" IPS X 1" IPS	DR 11	10004197	100	0.11	YES
1-1/4" IPS X 1-1/4" CTS	DR 9.3 X .090 WALL	10003946	100	0.15	YES
1-1/2" IPS X 1" IPS	DR 11	10004198	100	0.16	YES
1-1/2" IPS X 3/4" IPS	DR 9.3	10003947	100	0.18	YES
1-1/2" IPS X 1" IPS	DR 9.3	10004199	100	0.19	YES
2" IPS X 1" IPS	DR 11	10003948	100	0.29	YES
2" IPS X 1-1/4" CTS	DR 11 X .090 WALL	10004200	100	0.30	YES
2" IPS X 1-1/4" IPS	DR 11	10002950	100	0.33	YES
2" IPS X 1-1/2" IPS	DR 11	10003814	50	0.30	YES
2" IPS X 2" CTS	DR 11 X .193 WALL	10004202	20	0.57	YES
3" IPS X 2" IPS	DR 11	10002951	10	0.65	YES
3" IPS X 2 IPS	DR 9	10004208	10	1.21	YES
3" IPS X 2" IPS	DR 9/9.3	10004209	10	1.15	YES
4" IPS X 2" IPS	DR 17	10004212	10	0.89	YES
4" IPS X 2" IPS	DR 11	10002952	10	1.02	YES
4" IPS X 2" IPS	DR 9/9.3	10004215	10	0.89	YES
4" IPS X 3" IPS	DR 17	10004213	10	0.98	YES
4" IPS X 3" IPS	DR 11	10002953	10	1.18	YES
4" IPS X 3" IPS	DR 9/9.3	10004216	10	1.73	YES
6" IPS X 4" IPS	DR 17	10004219	5	3.30	YES
6" IPS X 4" IPS	DR 11	10002954	5	3.26	YES
6" IPS X 4" IPS	DR 9	10004221	5	3.67	YES
8" IPS X 6" IPS	DR 17	10004224	5	5.41	YES
8" IPS X 6" IPS	DR 11	6912955	6	6.13	YES
8" IPS X 6" IPS	DR 9	10004227	6	7.69	YES

CENTRAL
The connection since 1955

Call for availability of other sizes and dimensions.

The Right Connection

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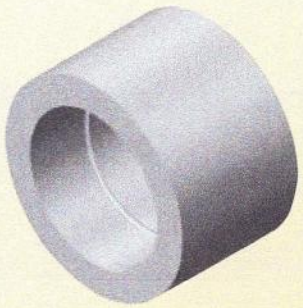
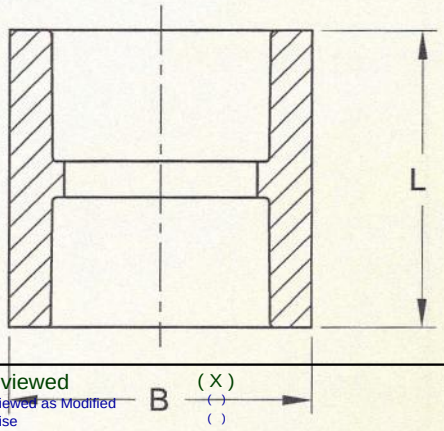
1-405-273-6302
www.centralplastics.com

Socket Fittings: Couplings





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Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

SOCKET COUPLING DIMENSIONS

Nominal Size	A	B	L
1/2" CTS	-	1.08	2.19
1/2" IPS	-	1.20	2.19
3/4" CTS	-	1.21	2.19
3/4" IPS	-	1.46	2.19
1" CTS	-	1.46	2.20
1" IPS	-	1.82	2.19
1-1/4" IPS	-	2.27	2.19
1-1/2" IPS	-	2.55	2.18
2" IPS	-	3.27	2.36
2" IPS SIDR 9	-	3.27	2.30
3" IPS	-	5.07	2.81
4" IPS	-	6.48	3.18

(PE3408/PE4710) SOCKET COUPLINGS

Main Size	Part Number	Pack. Qty.	Wt.	AWWA
1/2" IPS	10005378	100	0.06	YES
3/4" IPS	10005379	100	0.07	YES
1" CTS	10005380	100	0.06	YES
1" IPS	10005381	100	0.11	YES
1-1/4" IPS	10005382	100	0.15	YES
1-1/2" IPS	10005383	100	0.19	YES
2" IPS	10005384	100	0.34	YES
3" IPS	10005385	10	1.17	YES
4" IPS	10005386	10	1.96	YES

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The connection since 1955

Call for availability of other sizes and dimensions.

The Right Connection

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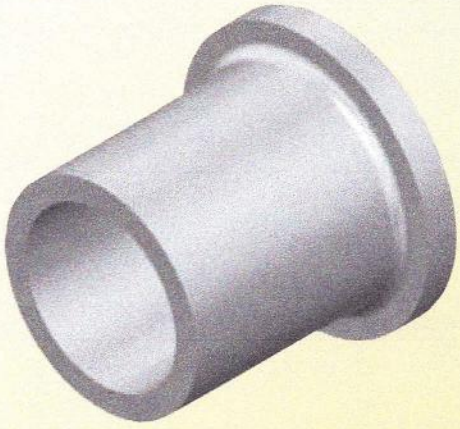
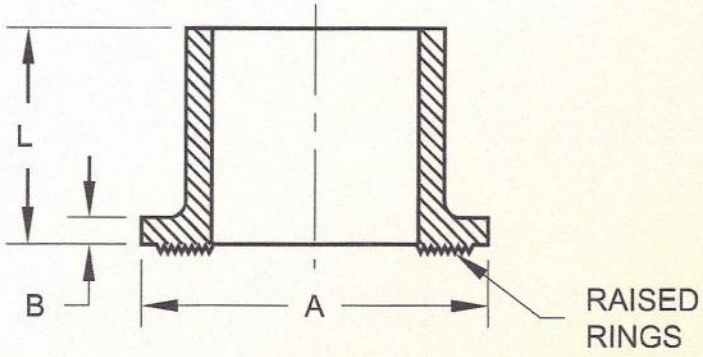
Flange Adapters:

(Beveled for Butterfly Valves available on request.
Standard 45° bevel unless otherwise specified by customer.)**





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Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

IPS FLANGE ADAPTER DIMENSIONS

Nominal Size	A	B	L
2" IPS	3.94	0.39	6.00
3" IPS	5.00	0.63	6.00
4" IPS	6.00	0.54	6.00
6" IPS	8.50	0.78	8.00
8" IPS	10.63	1.00	11.00
10" IPS	12.75	1.28	12.00
12" IPS	15.00	1.54	12.00
14" IPS	17.50	1.50	12.00
16" IPS	20.00	1.75	12.00
18" IPS	21.38	1.88	12.00
20" IPS	23.47	2.27	12.00
22" IPS	25.59	2.50	12.00
24" IPS	27.85	2.82	12.00

CENTRAL
The connection since 1955

**Do to variations in valve dimensions, the installer should verify proper function of the valve at the time of installation. Call for availability of other sizes and dimensions.

The Right Connection

Flange Adapters:

(Beveled for Butterfly Valves available on request.
Standard 45° bevel unless otherwise specified by customer.)**

(PE3408/PE4710) IPS FLANGE ADAPTERS					
Size	SDR	Part Number	Pack. Qty.	Wt.	AWWA
2" IPS	DR17	10004395	10	0.40	YES
2" IPS	DR11	10004392	10	0.49	YES
2" IPS	DR9/9.3	10004397	10	0.55	YES
2" IPS	DR7/7.3	10004396	10	0.65	YES
3" IPS	DR17	10004443	10	0.76	YES
3" IPS	DR11	10004439	10	0.95	YES
3" IPS	DR9/9.3	10004447	10	1.15	YES
3" IPS	DR7/7.3	10004446	10	1.28	YES
4" IPS	DR17	6910823	4	1.54	YES
4" IPS	DR11	6912104	4	1.58	YES
4" IPS	DR9/9.3	10003642	4	1.74	YES
4" IPS	DR7/7.3	6912368	4	2.38	YES
6" IPS	DR17	6910835	2	4.16	YES
6" IPS	DR11	6912105	2	4.43	YES
6" IPS	DR9/9.3	6910361	2	4.25	YES
6" IPS	DR7/7.3	10004473	2	5.91	YES
8" IPS	DR17	6911501	2	10.10	YES
8" IPS	DR11	6912124	2	10.10	YES
8" IPS	DR9/9.3	6910849	2	9.48	YES
8" IPS	DR7/7.3	10004490	2	11.10	YES
10" IPS	DR17	10004330	2	10.82	YES
10" IPS	DR11	6912376	2	16.25	YES
10" IPS	DR9	10004336	2	14.70	YES
10" IPS	DR7	10004335	2	16.60	YES
12" IPS	DR17	10003354	2	15.42	YES
12" IPS	DR11	6912126	2	22.89	YES
12" IPS	DR9	10003129	2	25.00	YES
12" IPS	DR7	10004350	2	29.05	YES
14" IPS	DR17	10004357	1	21.50	YES
14" IPS	DR11	10004353	1	30.38	YES
14" IPS	DR9	10004362	1	35.90	YES
14" IPS	DR7	10004361	1	41.80	YES

CENTRAL
The connection since 1955

**Do to variations in valve dimensions, the installer should verify proper function of the valve at the time of installation. Call for availability of other sizes and dimensions.

The Right Connection

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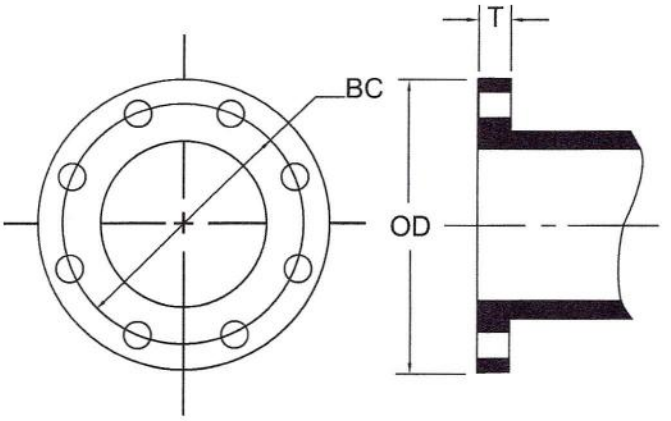
1-405-273-6302
www.centralplastics.com

Ductile and Cast Iron Flanged Fittings

- **All Griffin Pipe Flanged Fittings are 100% hydrostatically tested at 1.5 times rated working pressure.**
- Griffin Pipe Flanged Fittings are suitable for both waterworks and industrial applications and are manufactured in accordance to ANSI/AWWA C110/A21-10.
- All flanges manufactured to AWWA C110 standards conform to the drilling and facing of ANSI specification B16.1 class 125.
- 2" - 12" fittings are listed by Underwriter Laboratories for fire protection service.
- Unless otherwise specified, Griffin Pipe furnished flanged fittings cement lined and tar coated inside in accordance to ANSI/AWWA C104/A21.4 and prime coated outside.
- Griffin Pipe can also provide bare fittings for special coatings.
- Fitting sizes 2" - 12" are adequate for water pressure of 250 PSI. In cast or ductile Iron.
- Fittings sizes 14" - 36" are adequate for water pressure of 150 PSI. In cast iron.
- Fittings sizes 14" - 36" are adequate for water pressure of 250 PSI in ductile iron.



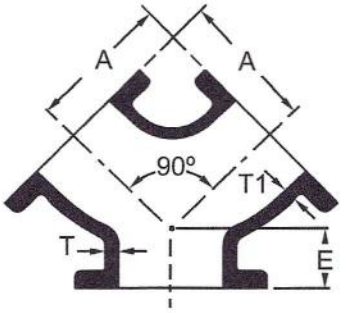
Size	OD	BC	T	Hole Dia.	Bolt Size	No. Bolts
2	6.00	4.75	.62	.75	5/8 x 2-1/4	4
2-1/2	7.00	5.50	.69	.75	5/8 x 2-1/2	4
3	7.50	6.00	.75	.75	5/8 x 2-1/2	4
4	9.00	7.50	.94	.75	5/8 x 3	8
5	10.00	8.50	.94	.88	3/4 x 3	8
6	11.00	9.50	1.00	.88	3/4 x 3-1/2	8
8	13.50	11.75	1.12	.88	3/4 x 3-1/2	8
10	16.00	14.25	1.19	1.00	7/8 x 4	12
12	19.00	17.00	1.25	1.00	7/8 x 4	12
14	21.00	18.75	1.38	1.12	1 x 4-1/2	12
16	23.50	21.25	1.44	1.12	1 x 4-1/2	16
18	25.00	22.75	1.56	1.25	1-1/8 x 5	16
20	27.50	25.00	1.69	1.25	1-1/8 x 5	20
24	32.00	29.50	1.88	1.37	1-1/4 x 5-1/2	20
30	38.75	36.00	2.12	1.37	1-1/4 x 6-1/2	28
36	46.00	42.75	2.38	1.62	1-1/2 x 7	32

ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in Pounds.

TRUE WYES

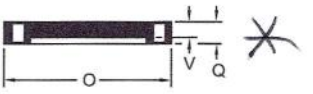
Size	Wt	T	T1	A	E
4	55	.52	.52	6.5	3.0
6	85	.55	.55	8.0	3.5
8	140	.60	.60	9.0	4.5
10	205	.68	.68	11.0	5.0
12	300	.75	.75	12.0	5.5



BLIND FLANGES*

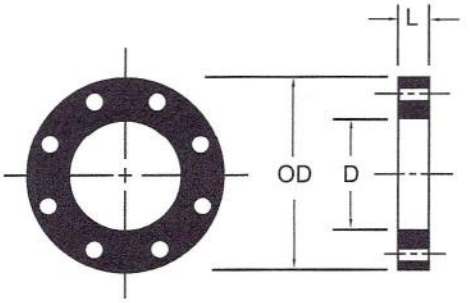
* Blind Flanges can be provided tapped according to customer's requirement.

Size	Wt	O	Q	V
3	9	7.50	.75	.69
4	16	9.00	.94	.88
6	25	11.00	1.00	.94
8	42	13.50	1.12	1.06
10	63	16.00	1.19	1.12
12	85	19.00	1.25	.81
14	120	21.00	1.38	.88
16	145	23.50	1.44	1.00
18	185	25.00	1.56	1.06
20	245	27.50	1.69	1.12
24	370	32.00	1.88	1.25
30	500	38.75	2.12	1.44
36	790	46.00	2.38	1.62



10" and Smaller

12" and Larger



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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

FLANGE FILLERS

Size		Wt & Length				
D	O.D.	1″	1-1/2″	2″	3″	4″
3	7.5	9	14	18	28	36
4	9.0	12	19	25	37	50
5	10.0	14	21	28	42	50
6	11.0	16	24	32	48	64
8	13.5	23	34	46	69	92
10	16.0	29	44	59	88	118
12	19.0	42	63	84	126	168
14	21.0	47	70	94	141	188
16	23.5	56	85	113	169	226
18	25.0	62	92	123	184	246
20	27.5	66	100	133	199	266
24	32.0	84	126	168	251	336
30	38.7	112	168	224	336	448
36	46.0	150	225	300	451	600

ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in Pounds.

ENGINEERING SUBMITTAL DATA
GRIFFIN PIPE PRODUCTS CO.'S COMMITMENT TO QUALITY

Griffin Pipe Products Co. manufactures Class 125 Cast & Ductile Iron Flanged Fittings for both Waterworks and Industrial applications. All of our fittings are manufactured in accordance with ANSI Specification B16.1 and AWWA C110. Griffin 2″ through 12″ Flanged Fittings are also listed by Underwriters Laboratories for fire protection service.

Griffin Pipe Products Co.'s quality control department maintains strict control over all manufacturing standards. Our fittings are produced to the following tolerances:

Mechanical Properties
Cast Iron to ASTM A 48 - Minimum Tensile Strength 30,000 psi
Ductile Iron to ASTM A 536 - Minimum Tensile Strength 70,000 psi
Yield Strength 50,000 psi
Elongation 5%
Chemical Properties
Phosphorous, Maximum 0.75%
Sulfur, Maximum 0.15%
Dimensional Tolerances

Center to face distance	+ or - .03 in.
Wall thickness	-0.10 in.
Angle of bends	+ or - 1/2 degree
Flange thickness	+.12 in. - 0 in.

As standard procedure **Griffin Pipe Products Co. hydrostatically tests every fitting** to insure quality casting integrity. These tests are performed at 1.5 times the rated working pressure.

At the buyers request Griffin Pipe Products Co. will also provide fittings cement-lined and tar-coated in accordance with **ANSI A 21.4** and **AWWA C104**. Griffin Pipe Products Co. fittings are provided with either a tar coated or epoxy primed exterior surface at the customers discretion.

We pride ourselves in producing the finest quality Flanged Fittings available in today's market. Our manufacturing standards and quality control procedures make certain that we abide by our commitment to be the best!

Electrofusion: Allowable Operating Pressures

The following charts represent the Allowable Operating Pressure for fittings manufactured from three grades of polyethylene resin used in our products. These values represent the most common Standard Dimension Ratios (SDR) used in the two primary industries that we service and are further divided up based on the design factors determined by each of their related governing authorities.

- .32 for natural gas distribution systems regardless of resin used
- .50 for water applications for PE3408/PE3608 resins
- .63 for water applications for PE4710 resins

} **All designs factors are assuming a standard operating temperature of 73° F**

NOTE: For other fluids, temperatures, chemicals and environmental considerations additional design factors may be required. (Canadian gas utilities use a .40 design factor for their natural gas applications.)

DOT Allowable Operating Pressure for Natural Gas Plastic Pipe Systems

(.32 design factor @ 73° F)

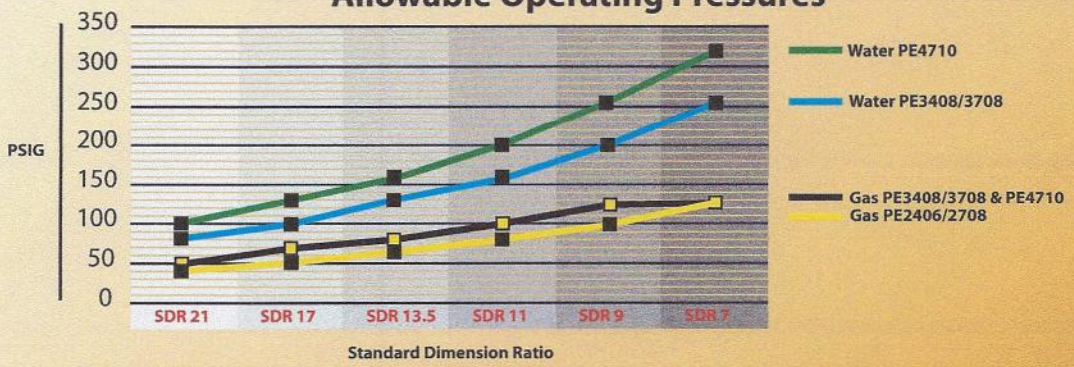
SDR	PE 2406/PE2708 **DOT Allowable**	PE 3408 **DOT Allowable**	PE4710 **DOT Allowable**
21	40	50	50
17	50	64	64
13.5	64	80	80
11	80	100	100
9	100	125**	125**
7	125**	125**	125**

Allowable Operating Pressure for Municipal & I Industrial Applications

SDR	PE 3408 **(.50 design factor @ 73° F)**	PE4710 **(.63 design factor @ 73° F)**
21	80	100
17	100	130
13.5	130	160
11	160	200
9	200	255
7	265	335

**** DOT Regulations only allow a 125 psi max for natural gas plastic pipe systems regardless of the materials Maximum Allowable Operating Pressure (MAOP).**

Allowable Operating Pressures



CENTRAL
The connection since 1955

The Right Connection

NOTE: Operating Pressure for Electrofusion Tapping Tees and Electrofusion Branch Saddles are determined by the material used, the outlet SDR and the governing regulations.

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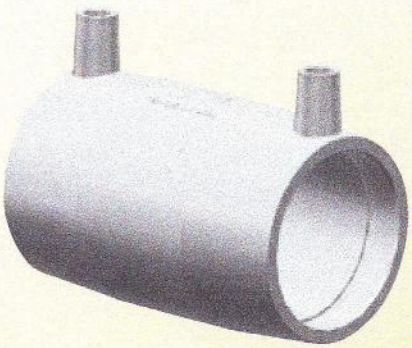
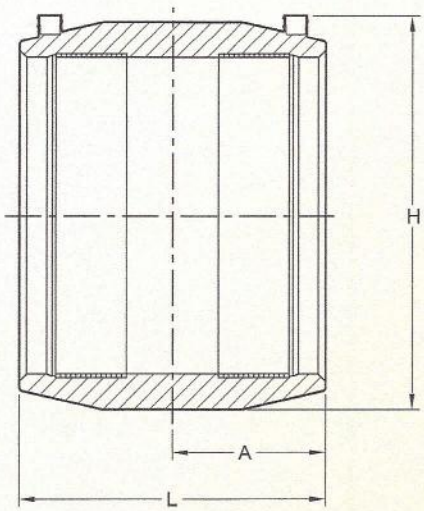
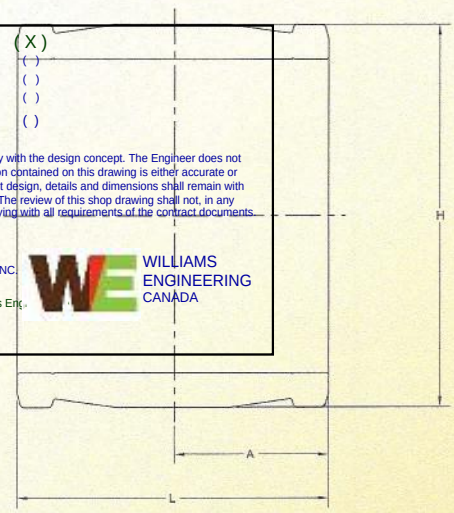
Electrofusion Fittings: Couplings

NOTE: Operating Pressure is 200 psi for PE4710 Couplings in allowable applications.







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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

EF COUPLING DIMENSIONS

Nominal Size	H	L	A
1/2" CTS	2.01	3.15	1.57
1/2" IPS	2.15	2.98	1.42
3/4" CTS	2.15	2.98	1.42
3/4" IPS	2.48	3.46	1.73
1" CTS	2.52	3.46	1.73
1" IPS	2.63	3.46	1.73
1-1/4" CTS	2.56	3.30	1.57
*1-1/4" DUCT (CON.)	3.00	3.70	1.82
1-1/4" IPS	3.04	3.86	1.93
*1-1/4" SIDR 9 (CON.)	3.00	3.70	1.82
1-1/2" IPS	3.36	4.33	2.17
2" IPS	3.78	4.72	2.36
2" CTS	3.59	4.37	2.12
2" IPS	3.82	4.31	2.09
2" IPS CONDUIT	3.55	4.32	2.09
2-1/2" CONDUIT	4.17	4.25	2.06
3" IPS	5.18	5.59	2.72
4" IPS	6.51	6.14	3.00
4" DIPS	6.06	6.93	3.46
5" IPS	7.56	7.17	3.54
6" IPS	8.70	8.35	4.10
6" DIPS	8.74	8.19	4.09
7" IPS	8.93	8.19	4.09
8" IPS	11.20	9.48	4.70
8" DIPS	11.14	10.16	5.08
10" IPS	13.41	10.50	5.00
10" DIPS	13.70	10.90	5.50
12" IPS	15.84	11.50	5.50
12" DIPS	16.20	12.80	6.40

*Industrial Non-Compliant ASTM Fittings.
Sizes not listed can be furnished on request.

CENTRAL
The connection since 1955

The Right Connection

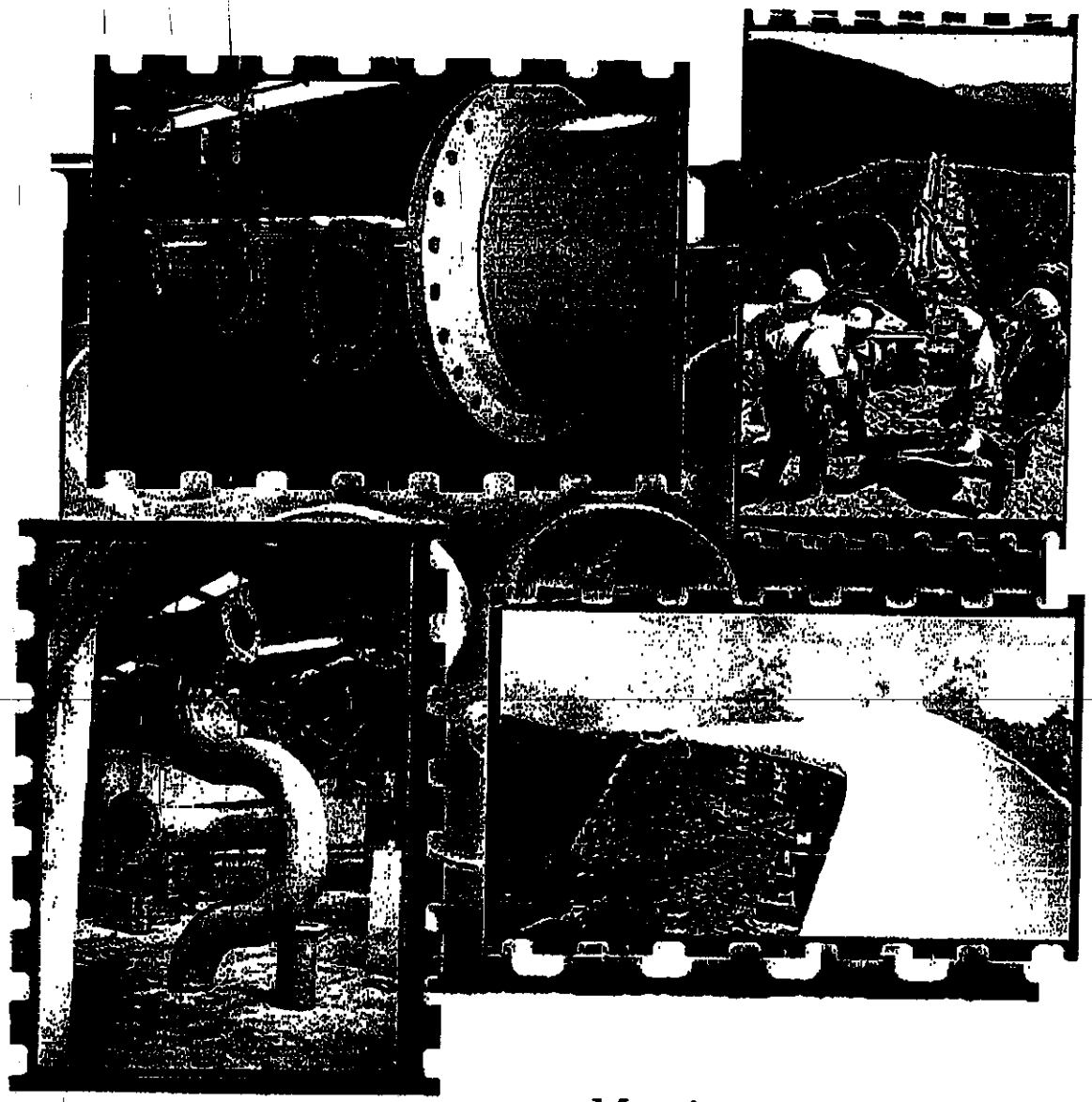
Electrofusion Fittings: Couplings

NOTE: Operating Pressure is 200 psi for PE4710 Couplings in allowable applications.

(PE3408/PE4710) ELECTROFUSION COUPLINGS						
Size	Description	Pin Type	Part Number	Pack. Qty.	Wt.	AWWA
1/2" CTS	ASTM D2513/F1055	4.7 R	5760019	50	0.09	YES
3/4" CTS	ASTM D2513/F1055	4.7 R	10004578	40	0.10	YES
1" CTS	ASTM D2513/F1055	4.7 R	5760023	25	0.18	YES
1 1/4" CTS	ASTM D2513/F1055	4.7 R	10004573	30	0.16	YES
2" CTS	ASTM D2513/F1055	4.7 S	10004580	30	0.46	-
1/2" IPS	ASTM D2513/F1055	4.7 R	10004627	40	0.13	YES
3/4" IPS	ASTM D2513/F1055	4.7 R	5760022	25	0.29	YES
1" IPS	ASTM D2513/F1055	4.7 R	5760024	25	0.14	YES
1 1/4" IPS	ASTM D2513/F1055	4.7 R	5760026	50	0.28	YES
1 1/2" IPS	ASTM D2513/F1055	4.7 R	5760028	35	0.34	YES
2" IPS	ASTM D2513/F1055	4.7 R	5760030	25	0.38	YES
2 1/2" IPS	CONDUIT PSI=0	3 Pin	5754047	20	0.55	-
3" IPS	ASTM D2513/F1055	4.7 R	10000358	36	1.57	YES
4" IPS	ASTM D2513/F1055	4.7 R	10000360	10	1.67	YES
6" IPS	ASTM D2513/F1055	4.7 R	10000359	8	4.37	YES
7" IPS	ASTM F1055	4.7 S	10003970	4	7.86	-
8" IPS	ASTM D2513/F1055	4.7 R	10000361	4	8.43	YES
10" IPS	ASTM D2513/F1055	4.7 R	10004579	1	15.40	YES
10" IPS **	ASTM D2513/F1055	4.7 S	10000362	1	15.24	YES
12" IPS	ASTM D2513/F1055	4.7 R	10004571	1	23.10	YES
12" IPS **	ASTM D2513/F1055	4.7 S	10000363	1	23.90	YES
1-1/4" SIDR 7	1.488 OD CONDUIT PSI=0	4.7 R	10004575	40	0.29	-
1-1/4" SIDR 9	1.580 OD CONDUIT PSI=0	4.7 R	10002826	30	0.24	-
4" DIPS	ASTM D2513/ F1055	4.7 S	10000353	10	2.34	YES
6" DIPS	ASTM D2513/ F1055	4.7 S	10000354	8	4.59	YES
8" DIPS	ASTM D2513/ F1055	4.7 S	10000355	4	8.37	YES
10" DIPS	ASTM D2513/ F1055	4.7 S	10000356	1	17.43	YES
12" DIPS	ASTM D2513/F1055	4.7 S	10000357	1	25.67	YES

Call for availability of other sizes and dimensions.
** For Use with Bar-Code Processor Only
4.7R = 4.7 Pin with Resistor
4.7S = 4.7 Solid Pin

3M™ Scotchkote™
Corrosion Protection Products



Meeting your coating needs for more than 40 years.

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engr.

Date: 25/03/2011

WILLIAMS ENGINEERING CANADA

3M *Innovation*

Fusion Bonded for Proven Performance

Corrosion Protection

3M, the leader in functional epoxy coating technology, offers a complete line of 3M™ Scotchkote™ powder coatings engineered for optimum corrosion protection of metal in the harshest environments, including saltwater, wastewater, petrochemicals, solvents and corrosive gases. Several of these coatings also provide enhanced properties for operation at elevated temperature, mechanical damage protection, compression, wear, abrasion, and cavitation resistance. Scotchkote heat-cured fusion bonded epoxy coatings are 100 percent-solids; thermosetting materials that achieve a high bond to metal surfaces as a result of a heat generated chemical reaction. They can be applied by fluidized bed, flocking (air spray), or electrostatic spray and are available through a worldwide network of applicators.

3M also provides several Scotchkote high-build liquid epoxy coatings for field application as primary corrosion protection coatings or as easy field repair materials for Scotchkote Fusion Bonded Epoxy coatings. Surface primers are available to enhance chemical resistance and raise temperature-operating range.

Scotchkote Fusion Bonded Epoxy Coatings

Features	Benefits
Resistant to Cathodic Disbondment	Long term performance under a range of service conditions and temperatures.
Excellent chemical resistance	Long term performance in a variety of soil conditions.
Abrasion, gouge and impact resistant	Added protection for bores, river crossings, rough handling and applications requiring mechanical damage resistance.
High adhesion to metal	Resistant to soil stress.
Thermosetting	Resistant to penetration and will not cold flow under pressure. Does not soften at elevated temperature.
Balanced gel and flow characteristics	Enhanced coating continuity and application on metal.
Sag Resistant	Excellent coverage on sharp edges.
Machinable	Can meet close tolerances.
Lightweight	Lower shipping costs.
Compatible with other coating systems	Can be overcoated with other materials for UV protection. Provides an excellent base coat for multilayer pipe coating systems.
Plant Applied	Controlled application conditions.
NSF and AWWA Standard C213 Approved (Several specific products only)	Good for potable water applications.
Established network of applicators	Widely available for pipeline (external and internal), reinforcing steel and custom coating applications.

1 Header piping for a water purification plant illustrates the types of complex shapes that can be coated with 3M™ Scotchkote™ coating.

2 Valve cutaway illustrates total coverage capability of 3M™ Scotchkote™ FBE coating.

3 3M™ Scotchkote™ coating protects this pump housing from salt water and cavitation damage.

4 Application of 3M™ Scotchkote™ epoxy coating on rebar.

5 Stacked pipe with 3M™ Scotchkote™ coating ready for installation.

To The Specifying Engineer

How to Specify 3M™ Scotchkote™ Coatings

It is possible for applicators to apply powder coatings by various methods. Please consult your 3M Corrosion Protection Products Sales Representative or customer service representative for the names and capabilities of local applicators. Key application steps to consider when writing specifications are as follows:

- Remove oil and grease
- Abrasive blast to near white metal
- Remove blast media dust
- Inspect for surface imperfections, such as weld spatter and smooth by grinding (does not apply to reinforcing steel)
- Acid or deionized water wash (optional) to remove residual inorganic contaminants.
- Preheat parts to suggested application temperature

Pipe rehabilitation project completed using 3M Scotchkote coating — and repaired with Scotchkote hotmelt patchsticks. 6

- Apply Scotchkote coating to the specified thickness
- Electrically inspect for continuity
- Repair as required

*Industry Standards and Specifications**

Pipe (External)

- **CSA Z245.20/06** - Canadian Standards Association External Fusion Bond Epoxy Coating for Steel Pipe/External Polyethylene Coating for Pipe
- **NFA 49-711** - French standard for steel tubes, three-layer external coating based on polypropylene by extrusion
- **DIN 30670** - German standard for polyethylene coatings for steel pipe fittings
- **NACE RP0394** - National Association of Corrosion Engineers Standard Recommended Practice, Application, Performance, and Quality Control of Plant-Applied, Fusion bonded Epoxy External Pipe Coating
- **NAPCA Bulletin 12-78** - National Association of Pipe Coating Applicators External Application Procedures for Plant Applied Fusion bonded Epoxy (FBE) To Steel Pipe
- **AWWA C213** - American Water Works Association Standard for Fusion-Bonded Epoxy Coating For The Interior and Exterior of Steel Water Pipelines

Reinforcing Steel

- **AASHTO M 284/M 284M** - Standard Specification for Epoxy Coated Reinforcing Bars
- **AASHTO T 253** - Standard Method of Test for Coated Dowel Bars
- **ASTM A 775/A 775M** - American Society for Testing Materials Standard Specification For Epoxy-Coated Reinforcing Steel
- **ASTM A 884/A 884M** - American Society For Testing Materials Standard Specification For Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcing Steel
- **ASTM A 934/A 934M** - American Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
- **ASTM D 3963/D D 3963M - 01**
- **NACE RP0395** - National Association of Corrosion Engineers Standard Recommended Practice Epoxy-Coated Steel Reinforcing Bars

Piles

- **ASTM A 950/A 950M** - American Society For Testing Materials Standard Specification For Fusion bonded Epoxy-Coated Structural H-Piles and Sheet Piles
- **ASTM A 972//A 972M** - American Society For Testing Materials Standard Specification For Fusion bonded Epoxy-Coated Pipe Piles

Pipes (Internal)

- **NSF/ANSI Standard 61,** Drinking Water System Components, for use with potable water.

**Specifications and Standards usually include the year in which they were last changed as part of the specification designator. These dates have not been included in the list.*

Internal Linings

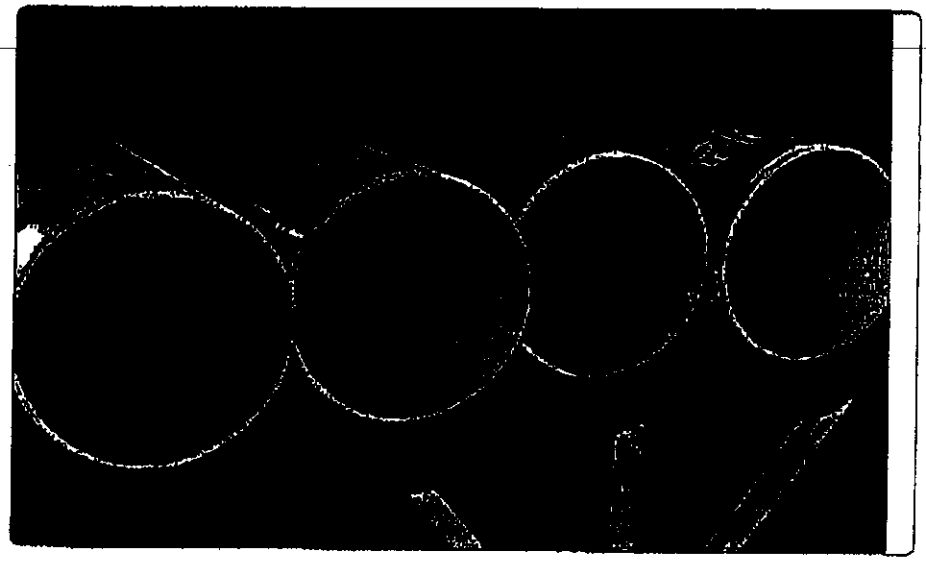
3M™ Scotchkote™ FBE coatings are available with extended gel, flow and cure characteristics for application to the interior surfaces of pipe. In some cases, existing pipeline or custom coating products may have been adapted for internal use by modifying these properties. Scotchkote products that have been adapted for internal pipe coating use and described in other sections of this brochure are Scotchkote 134, 135, and 206N Extra Long Gel and 6258. Other 3M coatings not listed, such as Scotchkote 6171 are available to meet special service requirements. Liquid primers are sometimes used with these coatings to enhance performance properties in particularly severe environments, such as those encountered in downhole oil production. Proper selection of internal coatings depends upon pipe size, type and service conditions. Contact your 3M sales or customer service representative for further information.

Scotchkote 345 Liquid Phenolic Primer

Scotchkote 345 Liquid Phenolic Primer is designed specifically for application to metal surfaces prior to top coating with Scotchkote FBE coatings. When properly applied, Scotchkote 345 primer and topcoat systems provide excellent resistance to CO_2, H_2S, CH_4, petroleum distillates, and brine at elevated temperatures and pressures.

Scotchkote 500N Water Base Primer

Scotchkote 500N Water Base Primer is a water-based metal treatment designed to increase adhesion of fusion bonded epoxy coatings. Properly applied to blast-cleaned steel, it provides protection for metal surfaces and a uniform bonding base for increased coating performance. This primer significantly improves hot water resistance, autoclave resistance, and cathodic disbondment and salt spray resistance of the coating. It is easily applied with minimal application equipment and promotes a chemically uniform steel surface condition.

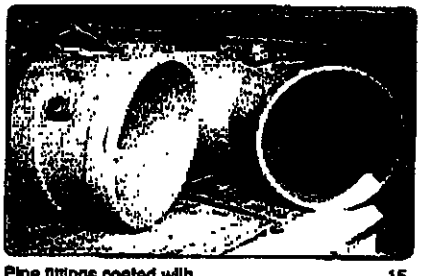


Pipe internally coated with 3M™ Scotchkote™ coating. 11

Pump volutes protected against corrosion with 3M™ Scotchkote™ 134. 12

Application of 3M™ Scotchkote™ 134 custom coating on a turbine. 13

Fluid bed dip application of 3M™ Scotchkote™ 206N. 14



Pipe fittings coated with 3M™ Scotchkote™ 206N. 15

Custom Coating

3M™ Scotchkote™ FBE coatings can be applied to a variety of parts for corrosion protection. Example applications include valves, pumps, tapping saddles, pipe appurtenances, manifolds, sewage aerators, tanks, pipe hangars, ladders, hydrants, cast iron risers and flow meters. Coating is accomplished by manual flocking (air spray), electrostatic spray, or fluid bed dip application.

Scotchkote 134 and Scotchkote 135

Scotchkote 134 (green) and Scotchkote135(gray)are bothdesigned for flock or electrostatic spray application. Because of their long gel time (upto 2.5 minutes at 350°F/177°C), Scotchkote 134 and 135 maximize the time of application so that large surface areas or parts with complex recesses can be coated without overspray or laminations. Balanced formula and controlled viscosity allow high thickness build and edge coverage without sag or drips. The coatings can also be applied cold electrostatically. Scotchkote 134 conforms to the requirements of NSF Standard 61, for use as a coating in contact with potable water and has been used extensively in the water/wastewater industry since 1965. Scotchkote 134 and 135 meet the requirements of AWWA Standard C213, for valves and appurtenances. A custom coating grade with Scotchkote 6171 is also available.

Scotchkote 206N Fluid Bed Grade

Scotchkote 206N Fluid Bed Grade is specifically designed for the fluidized bed application process. Product gel and flow are carefully controlled to produce a smooth, continuous coating film with high edge coverage. Special fluidizing materials have been thoroughly blended to enable even dispersion of product and optimum fluidization in the largest of fluid beds. The coating cures quickly from residual heat retained in the part and does not usually require postbaking. Scotchkote 206N Fluid Bed Grade has a growing list of international approvals for use as a coating in contact with potable water, including conformance to the requirements of NSF Standard 61.

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 25/03/2011

WILLIAMS ENGINEERING CANADA

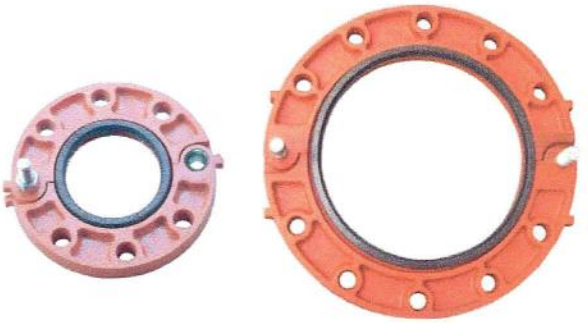
SHURJOINT®
www.shurjoint.com

7041 **D-01**

c UL us LISTED FM APPROVED

MODEL 7041 FLANGE ADAPTER - ANSI 125/150

The Model 7041 Flange Adapter allows for a direct connection with ANSI class 125/150 flanges. The specially designed gasket enables the transition from a grooved system to a flanged system or component with this single flange adapter. The two-segment design provides an easy and fast installation. 2" through 12" flange adapters are supplied hinged as a single assembly, while 14" -24" (Model 7041N) are supplied with two separate segments and a drawer kit. All include an EPDM rubber gasket and plated track bolts and nuts. Housing segments are supplied with our standard painted finishes, i.e. orange or RAL3000 red. Optional finishes such as hot dipped zinc galvanized and custom epoxy coatings are available.



MODEL 7041 MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12, min. tensile strength 448MPa (65,000 psi).

• Surface Finish:

Standard painted finishes in orange or RAL3000 red.

- ☐ Hot dip zinc galvanized (Option).
- ☐ Epoxy coatings in RAL3000 red or other colors (Option)

• Rubber Gasket:

To assure maximum life for the service intended, proper gasket selection and specification in ordering is essential. Failure to select the proper gasket compound may result in personal injury, property damage, joint leakage or joint failure.

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230°F (+110°C). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals. Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -30°F (-34°C) to +230°F (+110°C).

- ☐ (Option) **Grade "T" Nitrile** (Color code: Orange stripe) Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Also good for water services under +66 °C (+150 °F). Temperature range: -29 °C to +82 °C (-20 °F to +180 °F). **Do not use for HOT WATER above +66 °C (+150 °F) or HOT DRY AIR above +60 °C (+140 °F)**

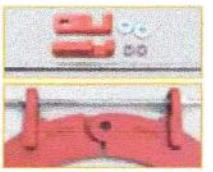
- ☐ Other options: Grade "O" Fluoroelastomer.
  Grade "L" Silicone.
  For additional details contact ***Shurjoint***.

• Standard Hex Bolts & Nuts:

Plated hex bolts conforming to ASTM A307 with hex nuts. (2 nuts and bolts are supplied). Bolts and nuts for the flange connection to be supplied by installer.

• Drawer Kit:

Screw Rod: Carbon Steel.
Assembly holders: Ductile Iron.
Bolts & Nuts: Commercial.



Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

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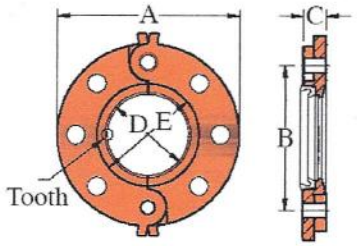
7041 D-01

MODEL 7041 FLANGE ADAPTER - ANSI CLASS 125/150



2" - 12" (hinged)

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Not Reviewed	( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Enç.

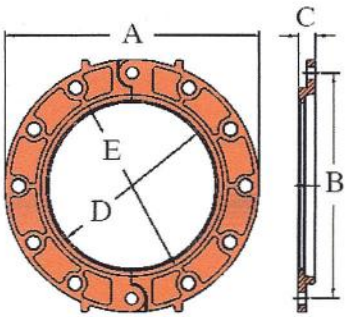
Date: 01/20/2011

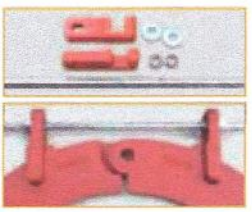
WILLIAMS ENGINEERING CANADA

Model 7041 Flange Adapter - ANSI Class 125/150

Nominal Size	Pipe OD	Max. Working Pressure	Max. End Load	Dimensions			Sealing Surface		Bolts		Weight
				A	B	C	D	E	Size	No.	
mm in	mm in	Bar PSI	KN Lbs	mm in	mm in	mm in	mm in	mm in	in		Kgs Lbs
50 2	60.3 2.375	20 300	5.7 1330	152 6.00	121 4.75	19 0.75	60 2.36	87 3.42	5/8	4	2.0 4.4
65 2.5	73.0 2.875	20 300	8.4 1950	178 7.00	140 5.50	22 0.87	73 2.87	102 4.00	5/8	4	2.5 5.5
80 3	88.9 3.500	20 300	12.3 2890	190 7.50	152 6.00	24 0.94	89 3.50	116 4.56	5/8	4	3.4 7.5
100 4	114.3 4.500	20 300	20.5 4770	229 9.00	191 7.50	24 0.94	114 4.50	141 5.56	5/8	8	4.0 8.8
125 5	141.3 5.563	20 300	31.3 7290	254 10.00	216 8.50	24 0.94	141 5.56	171 6.73	3/4	8	4.5 9.9
150 6	168.3 6.625	20 300	44.5 10340	279 11.00	241 9.50	25 1.00	168 6.62	198 7.79	3/4	8	5.5 12.1
200 8	219.1 8.625	20 300	75.3 17520	343 13.50	298 11.75	28 1.12	219 8.62	254 10.00	3/4	8	8.0 17.6
250 10	273.0 10.750	20 300	117.0 27210	406 16.00	362 14.25	30 1.18	273 10.75	308 12.12	7/8	12	13.8 30.4
300 12	323.9 12.750	20 300	164.7 38280	482 19.00	432 17.00	32 1.25	324 12.75	359 14.13	7/8	12	19.0 41.8

MODEL 7041N FLANGE ADAPTER - ANSI CLASS 125/150





14" ~ 24": Supplied with a drawer kit.

Model 7041N Flange Adapter - ANSI Class 125/150

Nominal Size	Pipe OD	Max. Working Pressure	Max. End Load	Dimensions			Sealing Surface		Bolts		Weight
				A	B	C	D	E	Size	No.	
mm in	mm in	Bar PSI	KN Lbs	mm in	mm in	mm in	mm in	mm in	in		Kgs Lbs
350 14	355.6 14.000	20 300	198.5 46160	533 21.00	476 18.75	36 1.42	382 15.04	351 13.82	1	12	30.2 66.5
400 16	406.4 16.000	20 300	259.2 60290	597 23.50	540 21.25	38 1.50	430 16.93	402 15.83	1	16	39.8 87.6
450 18	457.2 18.000	20 300	328.2 76300	635 25.00	578 22.75	40 1.56	486 19.14	452 17.80	1-1/8	16	42.8 94.2

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Model 7041N Flange Adapter - ANSI Class 125/150

Nominal Size	Pipe OD	Max. Working Pressure	Max. End Load	Dimensions			Sealing Surface		Bolts		Weight
				A	B	C	D	E	Size	No.	
mm in	mm in	Bar PSI	KN Lbs	mm in	mm in	mm in	mm in	mm in	in		Kgs Lbs
500 20	508.0 20.000	20 300	405.2 94200	699 27.50	635 25.00	43 1.60	537 21.15	504 19.83	1-1/8	20	50.6 111.4
550 22	559.0 22	20 300	507.0 113982	749 29.50	692 27.25	48 1.90	551 21.70	588 23.15	1-1/4	20	63.6 139.9
600 24	609.6 24.000	20 300	583.5 135650	813 32.00	749 29.50	48 1.89	635 25.0	602 23.70	1-1/4	20	71.8 157.9

MODEL 7041 NOTES

• Sealing Surface (D & E):

The sealing surface of the mating flange adapter, the area shown in the illustration between D & E shall be free from gouges, undulations or deformities of any type to assure optimum sealing.

• Gasket Insertion:

Make sure that the bottom of the gasket (the making side) is positioned and seated against the bottom of the flange recess.

• Sandwich plates:

The Model 7041 flange adapter requires a hard flat face for effective gasket sealing. A sandwich plate is required and should always be used when the mating surface is not adequate, as with the serrated faces of some valves or the rubber faced or rubber lined flange of a wafer valve.

• Inside teeth:

The Model 7041 Flange adapter have small triangular teeth inside the key shoulder to prevent rotating on the pipe. These teeth should be ground off prior to mating to rubber lined grooved end valve, plastic valve or light wall pipe (Sch. 5) because of possible damage to the surface coating or the integrity of the pipe strength.

• Caution:

The Model 7041 flange adapters shall not be used as anchor points for tie-rods across non-restrained joints. Do not use Model 7041 flange adapters within 90 degrees of one another on a standard fitting when the outside dimensions cause interference.

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

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H312 **Q-03**

MODEL H312 HDP FLANGE

The ***Shurjoint*** Model H312 HDP flanges provides for the direct transition from HDP pipe or fittings to ANSI class 125 or 150 flanged components. The H312 can be rotated for fast and easy bolt alignment prior to tightening. The gasket seals both on the outside of the pipe and to the flange face providing a leak-tight seal when secured in place.

Caution:
Shurjoint recommends the use of a silicone based lubricant for the HDP series. Do not use the ***Shurjoint*** standard lubricant, which is designed for steel pipe use. Do not use hydrocarbon based oils, grease or soap based solutions either.

MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).

• Surface Finish:

Orange color painted or red RAL3000 color painted.

- ☐ Hot dip galvanized (Option).
- ☐ Epoxy coated in red RAL3000 or other colors (Option)

• Rubber Gasket:

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230°F (+110°C). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals. Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -29°F (-34°C) to +230°F (+110°C)*
* For hot water application between 200°F - 230°F extreme caution should be used as the life of the gasket can be greatly reduced by incremental increases in temperature. Additional factors that affect gasket life and performance include temperature, fluid medium (air, water, air with water... etc.) and the continuous or intermittent use of the piping system. For specific applications over 200°F (93°C), please consult ***Shurjoint*** for recommendations.

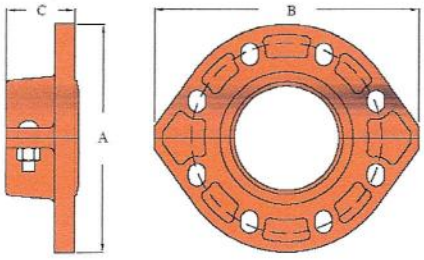
- ☐ **Grade "T" Nitrile** (Color code: Orange stripe) (Option) Recommended for petroleum products, vegetable oils, mineral oils and air with oil vapors. Temperature range: -29 °C to +82 °C (-20 °F to +180 °F). Also good for water services under +66 °C (+150 °F).
  Do not use for HOT WATER above +66 °C (+150 °F) or HOT DRY AIR above +60 °C (+140 °F)
- ☐ Other options: Grade "O" Fluoro-Elastomer, Grade "L" Silicone, etc. are also available upon request.

• Draw Bolts & Nuts (Factory supplied):

Heat treated carbon steel track bolts to ASTM A183 Gr. 2, zinc electroplated with heavy-duty hex nuts to ASTM A563.
(Flange bolts and nuts are to be prepared by installer.)

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

MODEL H312 HDP FLANGE



Model H312 HDP Flange

Nom. Size	Pipe OD Actual	Coupling Dimensions A	B	C	Flange Bolts* No.	Size	Approx. Weight
mm in	mm in	mm in	mm in	mm in		in	Kg Lbs
80 3	88.9 3.500	197 7.75	225 8.86	79 3.10	4	5/8	4.8 10.6
100 4	114.3 4.500	229 9.00	260 10.25	79 3.10	8	5/8	6.8 15.0
150 6	168.3 6.625	279 11.00	311 12.25	95 3.75	8	3/4	9.8 21.5
200 8	219.1 8.625	343 13.50	375 14.75	87 3.42	8	3/4	13.1 28.8
250 10	273.0 10.750	406 16.00	533 21.0	108 4.25	12	7/8	19.5 42.9
300 12	323.9 12.750	483 19.02	610 24.0	108 4.25	12	7/8	28.5 62.7

* Flange bolts and nuts are to be prepared by installer.
**Shurjoint* recommends the use of a silicone based lubricant for use with the HDP series

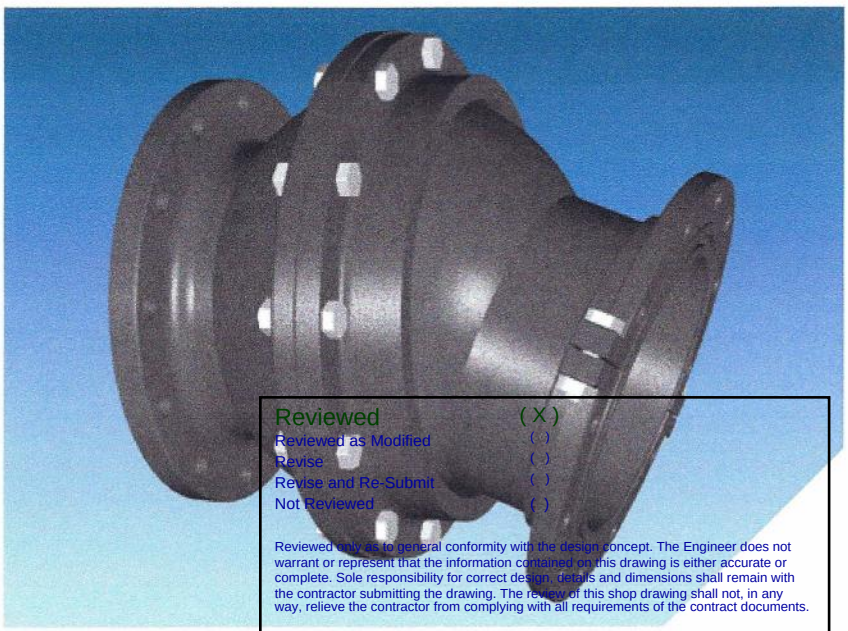
General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. For additional information contact ***Shurjoint***..
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

EBAA IRON INC
Your Connection to the Future™

FLEX-900®

Flexible Ball Joints for Water and Wastewater Pipelines



FLEX-912 (912FF0) for 12 inch Flanged fittings or pipe

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir.
Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

Features and Applications:

- Sizes 3 inch through 48 inch
- Hydrostatically tested prior to shipment
- Rated 350 PSI working water pressure (Sizes 30 inch and above rated at 250 PSI)
- Constructed of A536 Ductile Iron
- 15 mils of Fusion Bonded Epoxy coating of all 'wetted' parts
- 15° to 20° of deflection depending upon size
- Seals conform to the applicable requirements of ANSI/AWWA C111/A21.11

For use on water or wastewater pipelines subject to hydrostatic pressure and tested in accordance with either AWWA C600 or ASTM D2774.

Nominal Pipe Size	Series Number: Flange by Flange	Series Number: Mechanical Joint by Restrained Plain End	Pressure Rating: Ductile Iron
3	903FF0	903MP0	350
4	904FF0	904MP0	350
6	906FF0	906MP0	350
8	908FF0	908MP0	350
10	910FF0	910MP0	350
12	912FF0	912MP0	350
14	914FF0	914MP0	350
16	916FF0	916MP0	350
18	918FF0	918MP0	350
20	920FF0	920MP0	350
24	924FF0	924MP0	350
30		Call for Availability	
36	936FF0	-	250
42		Call for Availability	
48		Call for Availability	

NOTE: For applications, end combinations, or pressures other than those shown, please contact EBAA for assistance.

Sample Specification

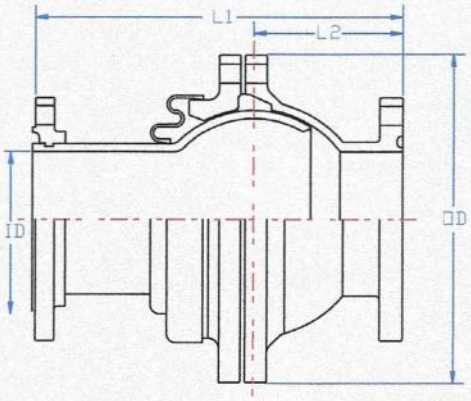
Flexible ball joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C153/A21.53. Flexible joints shall consist of a ball and socket type joint capable of 15° minimum deflection. Each flexible ball joint shall be pressure tested against its own restraint to a minimum of 350 PSI. MEGALUG® joint restraint shall be provided with each mechanical joint connection. All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating and gaskets shall meet ANSI/NSF-61. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16. All flexible ball joints shall be FLEX-900 as manufactured by EBAA Iron, Inc. or approved equal.

FLEX-900 Submittal Reference Drawing (3 inch - 12 inch)

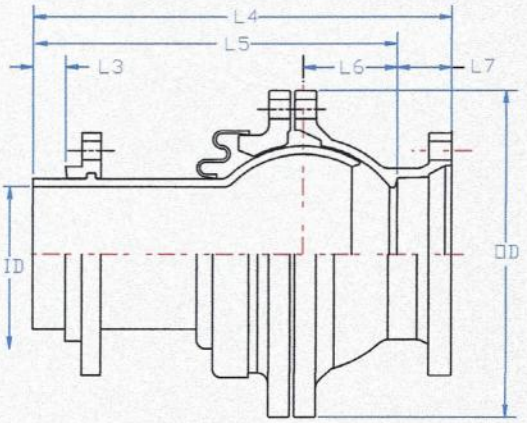
EBAA IRON

MADE IN USA

Flange x Flange



Restrained Plain End x Mechanical Joint

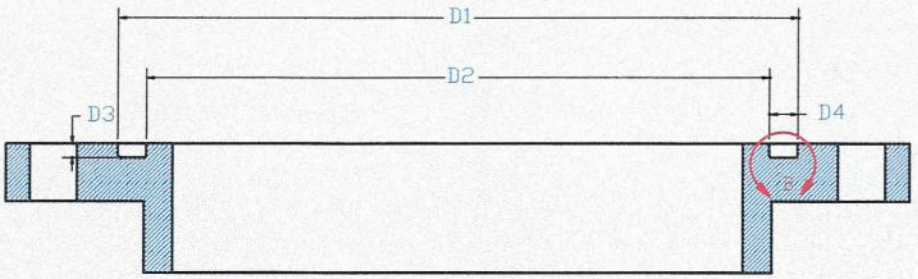


Dimensions for FLEX-900 (3 inch through 12 inch)

Nominal Pipe Size	L1	L2	L3	L4	L5	L6	L7	ID	OD
3	11.4	5.7	2	14.2	11.7	3.5	2.5	3.2	9.2
4	15.8	6.4	1.8	18.2	15.7	3.7	2.5	4.1	13.0
6	17.0	7.0	1.7	19.3	16.8	4.3	2.5	6.2	15.0
8	17.5	7.6	1.6	19.6	17.1	4.9	2.5	8.3	17.3
10	20.8	8.5	1.6	22.7	20.2	6.0	2.5	10.3	22.7
12	21.9	9.6	1.6	24.2	21.7	6.7	2.5	12.3	22.7

NOTE: Dimensions are in inches and are subject to change with out notice.

FLEX-900 Flange O-ring Groove



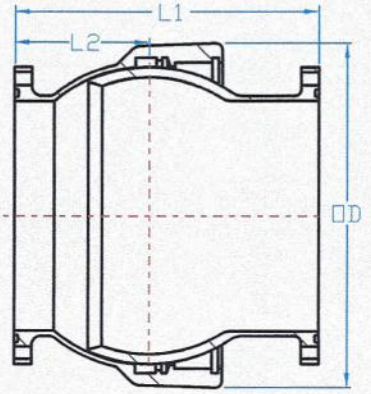
Size	D1	D2	D3	D4	D5	O-ring Diameter	O-ring Part Number	Cut Length
3	4.885	4.185	0.175	0.350	0.0625	0.25	983003	Molded
4	5.900	4.700	0.300	0.600	0.0625	0.5	983004	16.5
6	8.00	6.800	0.300	0.600	0.0625	0.5	983006	23
8	10.100	8.900	0.300	0.600	0.0625	0.5	983008	29.75
10	12.200	11.000	0.300	0.600	0.0625	0.5	983010	36.25
12	14.300	13.100	0.300	0.600	0.0625	0.5	983012	42.75
14	16.200	15.00	0.300	0.600	0.0625	0.5	983014	49.375
16	18.500	16.900	0.400	0.800	0.1250	0.625	983016	56.25
18	20.700	19.100	0.400	0.800	0.1250	0.625	983018	62.75
20	23.000	21.400	0.400	0.800	0.1250	0.625	983020	70
24	27.200	25.600	0.400	0.800	0.1250	0.625	983024	82.75
30	33.500	31.700	0.400	0.900	0.1250	0.75	983030	103
36	40.000	38.300	0.400	0.850	0.1250	0.75	983036	123.5
42	46.580	44.080	0.650	1.250	0.1250	N/A	983042	N/A
48	52.720	50.220	0.650	1.250	0.1250	1	983048	161

FLEX-900 Submittal Reference Drawing (14 inch - 48 inch)

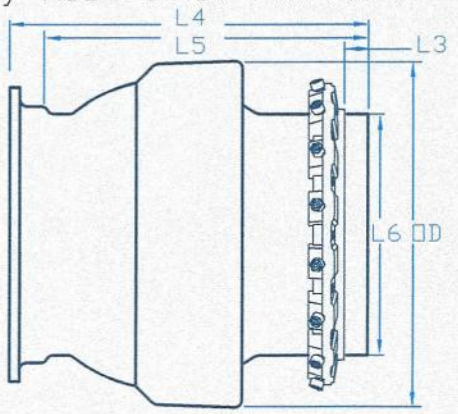
EBAA IRON

MADE IN USA

Flange by Flange



Mechanical Joint
by Restrained Plain End



Nominal Pipe Size	Dimensions for FLEX-900 (14 inch through 48 inch)							
	L1	L2	L3	L4	L5	L6	ID	OD
14	21.5	10.3	3.0	26.3	25.2	15.3	14.4	22.5
16	26.5	13.6	2.5	30.3	26.8	17.4	16.5	25.0
18	25.4	12.9	3.0	29.7	26.2	19.5	18.6	29.9
20	24.6	11.3	2.5	32.9	29.4	21.6	20.6	30.5
24	32.9	14.5	2.5	38.7	35.2	25.8	24.8	37.3
30				Call for Availability				
36	35.5	17.1	-	-	-	-	37.0	50.3
42				Call for Availability				
48				Call for Availability				

NOTE: Dimensions are in inches and are subject to change without notice.
Mechanical Joint by Restrained Plain End sizes are only available up to 24 inch.

Nominal Pipe Size	Weights (lbs) 900FF0 (FE x FE)	900MP0 (MJ x RPE)
3	57.89	41.95
4	103.40	99.38
6	149.78	153.54
8	202.41	196.27
10	277.46	271.88
12	374.98	349.16
14	554.70	621.77
16	596.46	523.01
18	895.46	916.82
20	817.92	966.58
24	1542.18	1652.18
30	2715.00	-
36	3801.00	-
42	Call	-
48	Call	-

Important Notes

In order for the FLEX-900 to protect pipeline connections, any load on the pipeline must be transferred to the FLEX-900 by restrained joints. Depending on the piping arrangement and expected movement of the pipeline, adjacent pipeline joints must be restrained to adequately transfer the loads to the FLEX-900.

The flanged outlets are dimensioned according to ANSI/AWWA C110/A21.10 with addition of the O-ring. An O-ring is provided with each flange to provide a proven water tight seal to a minimum of 350 PSI.

Mechanical joint connection conform to the dimensional requirements of either ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 depending on the size.

Installation Instructions

1. Remove protective end covers.
2. Remove polyethylene sleeve and other materials.
3. Check interior, remove dirt and foreign material from interior and end connections.
4. For buried applications install polyethylene sleeve per ANSI/AWWA C105/A21.5 recommendations.
5. Assembly of flange joint:
   a. Place O-ring in groove.
   b. Place FLEX-900 flange against adjoining flange, install and hand tighten bolts.
   c. Check O-ring for proper placement.
   d. Tighten flange bolts.
6. Install mechanical joint FLEX-900 end connections using the EBAA Iron MEGALUG® Mechanical Joint Restraint suitable for adjacent pipe material. MEGALUG 1100 should be used on ductile iron pipe. MEGALUG 2000PV is to be used on PVC pipe. Assembly instructions for each of these restraints products are included with the restraint device.
7. Assembly of restrained plain end:
   a. Lubricate and install EBAA-Seal™ Improved Mechanical Joint Gasket provided over plain end per ANSI/AWWA C600.
   b. Insert plain end into adjacent mechanical joint bell.
   c. Install and hand tighten T-bolts.
   d. Tighten T-bolts per AWWA recommendations.
8. Touch up exterior coating as necessary.

	Protection From			
FLEX-TEND® Family	Shear Plain	Bending Moments w/Expansion	Bending Moments No Expansion	Expansion (Axial)
FLEX-TEND Double Ball	Yes	Yes	Yes	Yes
FLEX-TEND Single Ball	No	Yes	Yes	Yes
FLEX-900	No	No	Yes	No
EX-TEND	No	No	No	Yes

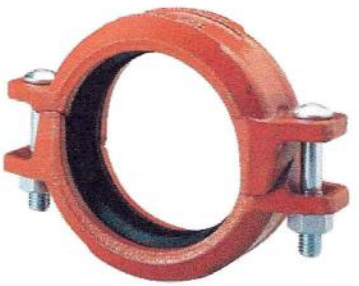
EBAA IRON Sales, Inc.
P.O. Box 857, Eastland, TX 76448
Tel: (254) 629-1731
Fax: (254) 629-8931
(800) 433-1716 within US and Canada
contact@ebaa.com
www.ebaa.com

Members of...
AMERICAN FOUNDRY SOCIETY

SHURJOINT®
www.shurjoint.com

Z07 **C-06**

MODEL Z07 STANDARD RIGID COUPLING
-Angle-Pad Design-



The ***Shurjoint*** Model Z07 is an angle-pad design standard rigid coupling for general piping applications where rigidity is required including valve connections, mechanical rooms, fire mains and long straight runs. The angle-pad design allows the coupling housings to slide along the bolt pads when tightened. The result is an offset clamping action which provides a rigid joint that resists flexural and torsional loads. Support and hanging requirements correspond to ANSI B31.1, B31.9 and NFPA 13.

The ***Shurjoint*** Model Z07 is available with a standard "C" shaped or ***GapSeal®*** gasket in a variety grades to meet your specific service requirements.

Sizes available: 32mm ~ 600mm / 1-1/4" ~ 24"
Working Pressure: Up to 52 bar / 750 psi

MODEL Z07 MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12, min. tensile strength 448MPa (65,000 psi).

• Surface Finish:

Standard painted finishes in orange or RAL3000 red.

- ☐ Hot dip zinc galvanized (Optional).
- ☐ Epoxy Coatings in RAL3000 red or other colors (Optional)

• Rubber Gasket:

To assure maximum life for the service intended, proper gasket selection and specification in ordering is essential. Failure to select the proper gasket compound may result in personal injury, property damage, joint leakage or joint failure.

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230°F (+110°C). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals. Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -30°F (-34°C) to +230°F (+110°C)

- ☐ (Option) **Grade "T" Nitrile** (Color code: Orange stripe) Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Also good for water services under +66°C (+150°F).
  Temperature range: -29 °C to +82 °C (-20 °F to +180 °F).
  Do not use for HOT WATER above +66 °C (+150 °F) or HOT DRY AIR above +60 °C (+140 °F).

- ☐ Other options: Grade "O" - Fluoroelastomer.
  Grade "L" - Silicone.

  For dry systems we recommends the use of the ***Shurjoint*** Gap Seal gasket.

  For additional details contact ***Shurjoint.***

• Bolts & Nuts:

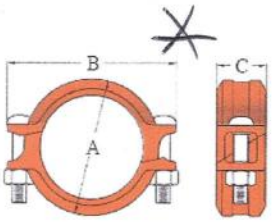
Heat treated carbon manganese steel track bolts to ASTM A449-83a (or A183 Gr. 2), minimum tensile strength 758 MPa (110,000 psi), Zinc electroplated, with heavy-duty hexagonal nuts to ASTM A563.

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

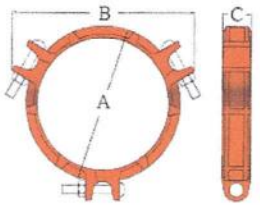
SHURJOINT®
www.shurjoint.com

Z07 **C-06**

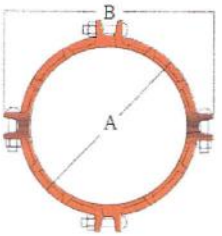
MODEL Z07 STANDARD RIGID COUPLING



1-1/4" ~ 12"



14" ~ 18"



20" ~ 24"

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documen

Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

Model Z07 Standard Rigid Coupling

Nominal Size	Pipe OD	Max. Working Pressure	Max End Load	Axial Displace-ment	Dimension			Bolt Size		Weight
					A	B	C			
mm in	mm in	Bar PSI	kN Lbs	mm in	mm in	mm in	mm in	No.	mm in	Kgs Lbs
32 1.25	42.2 1.660	52 750	7.21 1620	0~1.2 0 ~ 0.05	68 2.68	105 4.13	47 1.85	2	M10 x 55 3/8 x 2-1/8	0.7 1.6
40 1.5	48.3 1.900	52 750	9.48 2130	0~1.2 0 ~ 0.05	74 2.91	115 4.53	47 1.85	2	M10 x 55 3/8 x 2-1/8	0.9 2.0
50 2	60.3 2.375	52 750	14.78 3320	0~1.7 0 ~ 0.07	86 3.39	120 4.72	48 1.88	2	M10 x 70 3/8 x 2-3/4	1.1 2.4
65 2.5	73.0 2.875	52 750	21.71 4875	0~1.7 0 ~ 0.07	100 3.94	140 5.50	48 1.88	2	M10 x 70 3/8 x 2-3/4	1.1 2.4
65 2.5	76.1 3.000	52 750	23.60 5300	0~1.7 0 ~ 0.07	102 4.00	146 5.75	48 1.88	2	M10 x 70 3/8 x 2-3/4	1.2 2.6
80 3	88.9 3.500	52 750	32.14 7215	0~1.7 0 ~ 0.07	115 4.53	157 6.18	48 1.88	2	M12 x 75 1/2 x 3	1.4 3.1
100 4	114.3 4.500	52 750	53.11 11925	0~4.1 0 ~ 0.16	147 5.78	199 7.83	54 2.13	2	M12 x 75 1/2 x 3	2.0 4.4
125 5	139.7 5.500	52 750	74.05 16625	0~4.1 0 ~ 0.16	175 6.88	235 9.25	54 2.13	2	M16 x 90 5/8 x 3-1/2	3.0 6.6
125 5	141.3 5.563	52 750	81.17 18225	0~4.1 0 ~ 0.16	177 6.97	235 9.25	54 2.13	2	M16 x 90 5/8 x 3-1/2	3.0 6.6
150 6	165.1 6.500	48 700	103.44 23225	0~4.1 0 ~ 0.16	200 7.87	259 10.20	54 2.13	2	M16 x 90 5/8 x 3-1/2	3.2 7.1
150 6	168.3 6.625	48 700	107.48 24130	0~4.1 0 ~ 0.16	203 8.00	263 10.35	54 2.13	2	M16 x 90 5/8 x 3-1/2	3.2 7.1
200 JIS 8	216.3 8.516	42 600	154.25 34158	0~3.2 0 ~ 0.13	264 10.39	340 13.39	64 2.50	2	M20 x 120 3/4 x 4-3/4	6.9 15.20
200 8	219.1 8.625	42 600	155.89 35000	0~4.8 0 ~ 0.19	268 10.55	342 13.46	64 2.52	2	M20 x 120 3/4 x 4-3/4	7.1 15.7
250 JIS 10	267.4 10.528	35 500	196.45 43504	0~3.2 0 ~ 0.13	321 12.63	397 15.63	65 2.56	2	--- 7/8 x 6-1/2	11.0 24.2
250 10	273.0 10.750	35 500	202.21 45400	0~3.2 0 ~ 0.13	327 12.86	431 16.98	65 2.56	2	--- 7/8 x 6-1/2	10.3 22.9
300 JIS 12	318.5 12.539	28 400	222.97 49369	0~3.2 0 ~ 0.13	372 14.65	452 17.80	65 2.56	2	--- 7/8 x 6-1/2	12.0 26.4
300 12	323.9 12.750	28 400	227.15 51000	0~3.2 0 ~ 0.13	377 14.86	480 18.88	65 2.56	2	--- 7/8 x 6-1/2	11.8 26.0
350 14	355.6 14.000	17 250	171.2 38485	0~3.2 0 ~ 0.13	408 16.06	505 19.89	75 2.95	3	--- 7/8 x 5-1/2	14.9 32.8
400 16	406.4 16.000	17 250	223.6 50265	0~3.2 0 ~ 0.13	467 18.39	554 21.84	75 2.95	3	--- 7/8 x 5-1/2	18.7 41.2
450 18	457.2 18.000	17 250	283.0 63615	0~3.2 0 ~ 0.13	525 20.68	607 23.89	79 3.11	3	--- 7/8 x 5-1/2	24.6 54.2
500 20	508.0 20.000	17 250	349.3 78540	0~3.2 0 ~ 0.13	582 22.93	698 27.47	76 3.00	4	--- 1 x 3-1/2	30.5 67.2
600 24	609.6 24.000	17 250	503.3 113000	0~3.2 0 ~ 0.13	687 27.05	803 31.61	78 3.06	4	--- 1 x 3-1/2	34.6 46.2

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***..
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

SHURJOINT®
www.shurjoint.com

MODELS 7120 TEE
7135 CROSS
7130 45° LATERAL

Shurjoint grooved end fittings are designed to meet the ASTM F1548-01 and all groove dimensions conform to ANSI / AWWA C606-04 and or ISO/FDIS 6182-12. For dimensional tolerances of cast fittings, refer to ISO/FDIS 6182-12 Table 3. ***Shurjoint*** grooved fittings are cast of ductile iron except where indicated (SW).

Model 7120

Model 7135

Model 7130

MATERIAL SPECIFICATIONS

- Fitting body:

  Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).
  - ☐ Carbon steel Sch. 40 pipe to ASTM A53 or 9.5mm (0.375") wall pipe of ASTM A234 Gr. WPB.

- Surface Finish:

  Orange color painted or red RAL3000 color painted.
  - ☐ Hot dip galvanized (Option).
  - ☐ Epoxy coated in red RAL3000 or other colors (Option)

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

__Shurjoint__ product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact __Shurjoint__ Technical Service. __Shurjoint__ reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on __Shurjoint__ products previously subsequently sold.

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Grooved-End Fittings E-05

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

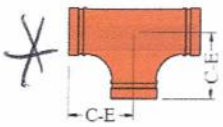

Fig. 7120 Tee

Fig. 7135 Cross

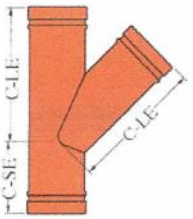

Fig. 7130
45° Lateral

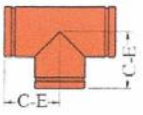

Fig. 7120
Tee (Welded)

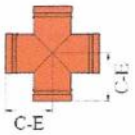

Fig. 7135
Cross (Welded)

Model 7120 TEE / 7135 CROSS / 7130 45° LATERAL

Nominal Pipe Size	Pipe O.D.	#7120 Tee		#7135 Cross			#7130 45° Lateral	
mm in	mm in	C-E	Kgs Lbs	C-E	Kgs Lbs	C-LE	C-SE	Kgs Lbs
25 1	33.4 1.315	57 2.25	0.4 0.9	57 SW 2.25	0.6 1.3	—	—	—
32 1.25	42.2 1.660	70 2.75	0.7 1.5	70 SW 2.75	1.0 2.2	146 SW 5.75	64 2.50	1.1 2.4
40 1.5	48.3 1.900	70 2.75	0.9 2.0	70 SW 2.75	1.1 2.5	159 SW 6.25	70 2.75	1.6 3.5
50 2	60.3 2.375	83 3.25	1.3 2.9	83 3.25	1.7 3.8	178 7.00	70 2.75	2.3 5.1
65 2.5	73.0 2.875	95 3.75	2.2 4.8	95 3.75	2.8 6.2	197 7.75	76 3.00	2.8 6.2
65 2.5	76.1 3.000	95 3.75	2.3 5.1	95 3.75	2.8 6.2	197 7.75	76 3.00	2.8 6.2
80 3	88.9 3.500	108 4.25	3.1 6.8	108 4.25	4.8 10.6	216 8.50	83 3.25	4.2 9.2
100 4	114.3 4.500	127 5.00	4.6 10.1	127 5.00	7.2 15.9	267 10.50	95 3.75	8.0 17.6
100 4	108.0 4.250	127 5.00	4.1 9.0	— —	— —	— —	— —	— —
125 5	141.3 5.563	140 5.50	6.5 14.3	140 5.50	9.1 20.0	318 12.50	102 4.00	12.5 27.5
125 5	133.0 5.250	140 5.50	6.0 13.2	— —	— —	— —	— —	— —
125 5	139.7 5.500	140 5.50	6.5 14.3	140 5.50	9.0 19.8	318 12.50	102 4.00	12.5 27.5
150 6	168.3 6.625	165 6.50	10.0 22.0	165 6.50	12.7 27.9	356 14.00	114 4.50	18.5 40.7
150 6	159.0 6.250	165 6.50	8.6 18.9	— —	— —	— —	— —	— —
150 6	165.1 6.500	165 6.50	8.5 18.7	165 6.50	12.0 26.4	356 14.00	114 4.50	18.5 40.7
200 8	219.1 8.625	197 7.75	20.0 44.0	197 7.75	22.0 48.4	457 18.00	152 6.00	32.0 70.4
200A 8	216.3 8.516	197 7.75	20.0 44.0	197 7.75	21.0 46.2	457 18.00	152 6.00	32.0 70.4
250 10	273.0 10.750	229 9.00	31.0 68.2	229 SW 9.00	32.0 70.4	521 20.50	165 6.50	47.6 104.7
250A 10	267.4 10.528	229 9.00	31.0 68.2	229 SW 9.00	32.0 70.4	521 20.50	165 6.50	47.6 104.7
300 12	323.9 12.750	254 10.00	45.0 99.0	254 SW 10.00	50.0 110.0	584 23.00	178 7.00	75.0 165.0
300A 12	318.5 12.539	254 10.00	45.0 99.0	254 SW 10.00	50.0 110.0	584 23.00	178 7.00	75.0 165.0
350 14	355.6 14.000	280 11.00	54.0 118.8	280 SW 11.00	91.0 200.2	673 SW 26.50	191 7.50	125.0 275.0
400 16	406.4 16.000	305 12.00	66.0 145.2	305 SW 12.00	113.8 250.4	737 SW 29.00	203 8.00	156.0 343.2
450 18	457.2 18.000	394 SW 15.50	124.3 273.5	394 SW 15.50	165.7 364.5	813 SW 32.00	216 8.50	195.0 429.0
500 20	508.0 20.000	438 SW 17.25	153.9 338.6	438 SW 17.25	205.2 451.4	889 SW 35.00	229 9.00	227.0 499.4
550 22	558.8 22.000	483 SW 19.00	150.0 330.0	483 SW 19.00	242.8 534.2	965 SW 38.00	241 9.50	280.0 616.0
600 24	609.6 24.000	508 SW 20.00	215.1 473.2	508 SW 20.00	286.8 631.0	1016 SW 40.00	254 10.00	324.0 712.8

SW: Segment welded steel.

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***..
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

MODELS 7160 END CAP
7160P END CAP WITH PLUG
7160H DOMED END CAP

Shurjoint grooved end fittings are designed to meet the ASTM F1548-01 and all groove dimensions conform to ANSI / AWWA C606-04 and or ISO/FDIS 6182-12. For dimensional tolerances of cast fittings, refer to ISO/FDIS 6182-12 Table 3. Shurjoint grooved fittings are cast of ductile iron.

Model 7160

Model 7160P

Model 7160H

MATERIAL SPECIFICATIONS

- Fitting body:

  Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).

- Surface Finish:

  Orange color painted or red RAL3000 color painted.
  - ☐ Hot dip galvanized (Option).
  - ☐ Epoxy coated in red RAL3000 or other colors. (Option)

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

__Shurjoint__ product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact __Shurjoint__ Technical Service. __Shurjoint__ reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on __Shurjoint__ products previously subsequently sold.

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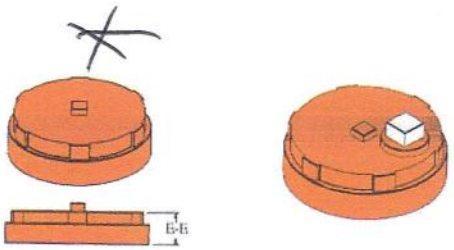
MODELS 7160 END CAP
7160P END CAP WITH PLUG



1-1/4" ~ 12"

Models 7160 End Cap / 7160P End Cap with Plug

Nominal Pipe Size	Pipe O.D.	7160 End Cap		7160P Plug Size
mm in	mm in	E-E mm / in	Kgs Lbs	mm in
25 1	33.4 1.315	22 0.87	0.1 0.2	— —
32 1.25	42.2 1.660	25 1.00	0.2 0.4	— —
40 1.5	48.3 1.900	25 1.00	0.2 0.4	— —
50 2	60.3 2.375	25 1.00	0.3 0.7	15 0.5
65 2.5	73.0 2.875	25 1.00	0.4 0.9	15 0.5
65 2.5	76.1 3.000	25 1.00	0.4 0.9	15 0.5
80 3	88.9 3.500	25 1.00	0.7 1.5	15 0.5
100 4	114.3 4.500	25 1.00	1.0 2.2	25 1
100 4	108.0 4.250	25 1.00	1.1 2.4	— —
125 5	141.3 5.563	25 1.00	1.7 3.7	25 1
125 5	133.0 5.250	25 1.00	1.7 3.7	— —
125 5	139.7 5.500	25 1.00	1.7 3.7	25 1
150 6	168.3 6.625	25 1.0	3.0 6.6	25 1
150 6	159.0 6.250	25 1.00	2.3 5.1	— —
150 6	165.1 6.500	25 1.00	3.0 6.6	25 1
200 8	219.1 8.625	30 1.18	5.5 12.1	40 1.5
200JIS 8	216.3 8.516	30 1.18	4.6 10.1	— —
250 10	273.0 10.750	32 1.25	7.0 15.4	40 1.5
250JIS 10	267.4 10.528	32 1.25	7.0 15.4	— —
300 12	323.9 12.750	32 1.25	10.0 22.0	40 1.5
300JIS 12	318.5 12.538	32 1.25	10.0 22.0	— —

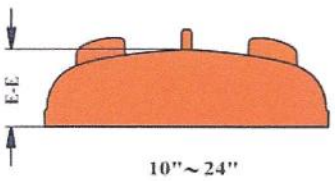
Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray, E.I.T. Williams Eng.
Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

MODEL 7160H DOMED END CAP



Model 7160H Domed End Cap

Nominal Pipe Size	Pipe O.D.	#7160H Domed End Cap	
mm in	mm in	E-E mm / in	Kgs Lbs
250 10	273.0 10.750	76.1 3.00	5.5 12.1
300 12	323.90 12.750	76.1 3.00	7.4 16.3
350 14	355.6 14.000	102 4.00	11.6 25.5
400 16	406.4 16.000	102 4.00	14.6 32.1
450 18	457.2 18.000	127 5.00	20.5 45.1
500 20	508.0 20.000	152 6.00	24.5 53.9
550 22	558.8 22.000	152 6.00	44.0 97.0
600 24	609.6 24.000	152 6.00	34.5 75.9

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***..
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

MODELS 7150 CONCENTRIC REDUCER
7151 ECCENTRIC REDUCER

The ***Shurjoint*** concentric reducers and eccentric reducers are all cast using ductile iron except where indicated (SW). The end-to-end dimensions of these reducers are less than that of fabricated reducers of the same size.

All groove dimensions conform to ANSI / AWWA C606-04 and or ISO/FDIS 6182-12. For dimensional tolerances of cast fittings, refer to ISO/FDIS 6182-12 Table 3.

MATERIAL SPECIFICATIONS

- Fitting body:
  Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).

- Surface Finish:
  Orange color painted or red RAL3000 color painted.
  - ☐ Hot dip galvanized (Option).
  - ☐ Epoxy coated in red RAL3000 or other colors (Option)

Job Name:	**System No.**	**Location:**	
Contractor:		**Approved:**	**Date:**
Engineer:		**Approved:**	**Date:**

MODELS 7150 CONCENTRIC REDUCER
7151 ECCENTRIC REDUCER

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

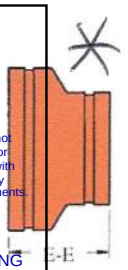


Fig. 7150 Conc. Reducer

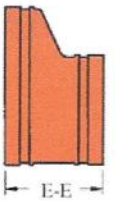


Fig. 7151 Ecc. Reducer

Fig. 7150 Conc. Reducer (Welded)

Fig. 7151 Ecc. Reducer (Welded)

Models 7150 Concentric Reducer / 7151 Eccentric Reducer

Nominal Pipe Size	Pipe OD	7150 Concentric Reducer		7151 Eccentric Reducer	
		E-E	Weight	E-E	Weight
mm / in	mm / in	mm / in	Kgs / Lbs	mm / in	Kgs / Lbs
32 x 25 1.25 x 1	42.2 x 33.4 1.660 x 1.315	64 2.50	0.3 0.7	— —	— —
40 x 25 1.5 x 1	48.3 x 33.4 1.900 x 1.315	64 2.50	0.4 0.9	— —	— —
40 x 32 1.5 x 1.25	48.3 x 42.2 1.900 x 1.660	64 2.50	0.4 0.9	— —	— —
50 x 25 2 x 1	60.3 x 33.4 2.375 x 1.315	64 2.50	0.4 0.9	— —	— —
50 x 32 2 x 1.25	60.3 x 42.2 2.375 x 1.660	64 2.50	0.4 0.9	— —	— —
50 x 40 2 x 1.5	60.3 x 48.3 2.375 x 1.900	64 2.50	0.4 0.9	— —	— —
65 x 50 2.5 x 2	73.0 x 60.3 2.875 x 2.375	64 2.50	0.5 1.1	89 3.50	0.7 1.5
65 x 50 2.5 x 2	76.1 x 60.3 3.000 x 2.375	64 2.50	0.5 1.1	89 3.50	0.7 1.5
80 x 25 3 x 1	88.9 x 33.4 3.500 x 1.315	64 2.50	0.8 1.8	— —	— —
80 x 32 3 x 1.25	88.9 x 42.2 3.500 x 1.660	64 2.50	0.6 1.3	— —	— —
80 x 40 3 x 1.5	88.9 x 48.3 3.500 x 1.900	64 2.50	0.7 1.5	— —	— —
80 x 50 3 x 2	88.9 x 60.3 3.500 x 2.375	64 2.50	0.6 1.3	89 3.50	1.0 2.2
80 x 65 3 x 2.5	88.9 x 73.0 3.500 x 2.875	64 2.50	0.6 1.3	89 3.50	1.0 2.2
80 x 65 3 x 2.5	88.9 x 76.1 3.500 x 3.000	64 2.50	0.6 1.3	89 3.50	1.0 2.2
100 x 50 4 x 2	114.3 x 60.3 4.500 x 2.375	76 3.00	1.1 2.2	102 4.00	1.4 3.1
100 x 65 4 x 2.5	114.3 x 73.0 4.500 x 2.875	76 3.00	1.0 2.2	102 4.00	1.5 3.3
100 x 65 4 x 2.5	114.3 x 76.1 4.500 x 3.000	76 3.00	1.0 2.2	102 4.00	1.5 3.3
100 x 80 4 x 3	114.3 x 88.9 4.500 x 3.500	76 3.00	1.0 2.2	102 4.00	1.6 3.5
125 x 100 5 x 4	141.3 x 114.3 5.563 x 4.500	89 3.50	2.0 4.4	102 4.00	2.7 6.0
150 x 50 6 x 2	168.3 x 60.3 6.625 x 2.375	102 4.00	1.9 4.2	102 4.00	3.1 6.9
150 x 50 6 x 2	168.3 x 60.3 6.625 x 2.375	102 4.00	1.9 4.2	102 4.00	3.1 6.9
150 x 65 6 x 2.5	168.3 x 73.0 6.625 x 2.875	102 4.00	1.9 4.2	— —	— —
150 x 80 6 x 3	168.3 x 88.9 6.625 x 3.500	102 4.00	2.0 4.4	102 4.00	3.5 7.7

Models 7150 Concentric Reducer / 7151 Eccentric Reducer

Nominal Pipe Size	Pipe OD	7150 Concentric Reducer		7151 Eccentric Reducer	
		E-E	Weight	E-E	Weight
mm / in	mm / in	mm / in	Kgs / Lbs	mm / in	Kgs / Lbs
150 x 100	168.3 x 114.3	102	2.1	102	3.8
6 x 4	6.625 x 4.500	4.00	4.6	4.00	8.4
150 x 125	168.3 x 141.3	102	2.5	102	4.5
6 x 5	6.625 x 5.563	4.00	5.5	4.00	9.9
150 x 50	165.1 x 60.3	102	1.9	102	3.1
6 x 2	6.500 x 2.375	4.00	4.2	4.00	6.9
150 x 65	165.3 x 76.1	102	1.9	—	—
6 x 2.5	6.500 x 3.000	4.00	4.2	---	---
150 x 80	165.1 x 88.9	102	2.0	102	3.5
6 x 3	6.500 x 3.500	4.00	4.4	4.00	7.7
150 x 100	165.1 x 114.3	102	2.1	102	3.8
6 x 4	6.500 x 4.500	4.00	4.6	4.00	8.4
150 x 125	165.1 x 139.7	102	2.5	102	4.5
6 x 5	6.500 x 5.500	4.00	5.5	4.00	9.9
200 x 80	219.1 x 88.9	127	5.0	—	—
8 x 3	8.625 x 3.500	5.00	11.0	---	---
200 x 100	219.1 x 114.3	127	5.1	127	5.4
8 x 4	8.625 x 4.500	5.00	11.2	5.00	11.9
200 x 150	219.1 x 168.3	127	5.2	127	8.0
8 x 6	8.625 x 6.625	5.00	11.4	5.00	17.6
250 x 100	273.0 x 114.3	152	9.0	152	12.0
10 x 4	10.750 x 4.500	6.00	19.8	6.00	26.4
250 x 150	273.0 x 168.3	152	9.0	152	11.5
10 x 6	10.750 x6.625	6.00	19.8	6.00	25.3
250 x 200	273.0 x 219.1	152	9.5	178	12.0
10 x 8	10.750 x 8.625	6.00	20.9	7.00SW	26.4
300x150	323.9 x 168.3	178	12.0	178	18.0
12 x 6	12.750 x 6.625	7.00	26.4	7.00	39.6
300 x 200	323.9 x 219.1	178	14.0	178	29.3
12 x 8	12.750 x 8.625	7.00	30.8	7.00	53.5
300 x 250	323.9 x 273.0	178	15.0	178	20.2
12 x 10	12.750 x 10.750	7.00	33.0	7.00	44.0
350 x 150	355.6 x 168.3	318	19.5	318	28.0
14 x 6	14.000 x 6.625	12.50SW	42.9	12.50SW	62.0
350 x 200	355.6 x 219.1	203	19.0	318	28.0
14 x 8	14.000 x 8.625	8.00	41.8	12.50SW	62.0
350 x 250	355.6 x 273.0	203	32.5	318	28.0
14 x 10	14.000 x 10.750	8.00	71.5	12.5SW	62.0
350 x 300	355.6 x 323.9	203	23.0	318	28.0
14 x 12	14.000 x 12.750	8.00	50.6	12.5SW	62.0
400 x 150	406.4 x 168.3	336	29.7	318	29.7
16 x 6	16.000 x 6.625	13.22SW	65.4	12.50SW	65.4
400 x 200	406.4 x 219.1	356	32.0	318	35.0
16 x 8	16.000 x 8.625	14.00	70.4	12.50SW	77.0
400 x 250	406.4 x 273.0	318	29.5	318	35.0
16 x 10	16.000 x 10.750	12.50SW	64.9	12.50SW	77.0
400 x 300	406.4 x 323.9	229	30.0	229	31.0
16 x 12	16.000 x 12.750	9.00	66.0	9.00	68.2
400 x 350	406.4 x 355.6	229	29.0	229	35.0
16 x 14	16.000 x 14.000	9.00	63.8	9.00	77.0
450 x 250	457.2 x 273.0	330	36.0	330	45.0
18 x 10	18.000 x 10.750	13.00SW	79.2	13.00SW	99.0
450 x 300	457.2 x 323.9	241	35.5	330	45.0
18 x 12	18.000 x 12.750	9.50	78.1	13.00SW	99.0
450 x 350	457.2 x 355.6	330	36.0	330	45.0
18 x 14	18.000 x 14.000	13.00SW	79.2	13.00SW	99.0
450 x 400	457.2 x 406.4	330	36.0	330	45.0
18 x 16	18.000 x 16.000	13.00SW	79.2	13.00SW	99.0
500 x 300	508.0 x 323.9	254	43.0	356	68.0
20 x 12	20.000 x 12.750	10.00	94.6	14.00SW	149.6
500 x 350	508.0 x 355.6	356	44.8	356	68.0
20 x 14	20.000 x 14.000	14.00SW	98.6	14.00SW	149.6
500 x 400	508.0 x 406.4	254	46.0	356	68.0
20 x 16	20.000 x 16.000	10.00	101.2	14.00SW	149.6
500 x 450	508.0 x 457.2	356	58.0	356	68.0
20 x 18	20.000 x18.000	14.00SW	127.6	14.00SW	149.6
600 x 250	609.6 x 273.0	305	36.0	381	42.0
24 x 10	24.000 x 10.750	12.00	79.2	15.00SW	92.4

Models 7150 Concentric Reducer / 7151 Eccentric Reducer

Nominal Pipe Size	Pipe OD	7150 Concentric Reducer		7151 Eccentric Reducer	
		E-E	Weight	E-E	Weight
mm / in	mm / in	mm / in	Kgs / Lbs	mm / in	Kgs / Lbs
600 x 300	609.6 x 323.9	305	70.0	381	79.0
24 x 12	24.000 x 12.750	12.00	154.0	15.00SW	173.8
600 x 350	609.6 x 355.6	381	70.0	381	79.0
24 x 14	24.000x14.000	15.00SW	154.0	15.00SW	173.8
600 x 400	609.6 x 406.4	305	70.0	381	79.0
24 x 16	24.000 x 16.000	12.00	154.0	15.00SW	173.8
600 x 450	609.6 x 457.2	381	70.0	381	79.0
24 x 18	24.000x18.000	15.00SW	154.0	15.00SW	173.8
600 x 500	609.6 x 508.0	305	71.0	381	79.0
24 x 20	24.000 x 20.000	12.00	156.2	15.00SW	173.8

SW: Segment welded steel.

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

MODELS 7110 90° ELBOW, REGULAR RADIUS
7111 45° ELBOW, REGULAR RADIUS
7112 22-1/2° ELBOW
7113 11-1/4° ELBOW

Shurjoint grooved end fittings are designed to meet the ASTM F1548-01 and all groove dimensions conform to ANSI / AWWA C606-04 and or ISO/FDIS 6182-12. For dimensional tolerances of cast fittings, refer to ISO/FDIS 6182-12 Table 3. ***Shurjoint*** grooved fittings are cast of ductile iron except where indicated (SW).

Fig. 7110

Fig. 7111

Fig. 7112

Fig. 7113

MATERIAL SPECIFICATIONS

- Fitting body:

  Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).

  ☐ Carbon steel Sch. 40 pipe to ASTM A53 or 9.5mm (0.375") wall pipe of ASTM A234 Gr. WPB.

- Surface Finish:

  Orange color painted or red RAL3000 color painted.

  ☐ Hot dip galvanized (Option).

  ☐ Epoxy coated in red RAL3000 or other colors (Option)

Job Name:	System No.	Location:
Contractor:	Approved:	Date:
Engineer:	Approved:	Date:

__Shurjoint__ product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact __Shurjoint__ Technical Service. __Shurjoint__ reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on __Shurjoint__ products previously subsequently sold.

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Grooved-End Fittings E-02

Reviewed	(X)
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Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray, E.I.T. Williams Eng.

Date: 01/20/2011

WILLIAMS ENGINEERING CANADA

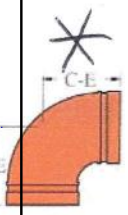


Fig. 7110
90° Elbow

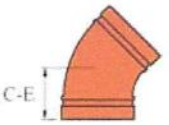


Fig. 7111
45° Elbow

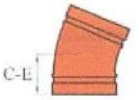


Fig. 7112
22-1/2° Elbow

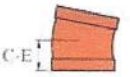


Fig. 7113
11-1/4° Elbow

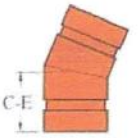


Fig. 7112
22-1/2° Elbow
(Welded)

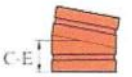


Fig. 7113
11-1/4° Elbow (Weld

Models 7110 / 7111 / 7112 / 7113 Elbows

Nominal Pipe Size	Pipe O.D.	#7110 90° Elbows C-E	#7110 90° Elbows Weight	#7111 45° Elbows C-E	#7111 45° Elbows Weight	7112 22-1/2° Elbows C-E	7112 22-1/2° Elbows Weight	#7113 11-1/4° Elbows C-E	#7113 11-1/4° Elbows Weight
mm in	mm in	mm in	Kgs Lbs	mm in	Kgs Lbs	mm in	Kgs Lbs	mm in	Kgs Lbs
25 1	33.4 1.315	57 2.25	0.3 0.7	45 1.75	0.2 0.4	—	—	—	—
32 1.25	42.2 1.660	70 2.75	0.5 1.1	45 1.75	0.3 0.7	45 1.75SW	0.3 0.7	35 1.38SW	0.2 0.4
40 1.5	48.3 1.900	70 2.75	0.7 1.5	45 1.75	0.4 0.9	45 1.75	0.6 1.3	35 1.38SW	0.3 0.7
50 2	60.3 2.375	83 3.25	0.9 2.0	51 2.00	0.7 1.5	48 1.88	0.8 1.8	35 1.38	0.8 1.8
65 2.5	73.0 2.875	95 3.75	1.2 2.6	57 2.25	0.9 2.0	51 2.01	1.0 2.2	38 1.50	1.0 2.2
65 2.5	76.1 3.000	95 3.75	1.4 3.1	57 2.25	1.0 2.2	51 2.01	1.0 2.2	38 1.50	1.0 2.2
80 3	88.9 3.500	108 4.25	2.1 4.6	64 2.50	1.3 2.9	57 2.25	1.4 3.1	38 1.50	1.1 2.4
90 3.5	101.6 4.000	114 4.50	2.5 5.6	—	—	—	—	—	—
100 4	114.3 4.500	127 5.00	2.8 6.2	76 3.00	2.0 4.4	73 2.88	2.0 4.4	45 1.75	1.5 3.3
100 4	108.0 4.250	127 5.00	3.5 7.7	76 3.00	2.0 4.4	—	—	—	—
125 5	141.3 5.563	140 5.50	5.0 11.0	83 3.25	3.5 7.7	73 2.88	3.3 7.3	51 2.00SW	2.7 5.9
125 5	133.0 5.250	140 5.50	4.1 9.0	83 3.25	2.7 5.9	—	—	—	—
125 5	139.7 5.500	140 5.50	5.0 11.0	83 3.25	3.5 7.7	73 2.88	3.3 7.3	51 2.00SW	2.7 5.9
150 6	168.3 6.625	165 6.50	6.4 14.1	89 3.50	4.4 9.7	79 3.12	5.0 11.0	51 2.00	3.4 7.5
150 6	159.0 6.250	165 6.50	6.0 13.2	89 3.50	3.8 8.4	—	—	—	—
150 6	165.1 6.500	165 6.50	5.7 12.5	89 3.50	4.4 9.7	79 3.12	5.0 11.0	51 2.00	3.4 7.5
200 8	219.1 8.625	197 7.75	12.5 27.5	108 4.25	9.0 19.8	98 3.88	10.0 22.0	51 2.00	5.5 12.1
200JIS 8	216.3 8.516	197 7.75	12.5 27.5	108 4.25	9.0 19.8	98 3.88	10.0 22.0	—	—
250 10	273.0 10.750	229 9.00	24.0 52.8	121 4.75	17.0 37.4	111 4.38	13.6 29.9	54 2.13	6.6 14.5
250JIS 10	267.4 10.528	229 9.00	24.0 52.8	121 4.75	17.0 37.4	111 4.38	13.6 29.9	54 2.13	6.6 14.5
300 12	323.9 12.750	254 10.00	35.0 77.0	133 5.25	22.5 49.5	124 4.88SW	18.3 40.3	57 2.25	8.5 18.7
300JIS 12	318.5 12.539	254 10.00	35.0 77.0	133 5.25	22.5 49.5	124 4.88SW	18.3 40.3	57 2.25	8.5 18.7
350 14	355.6 14.000	280 11.00	35.0 77.0	152 6.00	22.0 48.4	127 5.00SW	21.0 46.2	89 3.50SW	14.6 32.1
400 16	406.4 16.000	305 12.00	43.0 94.6	184 7.25	44.0 96.8	127 5.00SW	24.0 52.8	102 4.00SW	19.0 41.8
450 18	457.2 18.000	394 15.50	75.0 165.0	203 8.00	46.6 102.5	140 5.50SW	30.0 66.0	114 4.50SW	24.0 52.8

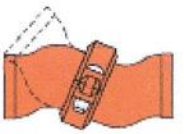
Models 7110 / 7111 / 7112 / 7113 Elbows

Nominal Pipe Size	Pipe O.D.	#7110 90° Elbows C-E	#7110 90° Elbows Weight	#7111 45° Elbows C-E	#7111 45° Elbows Weight	7112 22-1/2° Elbows C-E	7112 22-1/2° Elbows Weight	#7113 11-1/4° Elbows C-E	#7113 11-1/4° Elbows Weight
mm in	mm in	mm in	Kgs Lbs	mm in	Kgs Lbs	mm in	Kgs Lbs	mm in	Kgs Lbs
500 20	508.0 20.000	438 17.25	92.0 202.4	229 9.00	47.6 104.7	152 6.00SW	36.3 79.9	127 5.00SW	30.0 66.0
550 22	558.8 22.000	508 20.00SW	129.0 283.8	280 11.00SW	80.0 176.0	178 7.00SW	51.0 112.2	152 6.00SW	46.0 101.2
600 24	609.6 24.000	508 20.00	129.0 283.8	280 11.00	80.0 176.0	178 7.00SW	51.0 112.2	152 6.00 SW	46.0 101.2

SW: Segment-welded steel.

MODEL 7112G 22-1/2° ELBOW, Goose Neck Design

The use of two 22-1/2° goose neck elbows and a coupling works as a universal joint and is ideal for instances where a pipe line and or system is in indeed of a slight adjustment



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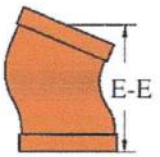

Fig. 7112
22-1/2° Elbow

Model 7112G 22-1/2° Elbow, Goose Neck

Nominal Pipe Size	Pipe O.D.	7112 22-1/2° Elbows E-E	7112 22-1/2° Elbows Weight
mm in	mm in	mm in	Kgs Lbs
40 1.5	48.3 1.900	95 G 3.75	0.6 1.3
50 2	60.3 2.375	95 G 3.75	0.8 1.3
65 2.5	73.0 2.875	102 G 4.00	1.0 2.2
65 2.5	76.1 3.000	102 G 4.00	1.0 2.2
80 3	88.9 3.500	114 G 4.50	1.4 3.1
100 4	114.3 4.500	127 G 5.00	2.0 4.4
125 5	141.3 5.563	127 G 5.00	3.3 7.3
125 5.5	139.7 5.500	127 G 5.00	3.3 7.3
150 6	168.3 6.625	159 G 6.25	5.0 11.0
150 6	165.1 6.500	159 G 6.25	5.0 11.0
200 8	219.1 8.625	197 G 7.75	10.0 22.0
200JIS 8	216.3 8.516	197 G 7.75	10.0 22.0

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

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Grooved-End Fittings E-04

c UL us LISTED FM APPROVED

MODEL 7110LR 1.5D LONG RADIUS 90° ELBOW
7111LR 1.5D LONG RADIUS 45° ELBOW
7137 TRUE-Y

All groove dimensions conform to ANSI / AWWA C606-04 and or ISO/FDIS 6182-12. For dimensional tolerances of cast fittings, refer to ISO/FDIS 6182-12 Table 3.

Reviewed
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray, E.I.T. Williams Eng.
Date: 01/20/2011

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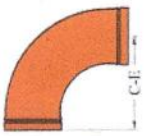


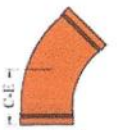
Fig. 7110LR
L/R 90° Elbow, 1-1/2D


Fig. 7111LR
L/R 45° Elbow, 1-1/2D


Fig. 7137
True-Y

Model 7110LR / 7111LR / 7137

Nominal Pipe Size	Pipe O.D.	#7110LR 1.5D LR 90° Elbows		#7111LR 1.5D LR 45° Elbows		#7137 True-Y		
mm in	mm in	C-E	Kgs Lbs	C-E	Kgs Lbs	C-LE	C-SE	Kgs Lbs
50 2	60.3 2.375	111 4.38	1.1 2.4	70 2.75	0.8 1.8	83 3.25	70 2.75	1.1 2.5
65 2.5	73.0 2.875	127 5.0	1.8 4.0	76 3.00	1.3 2.9	95 3.75	76 3.00	2.0 4.3
65 2.5	76.1 3.000	127 5.0	1.8 4.0	76 3.00	1.3 2.9	95 3.75	76 3.00	2.0 4.3
80 3	88.9 3.500	149 5.88	2.5 5.5	86 3.38	2.2 4.9	108 4.25	83 3.25	2.8 6.1
100 4	114.3 4.500	191 7.50	4.7 10.3	102 4.00	3.5 7.7	127 5.00	95 3.75	4.5 10.0
125 5	141.3 5.563	241 9.50	8.3 18.3	127 5.0	6.7 14.7	140 5.50	102 4.00	6.8 15.0
125 5	139.7 5.500	241 9.50	8.3 18.3	127 5.0	6.7 14.7	140 5.50	102 4.00	6.8 15.0
150 6	168.3 6.625	273 10.75	11.5 25.3	140 5.50	8.2 18.0	165 6.50	114 4.50	10.1 22.3
150 6	165.1 6.500	273 10.75	11.5 25.3	140 5.50	8.2 18.0	165 6.50	114 4.50	10.1 22.3
200 8	219.1 8.625	362 14.25	22.0 48.4	184 7.25	16.3 36.0	197 7.75	152 6.00	16.3 36.0
250 10	273.0 10.750	438 17.25	48.5 107.0	216 8.50	25.9 57.0	229 9.00	165 6.50	30.8 70.0
300 12	323.9 12.750	521 20.50	71.5 157.3	254 10.00	40.8 90.0	254 10.00	178 7.00	36.3 80.0

MATERIAL SPECIFICATIONS

- **Fitting body:**
  Ductile Iron to ASTM A536, Gr. 65-45-12, Min. tensile strength 448MPa (65,000 psi).

- **Surface Finish:**
  Orange color painted or red RAL3000 color painted.
  - ☐ Hot dip galvanized (Option).
  - ☐ Epoxy coated in red RAL3000 or other colors (Option)

Job Name:	System No.	Location:
Contractor:	Approved:	Date:
Engineer:	Approved:	Date:

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- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606-04 specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
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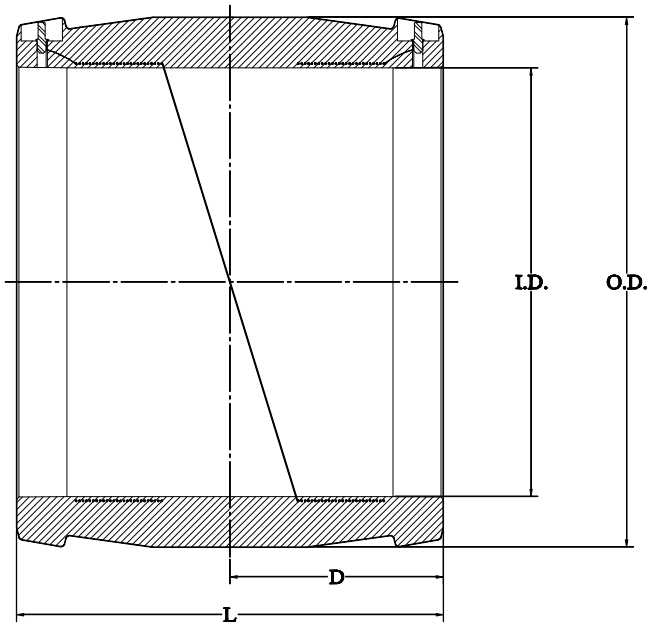
FULL COUPLINGS

ELECTROFUSION FITTINGS

LARGE DIAMETER IPS SDR 17

FOR REFERENCE ONLY

PLOW-IN STYLE SINGLE COIL



NOMINAL SIZE	INSIDE DIA. (MAXIMUM) I.D.	INSIDE DIA. (MINIMUM) I.D.	OUTSIDE DIA. (NOMINAL) O.D.	STAB DEPTH (NOMINAL) D	OVERALL LENGTH (NOMINAL) L
14"IPS	14.010	13.980	16.22	6.42	12.84
	355.85 mm	355.09 mm	412.0 mm	163.1 mm	326.1 mm

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 04/05/2011

WILLIAMS ENGINEERING CANADA

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Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray EIT, Williams Engir

Date: 04/05/2011

W Series

Medium Duty, Grade 2 Cylindrical Lever and Knob Locks

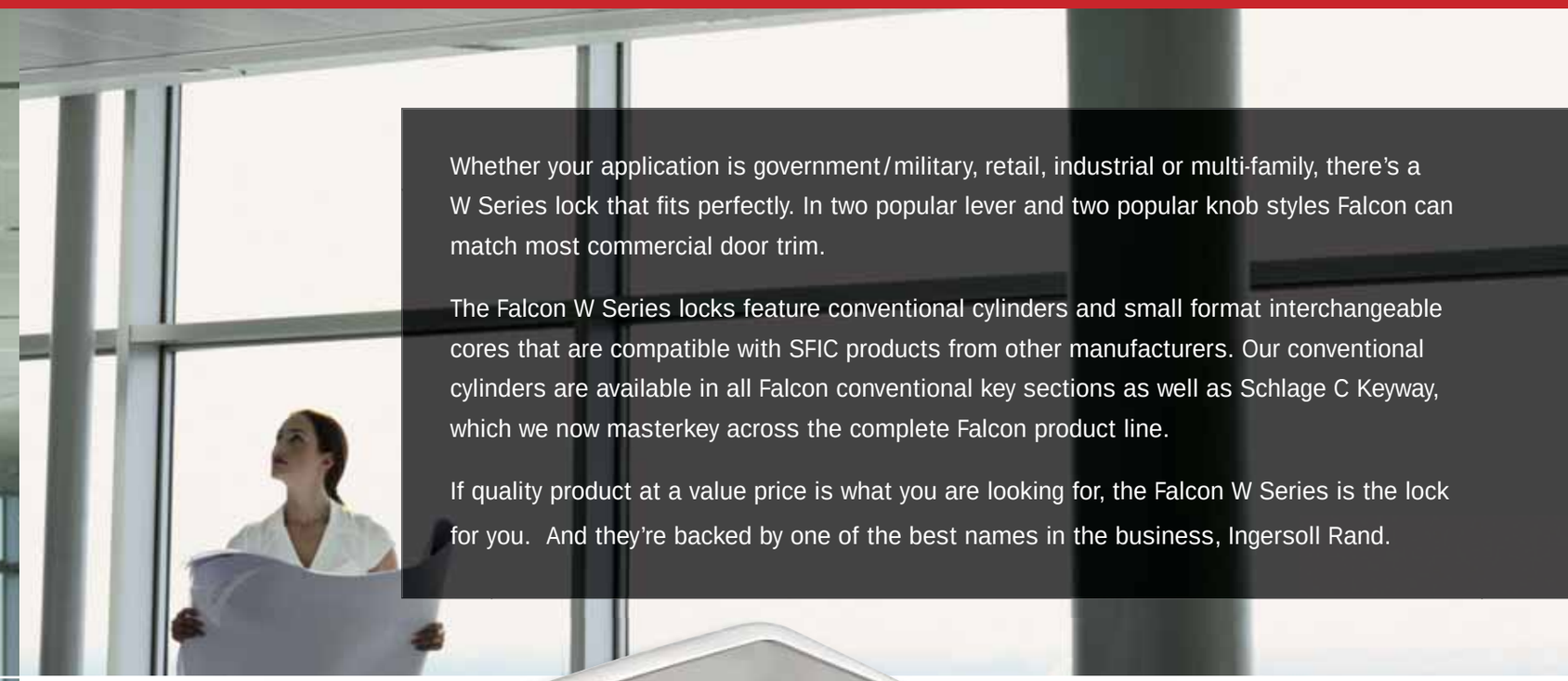
THE FALCON DIFFERENCE

SECURITY AND UNCOMPROMISING VALUE

At Falcon, we know that every product you specify not only has to meet local building codes, but also your expectations for performance and quality. We take your expectations seriously, and that's why we build our locks to deliver durability, convenience and unmatched value.

After all, we've built our reputation on the same standards that you have – providing quality products at a reasonable price delivered on time. It's the way we do business and it's what makes Falcon locks a powerful choice no matter what your project.

FALCON W SERIES



Whether your application is government/military, retail, industrial or multi-family, there's a W Series lock that fits perfectly. In two popular lever and two popular knob styles Falcon can match most commercial door trim.

The Falcon W Series locks feature conventional cylinders and small format interchangeable cores that are compatible with SFIC products from other manufacturers. Our conventional cylinders are available in all Falcon conventional key sections as well as Schlage C Keyway, which we now masterkey across the complete Falcon product line.

If quality product at a value price is what you are looking for, the Falcon W Series is the lock for you. And they're backed by one of the best names in the business, Ingersoll Rand.

FEATURES

- **Stainless steel latch bolt**
- **UL listed latch standard**
- **Wrought brass or bronze roses over steel through-bolted rose inserts**
- **Conventional cylinders or interchangeable core keying compatible with SFIC products from Falcon or other manufacturers**
- **Non-handed levers for easy field installation**
- **Solid, pressure-cast zinc levers**

LEVERS

Levers are solid pressure-cast zinc, finished to match mating parts. Roses are wrought brass or bronze installed over steel through-bolted rose inserts. A spring-loaded retainer secures levers. Secure side retainer cannot be depressed without a key that operates the lock.

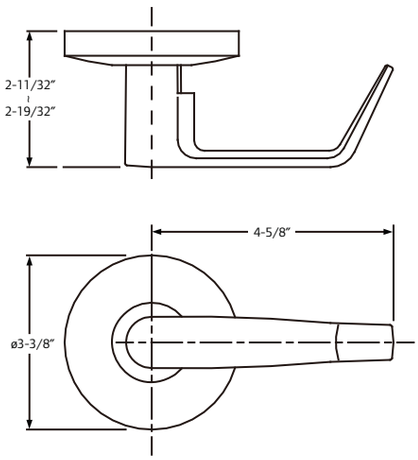
Small Format Interchangeable Core (SFIC)
Dane shown

Thumbturn (interior)
Quantum shown

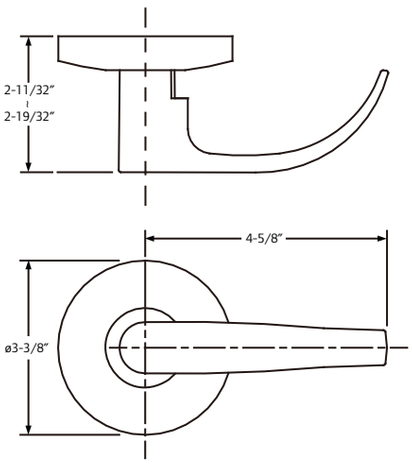
Plain
Dane shown

Conventional Cylinder
Quantum shown

Dane



Quantum



Abrasive Lever Options

All levers are available with an abrasive strip along the length of the lever to identify entrances to areas hazardous to the disabled. To order add 6 (for example, 6DA for Dane lever or 6QU for Quantum lever) to the order number.

Catalog Number		Description	ANSI Number and Grade
W101		**Passage Latchset** Latch bolt by levers at all times.	F75
W161		**Communicating/Exit Latch** Deadlocking latch bolt by inside lever. Non-removable blank plate outside. Inside lever is always free.	
W201		**Patio Lock** Deadlocking latch bolt by levers. Outside lever is locked by push button from inside. Rotating inside lever or closing door releases button and unlocks outside lever.	F77
W301		**Privacy Lock** Latch bolt by levers. Outside lever is locked by push button on inside lever. Rotating inside lever or closing door releases push button and frees outside lever. Inside lever is always free. Emergency release in outside lever unlocks door.	F76
W501		**Entry Lock** Push button locking. Button on inside locks outside lever until unlocked by key or by rotating inside lever. Closing door release push button and unlocks door. Inside lever always free. Deadlock latchbolt.	F82
W511		**Entry/Office Lock** Deadlocking latch bolt by levers. Turn/push button locking. Pushing and turning button locks outside lever, requiring use of a key for unlocking the door until button is manually unlocked. Pushing button locks outside lever until unlocked by key or by rotating inside lever. Inside lever is always free.	F109
W561		**Classroom Lock** Deadlocking latch bolt by levers. Outside lever is locked by key in outside lever. Inside lever is always free.	F84
W581		**Storeroom Lock** Deadlocking latch bolt by lever inside or key outside. Outside lever is always locked. Inside lever is always free.	F86
W711		**Apartment Entrance Lock** Deadlocking latch bolt by levers. Turn/push button locking. Pushing and turning button locks outside lever, requiring use of a key for unlocking the door until button is manually unlocked. Pushing button locks outside lever until unlocked by key, by rotating inside lever, or by closing the door. Inside lever is always free.	
W12		**Single Dummy Trim** Single trim, surface-mounted rigid lever.	

KNOBS

Knobs are constructed of brass or cold-formed steel and are zinc-plated and dichromated for rust resistance. Springs are stainless steel. Roses are heavy-wrought brass or bronze, installed over wrought steel reinforcing plates. Knobs are brass or bronze, secured by a steel knob retainer, which cannot be depressed when lock has been locked.

Cointurn
Elite shown

Cylinder
Elite shown

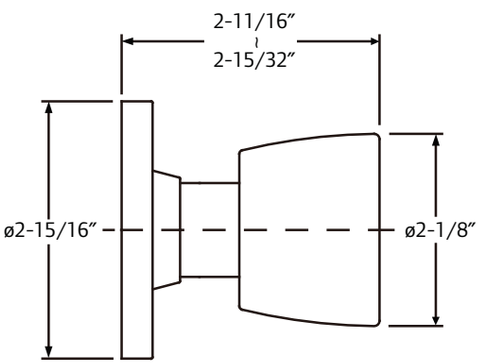
Interchangeable Core
Elite shown

Plain
Hana shown

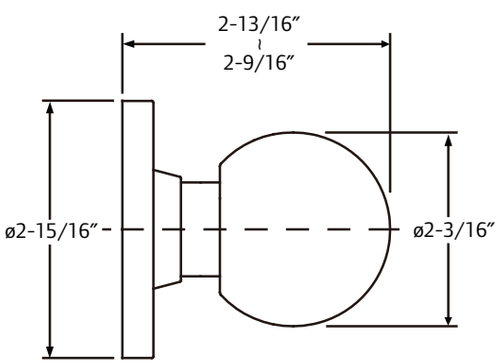
Pushbutton (interior)
Hana shown

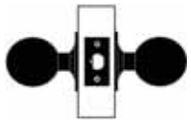
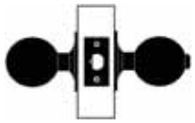
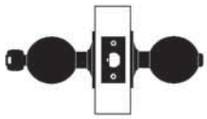
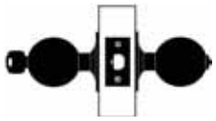
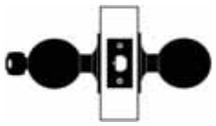
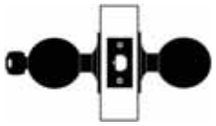
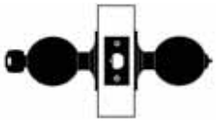
Thumbturn (interior)
Hana shown

Elite



Hana



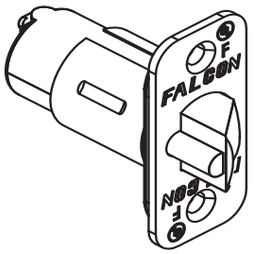
Catalog Number		Description	ANSI Number and Grade
W101		**Passage Latchset** Latch bolt by knob at all times.	F75
W301		**Privacy Lock** Latch bolt by knobs. Outside knob is locked by push button on inside knob. Rotating inside knob or closing door releases push button and frees outside knob. Inside knob is always free. Emergency release in outside knob unlocks door.	F76
W501		**Entry Lock** Push button locking. Button on inside locks outside knob until unlocked by key or by rotating inside knob.	F82
W511		**Entry/Office Lock** Deadlocking latch bolt by knobs. Turn/push button locking. Pushing and turning button locks outside knob, requiring use of a key for unlocking the door until the button is manually unlocked. Pushing button locks outside knob until unlocked by key or by rotating inside knob. Inside knob is always free.	F109
W561		**Classroom Lock** Deadlocking latch bolt by knobs. Outside knob is locked by key in outside knob. Inside knob is always free.	F84
W581		**Storeroom Lock** Deadlocking latch bolt by knobs. Outside knob is always locked. Inside knob is always free.	F86
W711		**Apartment Entrance Lock** Deadlocking latch bolt by knobs. Turn/push button locking. Pushing and turning button locks outside knob, requiring use of a key for unlocking the door until the button is manually unlocked. Pushing button locks outside knob until unlocked by key, by rotating inside knob, or by closing the door. Inside knob is always free.	
W12		**Single Dummy Trim** Single trim, surface-mounted rigid knob.	

LATCHES AND STRIKES

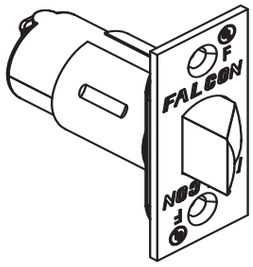
LATCHES

” Projection, UL Listed, Stainless Steel Bolt

- Latches for W Series locks are 3-hour UL listed.
- 2-3/4” backset standard.
- 2-3/8” backset optional.
- Unless otherwise specified we furnish a 1” x 2-1/4” square corner faceplate on 2-3/8” backset latches, and a 1-1/8” x 2-1/4” square corner faceplate on 2-3/4” backset latches.



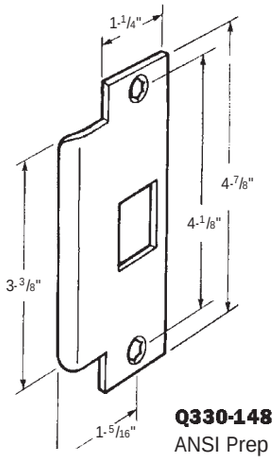
1/4” Radius Corner
1/2” Projection



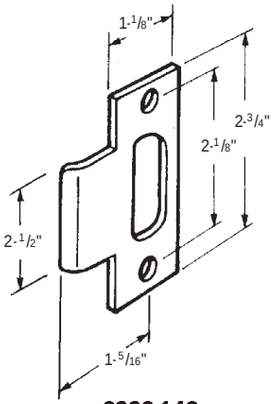
Square Corner
1/2” Projection

Catalog Number	Description (functions)	Faceplate Size	Corner
Q330-192	2-3/4” Backset Dead Locking (201, 711, 501)	1” x 2-1/4”	Square
Q330-193	2-3/4” Backset Dead Locking (201, 711, 501)	1” x 2-1/4”	Radius
Q330-194	2-3/4” Backset Dead Locking (201, 711, 501)	1-1/8” x 2-1/4”	Square
Q330-195	2-3/4” Backset Dead Locking	1” x 2-1/4”	Square
Q330-196	2-3/4” Backset Dead Locking	1” x 2-1/4”	Radius
Q330-197	2-3/4” Backset Dead Locking	1-1/8” x 2-1/4”	Square
Q330-198	2-3/8” Backset Dead Locking (201, 711, 501)	1” x 2-1/4”	Square
Q330-199	2-3/8” Backset Dead Locking (201, 711, 501)	1” x 2-1/4”	Radius
Q330-200	2-3/8” Backset Dead Locking (201, 711, 501)	1-1/8” x 2-1/4”	Square
Q330-201	2-3/8” Backset Dead Locking	1” x 2-1/4”	Square
Q330-202	2-3/8” Backset Dead Locking	1” x 2-1/4”	Radius
Q330-203	2-3/8” Backset Dead Locking	1-1/8” x 2-1/4”	Square
Q330-204	2-3/4” Backset Spring Latch	1” x 2-1/4”	Square
Q330-205	2-3/4” Backset Spring Latch	1” x 2-1/4”	Radius
Q330-206	2-3/4” Backset Spring Latch	1-1/8” x 2-1/4”	Square
Q330-207	2-3/8” Backset Spring Latch	1” x 2-1/4”	Square
Q330-208	2-3/8” Backset Spring Latch	1” x 2-1/4”	Radius
Q330-209	2-3/8” Backset Spring Latch	1-1/8” x 2-1/4”	Square

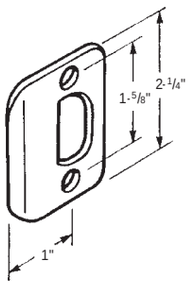
STRIKES



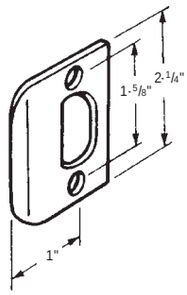
Q330-148
ANSI Prep
A115.2



Q330-149
T Strike
Square Corner



Q330-150
Full Lip, 1/4”
Radius Corner



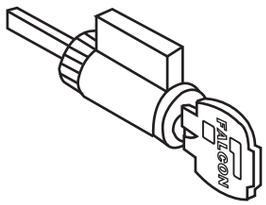
Q330-151
Full Lip,
Square Corner

CYLINDERS AND ACCESSORIES

FALCON STANDARD CYLINDERS

6-Pin

Catalog Number	Description
Q330-154	Falcon (specify keyway)
Q330-155	Falcon (for W561)



Standard Cylinder

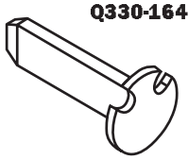
Specify finish: 606 or 626
Specify keyway: G (standard), H, K, L, N, P

STANDARD CYLINDERS WITH OTHER KEYWAYS

6-Pin

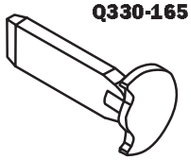
Catalog Number	Description
Q330-152	Schlage C
Q330-153	Schlage C for W561
Q330-166	Corbin 60 (0 bit or KD only)
Q330-167	Corbin 60 (0 or KD only) for W561
Q330-210	Russwin D1 (0 bit or KD only)
Q330-211	Russwin D1 (0 bit or KD only) for W561
Q330-158	Cor/Russ L4 (0 bit or KD only)
Q330-159	Cor/Russ L4 (0 bit or KD only) for W561
Q330-160	Sargent LA (0 bit or KD only)
Q330-161	Sargent LA (0 bit or KD only) for W561
Q330-164	Tailpiece for Q330-154 Falcon and Schlage cylinders (All other functions)
Q330-165	Tailpiece for Q330-155 Falcon and Schlage cylinders (W 561 function only)
Q330-168	Tailpiece for SFIC (All functions)
Q330-156	Yale 8 (0 bit or KD only)
Q330-169	Tailpiece for W Lock knobs — SFIC

Q330-164



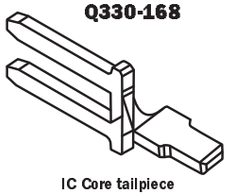
Conventional cylinder tailpiece

Q330-165



Conventional cylinder tailpiece W561

Q330-168

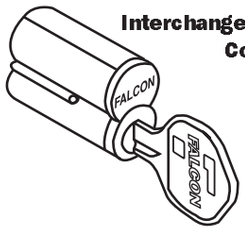


IC Core tailpiece

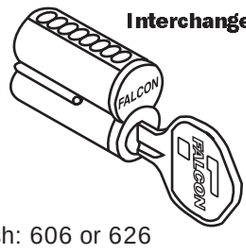
FALCON INTERCHANGEABLE CORE

Catalog Number	Description
C606 (6-pin), C607 (7-pin)	For use in all I/C keyed locks (cover style)
CB806 (6-pin), CB807 (7-pin)	For use in all I/C keyed locks (cap style)

Interchangeable Core Cover Style



Interchangeable Core Cap Style



Specify finish: 606 or 626
Specify keyway: A (standard) or other keyway

CONVERSION CHART

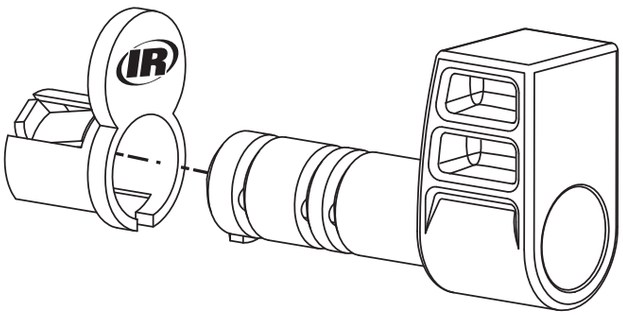
W Series Grade 2 Cylindrical Key-in-Lever

ANSI	Function	FALCON	Arrow	Cal-Royal	Corbin/ Russwin	Dorma	Hager	Marks	Best
C75	Passage	W101	RL01	SL-30	CL3810	CL710	3510	N	7KN
	Comm/Exit	W161	RL03	SL-50	-	CL725	3525	DC	-
F77	Patio	W201	RL04	-	CL3840	CL730	-	P	-
F76	Privacy	W301	RL02	SL-20	CL3820	CL740	3540	L	7KL
F109	Entry/Office	W511	RL11		CL3851	CL753	3553	AB	7KAB
F84	Classroom	W561	RL17	SL-03	CL3855	CL770	3570	S	7KR
F86	Storeroom	W581	RL12	SL-05	CL3851	CL780	3580	F	7KD
	Apt. Entry	W711	-	-	-	-	-	-	-
	Dummy Single	W12	RL08	SL-40	CL3850	CL701	3517	DO	7KIOT
F82	Entry	W501	-	SL-00	CL3861	CL750	-	B	

Trim Syles	FALCON	Arrow	Cal-Royal	Corbin/ Russwin	Dorma	Hager	Marks	S. Parker
	DANe	SR	SL	N2D	LR	Withnell	170	SL
	QUAntum	BRR	RL	PZD	LC	Archer	270	-

CONSTRUCTION KEYING

Falcon offers two different construction key systems depending on the size of and application within the project. Both systems permit the installation and use of regular door locks during construction, yet completely preserve the security of the keying system for the building owner. The Master, Grand Master and change keys are never with the locks during the construction phase of a building. Only the "construction" keys are sent to the jobsite. Where the job permits we will use the "Lost Pin" system as our standard system for construction keying. Larger or more complicated jobs may require use of the "Blockokey® System" for construction keying.



"DISPOSABLE CONSTRUCTION" INTERCHANGEABLE CORES

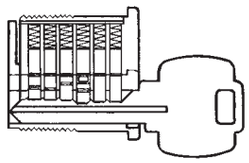
The disposable construction core (1408) is an inexpensive alternative to interior keyed construction cores. This core should be used on interior door applications or where security on a site is not a concern. No keys need to be issued. The disposable core is inserted in the lever or knob, and is operated by a thumbturn, which retracts the latch bolt. Use either brass or permanent construction cores on exterior doors or secured areas when security is needed.

LOCKS WITH THE "LOST PIN" SYSTEM

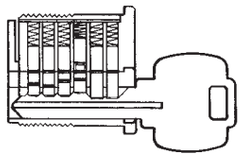
Our "lost pin" construction system consists of one construction pin and a shallow hole in the side of the plug.

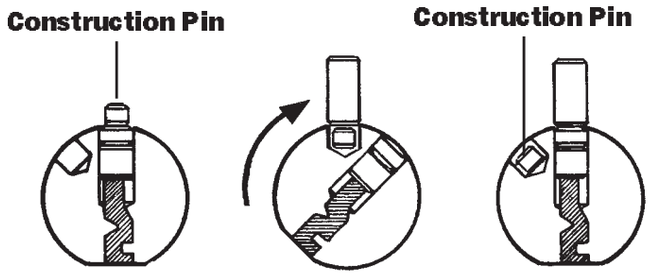
All lock cylinders on a specific project are operable by a special "project key." The building contractor may assign all duplicates of this key to workers and subcontractors as required. No regular change keys or master keys are needed on the job, eliminating the possibility of subsequent exposure from lost or stolen keys.

Construction Key – KB566
With the construction key in use the construction pin is always in the cylinder plug, sitting on top of the bottom pin.



Master Key – KB578
With the master key inserted the construction pin is pushed up into the cylinder housing. Rotating the master key to the right drops the construction pin into the hole in the plug, eliminating any future use of the construction key.

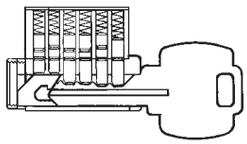




HOW BLOCKOKEY CYLINDERS ARE USED

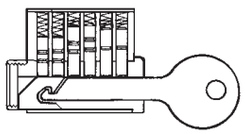
1. Project Key – KB531

Operation of the lock cylinder is by the special “project key.” The last two pins in the cylinder are inoperative because of the “key block” mechanism.



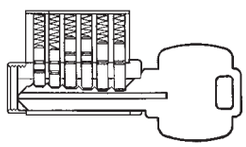
2. Removal Tool – KB536

The “project key” no longer operates the cylinder when the “key block” mechanism is removed. A key block removal tool comes with the master keys for the locks. Push the removal tool into the keyway and then withdraw it to remove the block. Thereafter the project key will no longer operate the lock cylinder.



3. Change or Master Keys – KB578

Cylinder is now only operable by the regular change key or master key.



HOW TO ORDER LOCKS WITH BLOCKOKEY SYSTEM

Blockokey locksets are ordered by adding the word “Blockokey” after the balance of the ordering information and are only available in Falcon keyways.

For example: 72 W511PD DAN 626 RH 30-209 30-149 1AA-72AA (Blockokey)

FEATURES AND SPECIFICATIONS

Door Thickness: 1-3/8" to 1-3/4" standard.

Backset: 2-3/4" standard; 2-3/8" also available.

Mechanism: Parts constructed of brass or cold-formed steel, zinc plated and dichromated for rust resistance. Springs are stainless steel.

Attachment: Lock chassis secured to door by two screws which pass through a steel rose insert inside and thread directly into the outer rose-mounting assembly, and two screws that screw into the chassis assembly.

Handing: Locks are non-handed.

Cylinder: Pinning in six chambers. Cylinder assemblies removable to re-key. Also available with 6- or 7-pin interchangeable core cylinders. Cylinder housings and plugs machined from solid brass. Springs are stainless steel. Two nickel silver keys furnished standard.

Competitor Cylinder: The W Series accepts standard 6-pin cylinders available from Falcon, as well as Schlage, Corbin-Russwin, Yale and Sargent.

Keyways: "G" keyway standard on Falcon standard cylinders. "A" keyway standard on I/C core cylinders. Also available with some optional keyways. Schlage "C" keyway also available on standard cylinders, includes master key. Master keying available on all Falcon and Schlage "C" keyways.

Trim: Roses are heavy wrought brass or bronze, installed over steel rose inserts which are through-bolted through door. Levers are pressure-cast zinc (solid levers-no-inserts) finished to match mating parts.

Latches: 1/2" bolt projection made of stainless steel and UL listed for 3-hour door assemblies. Latches have self-adjusting fronts to accommodate beveled or flat doors. 2-3/8" backset with 1" x 2-1/4" latch faces or 2-3/4" backset with 1-1/8" x 2-1/4" latch faces.

Strikes: 4-7/8" x 1-1/4" ANSI strike with curved lip to meet ANSI A115.2 door frame preparation standard. Consult Options and Accessories section for other available strikes, sizes and configurations.

Screws: Furnished with combination screws for use in wood or metal doors and frames.

ANSI/BHMA: Meets ANSI/BHMA A156.2, Series 4000, Grade 2.

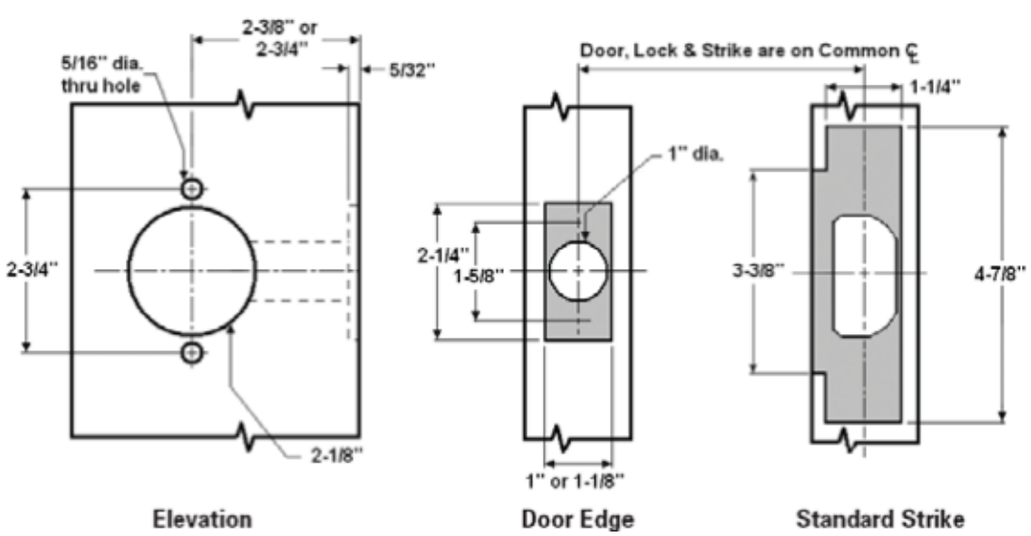
UL: 3-hour A label.

SPECIFICATIONS

Key-in-lever cylindrical locksets shall be Falcon W Series or equal, and meet the following requirements:

- All locks shall meet ANSI/BHMA A156.2, Series 4000, Grade 2 test requirements for key-in-lever locksets.
- Locksets shall be UL listed 3 hour A Label.
- Lever trim shall have individual heavy-duty springs for lever return and to prevent lever sag. Trim shall be through-bolted.
- All lever designs shall be solid (no inserts) and meet the federal ADA and state disability requirements.
- Locksets shall adjust to fit door thickness from 1-3/8" to 1-3/4".
- All locksets shall be non-handed and shall not require field disassembly for re-handing.
- Preparation for door must be non-handed.
- Acceptable manufacturer: Falcon Lock

DOOR TEMPLATING



HOW TO ORDER

For correct ordering and to ensure no delays in shipment of your order, the following descriptive data must be listed in the sequence shown. Necessary information can be found in other parts of this catalog. The example to the right shows an order for 12 each W locksets in the 581 storeroom function, QUA (Quantum) trim design in a 626 (satin chrome) finish, with a 2-3/4" backset latch, to accommodate doors 1-3/4" thick.

Quantity: Indicate the quantity required.

Catalog number: Select function number, cylinder type and latch style from tables in this section.

Trim design: Indicate letter of lever design. DAN = Dane; QUA = Quantum; ELI = Elite; HAN = Hana. Outside design always proceeds inside design on split designs. If adding an abrasive lever option, add 6 to design code (example 6DAN).

Finish: When the finish is the same for the outside and inside trim it is shown once (ex.: 626). Outside finish always precedes inside finish on split finishes (ex.: 605 x 625).

Latches: 2-3/4" backset standard. 2-3/8" backset available. All latches are UL listed 3-hour A label.

Strikes: 4-7/8" x 1-1/4" ANSI strike standard. Optional T strike or Full Lip strikes available. See page 8.

Cylinder type: 6-pin.

Keying Detail: We suggest using standard terms developed by DHI (Door & Hardware Institute) or ALOA (Associated Locksmiths of America). Example: AA1-Grand Master keyed, Master keyed, change key 1.

Interchangeable core: To order product capable of accepting an interchangeable core, add suffices from the keying table to the function number, preceding the latch style. Example: W511HD will be supplied with SFIC keyed construction core.

Keyways: "G" is standard on regular cylinders. "A" is standard on interchangeable cores. Other keyways available. See page 9.

Additional keys: Note the total number of keys required.
Large bow keys: Add "with large bow keys" under additional details.

SAMPLE ORDER

Line Item	QTY	Product	Outside		Inside		Hand	Latch	Strike	Door Thickness	EXT	DIM	Additional Details/Keying
			DES	FIN	DES	FIN							
1	12	W581D	QUA	626			RHR	30-197	30-149	13/4			

EXAMPLE: Twelve W Series storeroom function locks with a Quantum lever in 626, 2-¾" backset latch, T-strike, to accommodate doors 1-¾" thick.

FINISHES

* All finishes available in all trim.

Bright Brass
605

Satin Brass
606

Oil Rubbed
Bronze
613

Bright Chrome
625

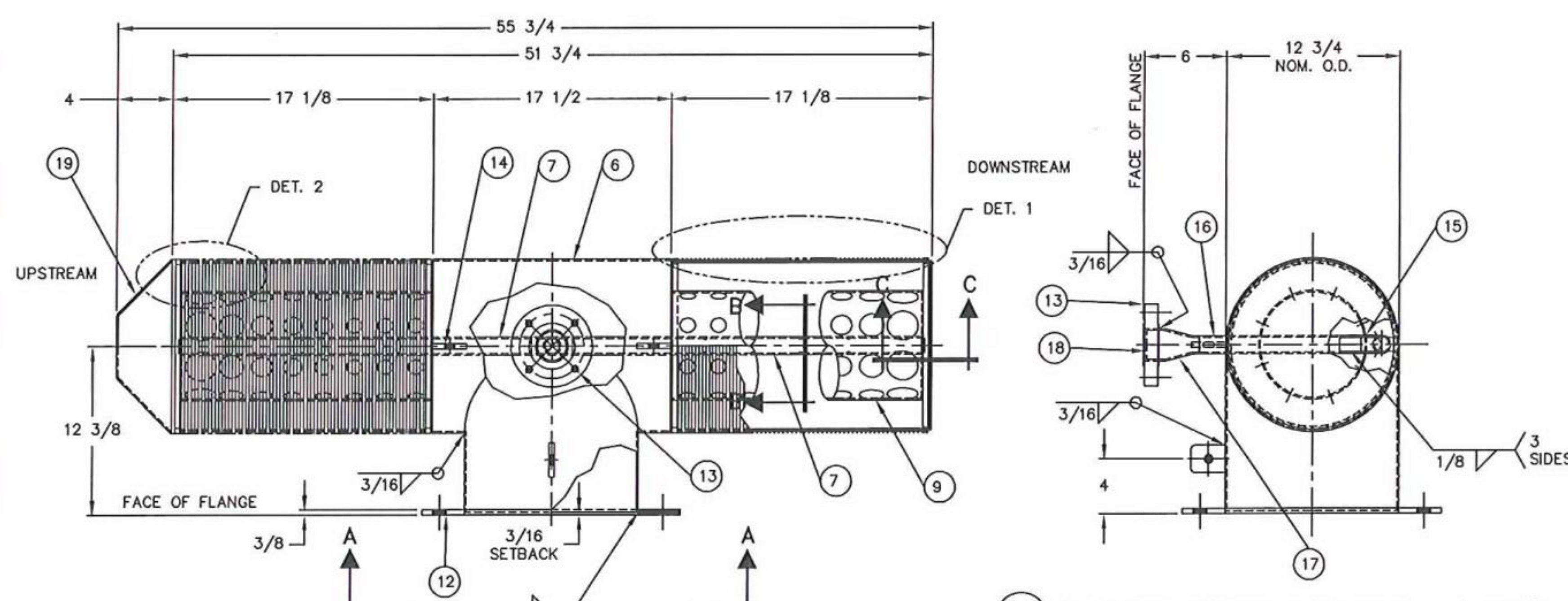
Satin Chrome
626

Although we apply the finest available protective plating and/or clear coating to the surface of our products, these finishes have limitations and, in time, may deteriorate from exposure to weather, pollution, perspiration, extremes of climate, frequency of use or other factors. Deterioration of finishes is, therefore, not a defect, but a normal process that is unavoidable. Falcon Lock cannot accept responsibility for finish deterioration under these circumstances; therefore, finishes cannot be guaranteed. These products will not be refinished or replaced under our warranty should deterioration of finish occur.

Ingersoll Rand
Security Technologies

Ingersoll Rand's Security Technologies Sector is a leading global provider of products and services that make environments safe, secure and productive. The sector's market-leading products include electronic and biometric access-control systems; time-and-attendance and personnel scheduling systems; mechanical locks; portable security; door closers, exit devices, architectural hardware, and steel doors and frames; and other technologies and services for global security markets.

800-266-4456 www.falcon.ingersollrand.com www.ingersollrand.com



(001) T-INTAKE SCREEN ASSEMBLY – 2 REQ'D.

ITEM	QTY.	DESCRIPTION	MAT'L.	REMARKS
(001)	2	T–INTAKE SCREEN ASSEMBLY (EA. CONSISTING OF)		
1	AS REQ'D.	HENDRICK WIRE #69S	316 SS	
2	72	HOUSE SUPPORT #130Q X LGTH. CUT TO FIT		
3	4	WELD RING 3/8 SQ. X 12.587 O.D.		
4	2	END PLATE 1/4 X 12 3/8 DIA.		
5	2	DIST. PLATE 1/8 X 7 3/4 I.D. X 12 15/32 O.D.		
6	ONE	TEE 12.587 O.D. X 17 1/2 RUN X 12 3/4 O.D. BRANCH X 1/4 WALL THICKNESS		10–176–3
7	2	AIR BURST PIPE 1" NOM. DIA. SCH10S		
8	2	END CAP 1/4 X 1 5/16 DIA.		
9	2	CORE TUBE 8 O.D. X 1/8 WALL THICKNESS		10–176–2
10	2	END CAP 1/4 X 7 3/4 DIA.		
11	ONE	BAR 1/8 X 1 X 4 LG.		
12	ONE	PLATE FLANGE AWWA BOLT PATTERN 3/8 THK.		
13	ONE	FLANGE RFSO 2" NOM. PIPE DIA. ANSI 150#		
14	3	LIFTING LUG 3/8 X 2 X 2 1/2		01–30–1
15	ONE	TEE 1" NOM. DIA. SCH 10S		
16	AS REQ'D.	PIPE 1" NOM. DIA. X LGHT. AS REQ'D. SCH 10S		
17	ONE	REDUCER 2 X 1" SCH 10S		
18	AS REQ'D.	PIPE 2" NOM. DIA. X LGHT. AS REQ'D. SCH 10S		
19	ONE	DEBRIS DEFLECTOR	316 SS	DWG. 01–95–4

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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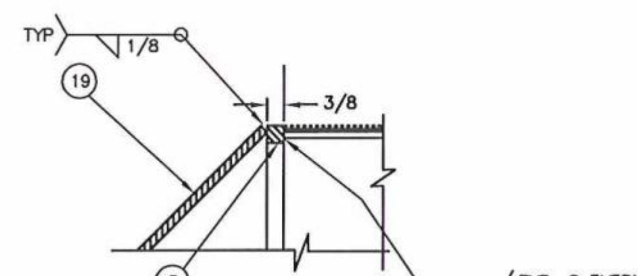
Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray EIT, Williams Engir

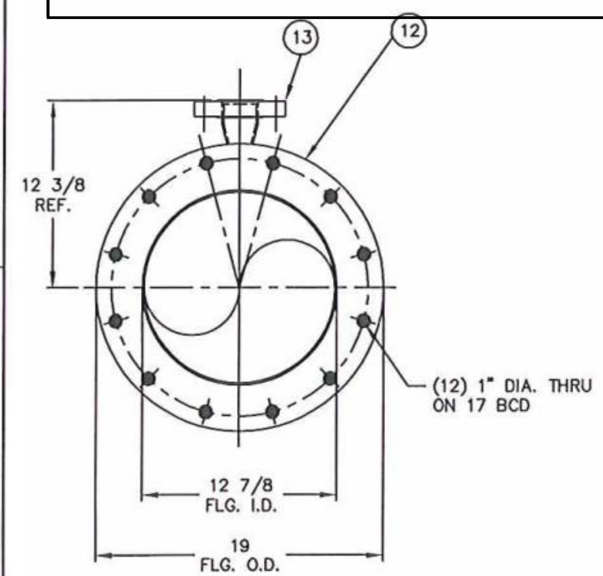
Date: 04/11/2010



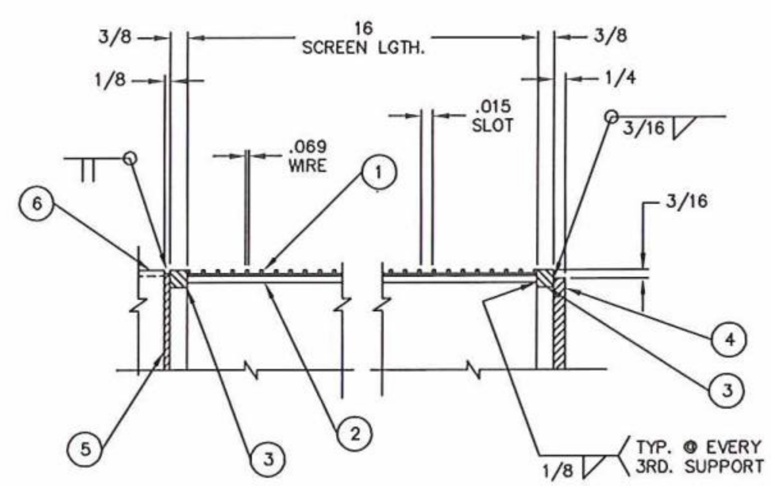
DET. 2

NOTE:

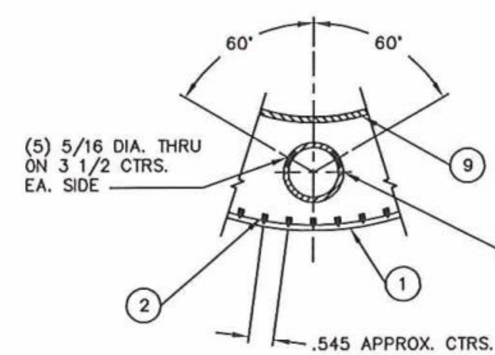
1. REMOVE ALL BURRS AND SHARP EDGES.
2. OPEN AREA = 18 %
3. DESIGN PRESSURE = 10 PSI OR 23 FT. WATER
4. FLOW = 220 GPM
5. EST. WT. 175#



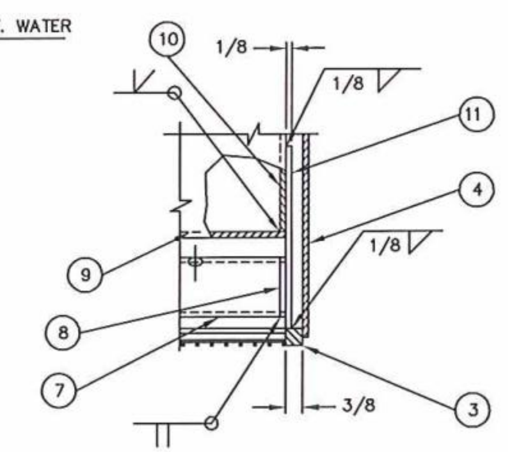
VIEW A–A



DET. 1



SECT. B–B



SECT. C–C

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

DRAWING STATUS

FOR APPROVAL ONLY

HENDRICK SHOP ORDER # 05596

DIMENSIONAL TOLERANCES (FLAT & CURVED PANELS)

DIMENSIONAL TOLERANCES (CYLINDERS)

ZONE	REV	DESCRIPTION	BY/DATE	APPV'D
		REVISIONS		

DRAWN BY: DTB — DATE: 09/27/10
APP'D.: JW — DATE: 9/29/10
MATERIAL: 316 S.S.
DESIGN No.:
SCALE: NTS

HENDRICK SCREEN — OWENSBORO, KENTUCKY

TITLE: B. A. ROBINSON Co. LTD
T–INTAKE SCREEN 12 O.D.
ASSEMBLY & DETAILS

DRAWING No. 10–176–1 — SHT. 1 OF 1 — REV. 0

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES					APPROX. SHIP WT.
					A	B	C	D	E	
150S20-1	A	2	4"	3" NPT	27.3	13.6	13.7	3.75	5.2	55
150S50-2	A	5	4"	3" NPT	41.1	23.6	17.5	3.75	5.2	75
150S75-3	A	7 1/2	4"	3" NPT	50.9	29.6	21.3	3.75	5.2	92
150S75-4	A	7 1/2	4"	3" NPT	54.7	29.6	25.1	3.75	5.2	97
150S100-5	A	10	4"	3" NPT	72.8	43.9	28.9	3.75	5.2	151
150S75-4	A	7 1/2	6"	3" NPT	49.9	24.2	25.7	5.38	5.6	135
150S100-5	A	10	6"	3" NPT	54.9	25.4	29.5	5.38	5.6	148
150S150-6	A	15	6"	3" NPT	61.3	28.0	33.3	5.38	5.6	167
150S150-7	A	15	6"	3" NPT	65.0	28.0	37.0	5.38	5.6	169
150S150-8	A	15	6"	3" NPT	68.8	28.0	40.8	5.38	5.6	174
150S200-9	A	20	6"	3" NPT	75.2	30.6	44.6	5.38	5.6	191
150S200-10	A	20	6"	3" NPT	79.0	30.6	48.4	5.38	5.6	193
150S200-11	A	20	6"	3" NPT	82.8	30.6	52.2	5.38	5.6	198
150S250-12	A	25	6"	3" NPT	89.0	33.1	55.9	5.38	5.6	235
150S250-13	A	25	6"	3" NPT	92.8	33.1	59.7	5.38	5.6	238
150S250-14	A	25	6"	3" NPT	96.6	33.1	63.5	5.38	5.6	242
150S300-15	A	30	6"	3" NPT	103.0	35.7	67.3	5.38	5.6	260
150S300-16	A	30	6"	3" NPT	106.8	35.7	71.1	5.38	5.6	262
150S300-17	A	30	6"	3" NPT	110.5	35.7	74.8	5.38	5.6	266
150S400-18	A	40	6"	3" NPT	119.4	40.8	78.6	5.38	5.6	306
150S400-19	A	40	6"	3" NPT	123.2	40.8	82.4	5.38	5.6	308
150S400-20	A	40	6"	3" NPT	127.0	40.8	86.2	5.38	5.6	323
150S400-21	A	40	6"	3" NPT	130.8	40.8	90.0	5.38	5.7	334
150S400-22	A	40	6"	3" NPT	134.5	40.8	93.7	5.38	5.7	338
150S400-23	A	40	6"	3" NPT	138.3	40.8	97.5	5.38	5.7	340
150S500-24	A	50	6"	3" NPT	162.2	57.8	104.4	5.38	6.1	442
150S500-25	A	50	6"	3" NPT	166.0	57.8	108.2	5.38	6.1	444
150S500-26	A	50	6"	3" NPT	169.8	57.8	112.0	5.38	6.1	446
150S500-27	A	50	6"	3" NPT	173.6	57.8	115.8	5.38	6.1	448
150S500-28	A	50	6"	3" NPT	183.4	63.8	119.6	5.38	7.1	450
150S600-29	A	60	6"	3" NPT	193.7	63.8	129.9	5.38	7.1	448
150S600-31	A	60	6"	3" NPT	201.3	63.8	137.5	5.38	7.1	452
150S600-33	A	60	6"	3" NPT	208.8	63.8	145.0	5.38	7.1	456
150S500-24	A	50	8"	3" NPT	143.2	38.8	104.4	7.50	7.5	492
150S500-25	A	50	8"	3" NPT	147.0	38.8	108.2	7.50	7.5	495
150S500-26	A	50	8"	3" NPT	150.8	38.8	112.0	7.50	7.5	497
150S500-27	A	50	8"	3" NPT	154.6	38.8	115.8	7.50	7.5	499
150S500-28	A	50	8"	3" NPT	158.4	38.8	119.6	7.50	7.5	501
150S600-29*	B	60	8"	3" NPT	169.7	41.8	127.9	7.50	7.5	539
150S600-31*	B	60	8"	3" NPT	177.3	41.8	135.5	7.50	7.5	543
150S600-33*	B	60	8"	3" NPT	184.8	41.8	143.0	7.50	7.5	547
150S750-36*	B	75	8"	3" NPT	201.8	47.4	154.4	7.50	7.5	592
150S750-39*	B	75	8"	3" NPT	213.1	47.4	165.7	7.50	7.5	598

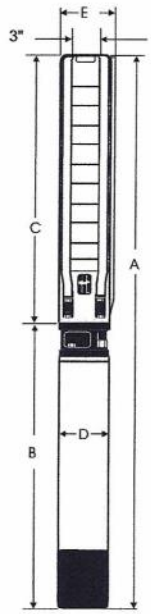


Fig. A

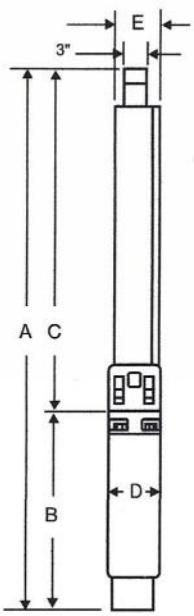


Fig. B

NOTES: All models suitable for use in 6" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
* Built into sleeve 3" NPT discharge, 8" min. well dia.

* C/W 30m FACTORY INSTALLED CORD

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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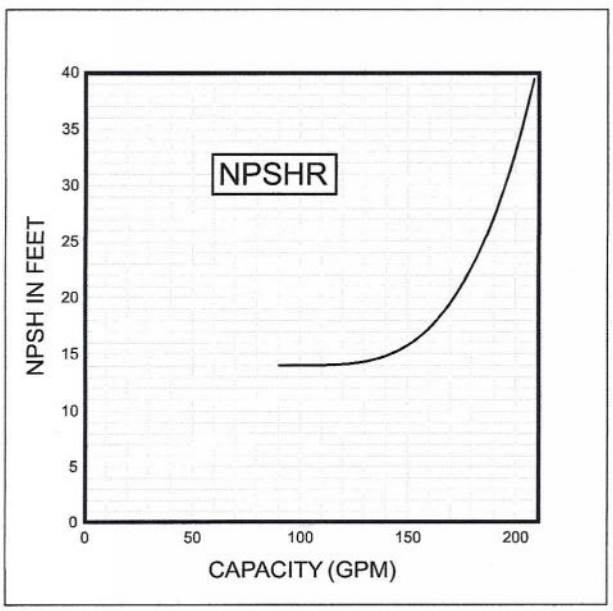
Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir.
Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

MATERIALS OF CONSTRUCTION

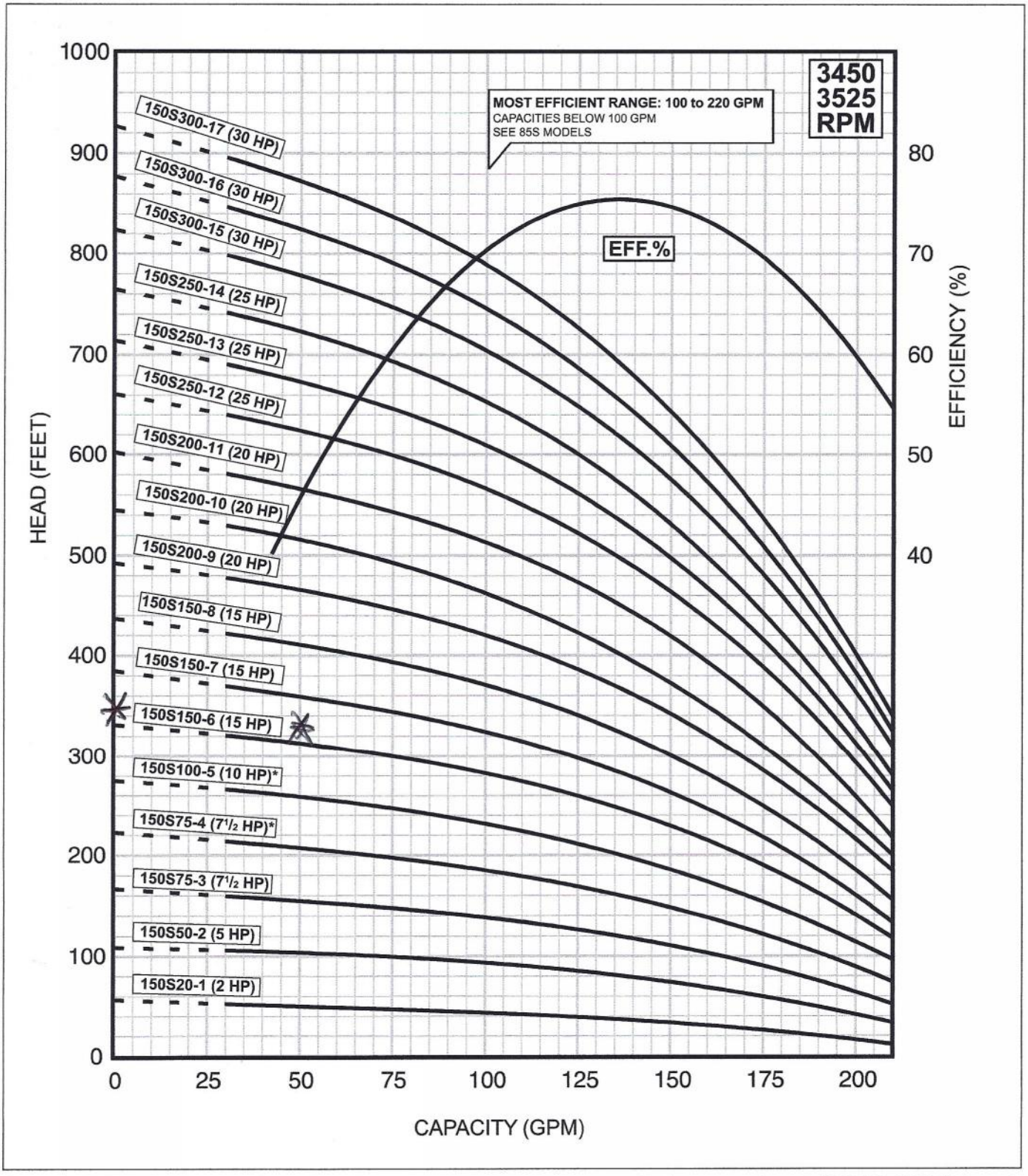
COMPONENT	CYLINDRICAL SHAFT (1-39 Stgs.)
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Seal Ring Support Plate	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Priming Inducer	304 Stainless Steel
Coupling	316/329 Stainless Steel**
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/PPS
Check Valve Seat	NBR/316 Stainless Steel
Top Bearing	NBR/304 Stainless Steel
Upthrust Disc	Carbon/Graphite
Upthrust Stop Washer	304 Stainless Steel
8" Motor Adaptor Plate	304 Stainless Steel
Sleeve*	316 Stainless Steel
Sleeve Flange	304 Stainless Steel

NOTES: Specifications are subject to change without notice.
***Required for 29-39 stage models.**
** 4" Coupling made of 316 Stainless Steel.



PERFORMANCE CURVES 150 GPM MODEL 150S

FLOW RANGE: 30 -220 GPM **OUTLET SIZE: 3" NPT** **NOMINAL DIA. 6"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 2-10 HP/3450 RPM
✱ 6" MOTOR STANDARD, 7.5-60 HP/3450 RPM, ✱
8" MOTOR STANDARD, 75 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 5 feet.

Duratec
AIRLINE SYSTEM

Submittal Data Sheet

Job or Customer:

Engineer:

Contractor:

Submitted by:

Approved by:

Order No:

Specification:

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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Date

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

Date

introduction

Duratec pipe's unique composite structure incorporates a rigid yet flexible aluminum core, permanently bonded to layers of durable high density polyethylene (HDPE) plastic. HDPE on the inner and outer layers provides the best corrosion resistance against aggressive manufacturing environments while eliminating the inner scaling and corrosion associated with traditional metal compressed air pipes. Duratec fittings are supplied in tough nickel plated brass or stainless steel and utilize unique double o-ring seals to ensure long term joint integrity.

Duratec pipe meets the requirements of ASTM F1282 and CSA B137.9, Standards specifications for PE-AL-PE Composite Pressure Pipes. Duratec fittings meet the requirements of ASTM F1974, Standard specification for Metal Insert Fittings for Composite Pressure Pipes and has a national CRN of OA02020.2C. Duratec fittings also meet ASME codes B31.3, B31.9 and are certified to OSHA safety regulations. The Duratec pipe and fitting system is rated for long term continuous operating pressures of 200psi at 73°F and 160psi at 140°F. The minimum allowable operating temperature for Duratec pipe and fittings is -40°F.

Duratec may be used for a wide range of applications including compressed air supply, hand tool operation, valve actuation, robotic installation, bulk inert gas delivery systems, industrial oxygen and CO_2 delivery for carbonated beverage lines.

< STANDARDS >

ASTM F1282
ASTM F1974

CSA B137.9
CSA B51

CRN OA02020.2C

< CODES >

ASME B31.3
ASME B31.9

COMPANION PRODUCTS

Duraplus™ air-line

Duraplus is a pressurized piping system made from high-impact, ductile ABS, and specifically engineered for conveying compressed air and inert gases. Your large diameter compressed air option with sizes available up to 4".

pipe and fitting availability

DURATEC PIPE

Sizes: 3/8", 1/2", 3/4" and 1" diameters
Configurations: 100 ft. and 300 ft. coils

DURATEC NICKEL PLATED FITTINGS

Sizes: 3/8", 1/2", 3/4" and 1"
Configurations: Couplers, Tees, Caps, Elbows, Reducers, Male Thread Adapters, Female Thread Adapters, Copper Solder Adapters

DURATEC NICKEL PLATED VALVES

Sizes: 3/8", 1/2", 3/4" and 1"
Configurations: Duratec x Duratec straight ball valves

DURATEC 316 STAINLESS STEEL FITTINGS

Sizes: 3/8", 1/2", 3/4" and 1"
Configurations: Duratec x Male Thread Straight Adapters

www.ipexinc.com
866 473-9462
Canadian Toll Free

IPEX

DAINDTIP060111

Installation Procedures

Installation:

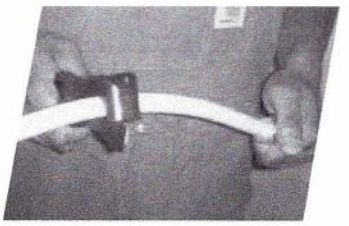
The **Duratec** fitting system is a compression style fitting with a twist. It includes a split ring that tightens down onto the outside of the pipe when the nut is tightened over the joint

Tools Required:

Installation is simple and straight forward. To install **Duratec** Pipe and **Duratec** fittings, you will need the following, Plastic Pipe Cutter, **Duratec** beveling tool, adjustable end wrench(es), Suitable bending spring (optional).

Procedure:

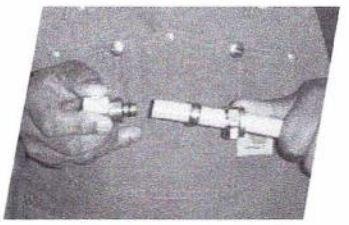
Cutting and Joining **Duratec**



1. Cut the pipe square. A plastic pipe cutter should be used. Ensure that the stainless steel cutting blade being used is in good condition and sharp. **Rotate wrist while cutting**.
2. Remove the nut and the split ring from the fitting.

3. Push the nut and the split ring onto the pipe. Bevel the inside of the pipe by inserting the Duratec reaming tool and **rotating it 360° to engage the blades**. The fitting will then slip easily into the pipe without displacing the o-rings.
4. Push the fitting onto the pipe and fully against the shoulder of the fitting. If necessary, at this point the fitting can be rotated on the pipe to facilitate threading onto a valve, tee, etc.

   Turn the nut finger tight, plus one full turn with a wrench.



5. If it is necessary to remove the fitting, release the nut, remove the split ring and pull the fitting off the pipe. Before reassembling the joint, inspect the split ring and o-rings and replace them if necessary.

Bending Duratec Pipe:

Duratec is easy to bend and unlike plastic pipes, retains it shape when bent. External bending springs and standard tube benders are available. Pipe in dimensions 3/8, 1/2, and 3/4 inch are easily bent by hand. For 1 inch pipe or if the bending radius is near the recommended limit of five (5) times the diameter of the pipe, a bending tool should be used.

Air Testing Procedures

The purpose of a site pressure test is to establish that all joints have been correctly made. Air test in accordance with the authority having jurisdiction.

After making the first 20 or 30 joints, it is recommended that a test be applied to prove that the installation is satisfactory. If a leak is discovered, follow the appropriate procedure below. Testing of **Duratec** systems can take place immediately upon installation, since the joining procedure does not require a curing time.

The pressure testing procedure detailed below should be strictly followed.

1. Fully inspect the installed piping for evidence of mechanical abuse and suspect joints.
2. Split the system into convenient test sections, not exceeding 1,000 feet. The piping should be capped off with a **Duratec** cap at the end of the pipe section to be tested.
3. Test **Duratec** to a maximum of 1.25 times the design operating pressure up to a maximum of 1.0 times the IPEX maximum rated pressure. Duration of testing shall comply with local regulatory measures or alternatively with the engineer designing and inspecting the system.
4. If there is a significant drop in pressure, or extended times are required to achieve the desired pressure, joint leakage has occurred. In this event inspect for joint leaks.
5. If joints are leaking, tighten the nut 1/8 to 1/4 turn.
6. Repeat Step 3 after repairing any leaking joints.

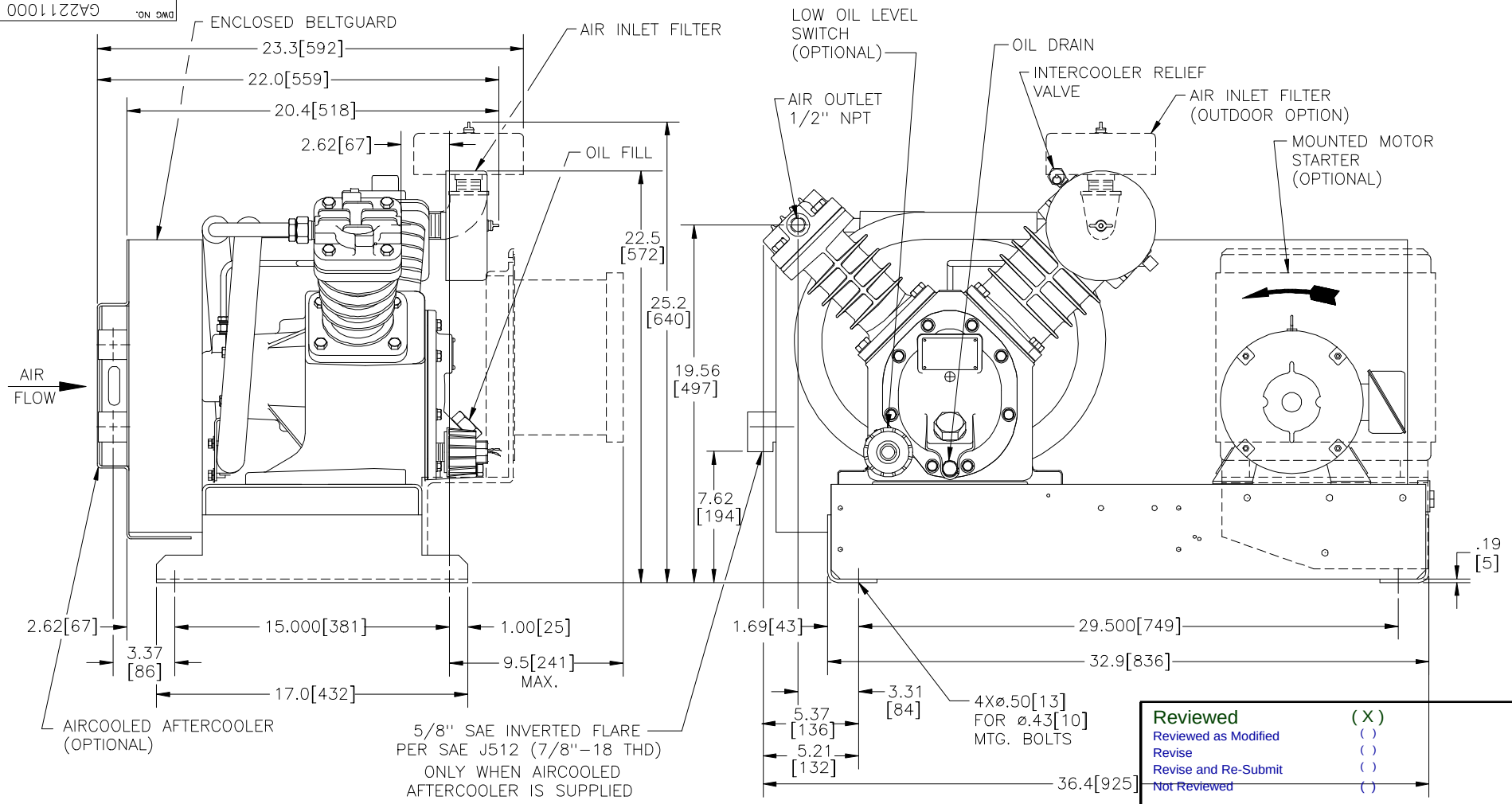
Air burst system includes:

Ingersoll Rand 2475X5 Air Compressor
Capacity- 17.1 cfm @ 125 PSIG
Maximum Pressure- 175 PSIG
TEFC motor enclosure
Nema IV starter
Nema IV pressure switch
Nema IV low oil switch
Start Up Kit

Reciever:
80 gallon vertical receiver with platform mounted compressor
200psi ASME coded vessel
Pressure gauge
Safety valve
Auto Drain 110 VAC

Valve:
Two 1.5" NPT ball valve, all stainless steel, RTFE seats and TFE stem seals, with locking handle. Valves to be installed in the field.

KUGLUTUK estimated bill of materials		
QNTY	PART NUMBER	DESCRIPTION
1	2475N5	5hp base mounted compressor
1	32276313	NEMA 4 low oil level switch
1	IR	TEFC motor
1	IR	Auto start stop NEMA 4
1	IR	start-up kit
1	B424B 200#	nema 4 pressure switch
1	EDV2000	120vac Auto drain
1	A21324048200	80 gallon receiver
1		paint receiver
2	1 1/2" 1366TEM	1 1/2" SS full ported theaded ball valves



NOTES:

1. FOUNDATION OR FLOOR MUST BE LEVEL AND SUPPORT ALL FEET EQUALLY; IF NECESSARY SHIM OR GROUT THE FOURTH FOOT.
2. FOUNDATION BOLTS SHOULD PROJECT THRU NUTS AT LEAST 1/2" [13] TO ALLOW FOR LEVELING.
3. ALLOW AT LEAST 12.00"[305] CLEARANCE MINIMUM ON ALL SIDES FOR PROPER AIR CIRCULATION.
4. APPROXIMATE NET WEIGHT: 350 LBS.[159kg]
5. ALL UNSPECIFIED DIMENSIONS: XXX = .125[3]
   XX = .25[6]
   X = .5[13]
6. DIMENSIONS IN [ ] ARE MILLIMETER DIMENSIONS UNLESS OTHERWISE SPECIFIED.

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WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray, EIT, Williams Engr.
Date: 04/11/2011

WILLIAMS ENGINEERING CANADA

APPROVED FOR:
IR ORDER NO.
CUSTOMER:
CUSTOMER ORDER NO.
PER: DATE:

SIZE:
MODEL:
PISTON DISPLACEMENT:
SPEED RPM:
DISCHARGE PRESSURE RATING:
ACTUAL DELIVERY:
REGULATION:

JOB: SPEC:
ITEM: CONTRACTOR:
ARCH.ENGR.:
MTR. H.P./KW: MTR. ENCL.:
MTR. VOLTS: PH: HZ:
STARTER TYPE:

THIRD ANGLE PROJECTION
SCALE 1/4"=1"
DATE
DRAWN J.SMITH
CHECKED
DSN. APP
ENGR. APP

INGERSOLL-RAND Co.
RECIPROCATING COMPRESSOR DIVISION
SMALL COMPRESSOR BUSINESS UNIT
CAMPBELLSVILLE, KY

REF. 2475X5
TITLE GENERAL ARRANGEMENT
SIZE C | DWG NO. GA2211000 | REV. 04
SHEET 1 OF 1

RCE-GC-11/97

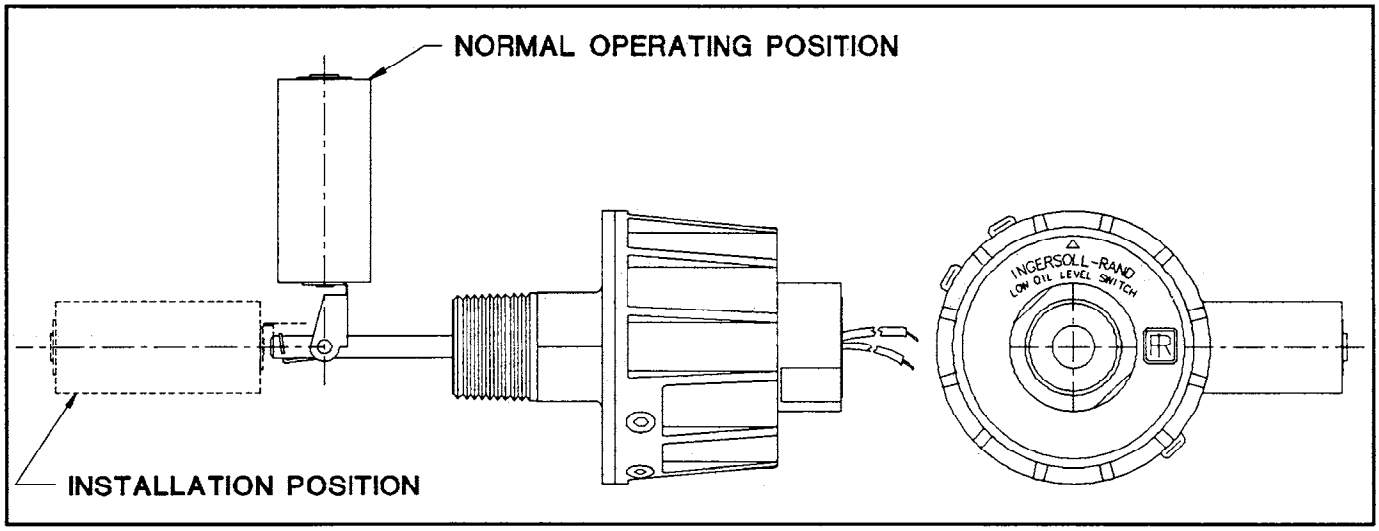

FIGURE 1. SWITCH ALIGNMENT.

checked immediately. A defective switch must be replaced.

A. REMOVAL. (**NOTE**: Frame end cover removal is not required to remove the low oil level switch).

1). Disconnect the main power supply and drain the oil from the frame (refer to your Instruction Manual for oil change procedures).
2). Disconnect the switch wires from the control circuit.
3). Loosen the three set screws and remove the switch cover.
4). Remove the switch body from the compressor frame. (**NOTE:** If the switch is to be removed from the compressor for an extended period of time, install a 3/4" NPT plug into the frame opening to keep dust and dirt out of the frame).

B. CLEANING. Thoroughly clean the float with a dry rag. If necessary, a non-flammable solvent can be used provided the float is wiped clean before the switch is reinstalled.

C. TESTING. The switch can be tested with a standard 12-volt automotive test light.

1). Align the cover on the switch body as shown in Figure 1.
2). Hold the float up so that the contact rod and cover do not make contact. The test light should be on.
3). Release the float. When the rod and cover make contact, the test light should go off.

D. INSTALLATION.

1). With the switch cover removed, apply pipe thread sealant to the switch threads.
2). With the float extended straight out, insert the switch body into the frame and tighten. When properly installed, the switch should be aligned as illustrated in Figures 1 and 2.
3). Hold the contact rod straight up at a 90° angle. Install the switch cover with the arrow pointing straight up at a 90° angle.
4). Carefully and evenly tighten the three set screws to secure the cover to the switch body, using caution not to over-tighten and damage the switch. The set screws should be torqued to 24-32 In. Oz.
5). Connect the switch wires to the control circuit. (Refer to your Instruction Manual).
6). Fill the compressor frame with lubricant. (Refer to your Instruction Manual).

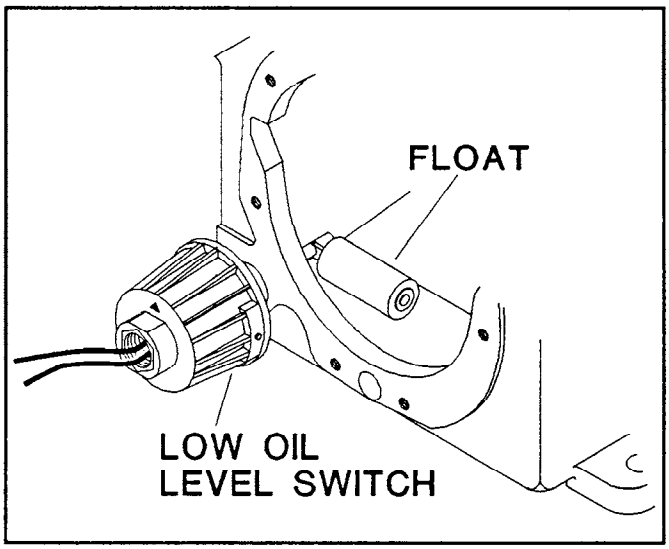

FIGURE 2. SWITCH INSTALLATION.

7. PARTS LIST DATA.

Should it ever be necessary to replace the switch, supply the information in Table 2. when ordering.

PART NBR.	DESCRIPTION
32276313	SWITCH, LOW OIL LEVEL

TABLE 2. PARTS LIST DATA.

INGERSOLL-RAND®

TECHNICAL MANUAL SUPPLEMENT

T30

Small Compressor Division
INGERSOLL-RAND COMPANY
Campbellsville, KY 47218

LOW OIL LEVEL SWITCH

PART NUMBER 32276313

⚠ WARNING

Compressed Air Has Great Force.

Can Cause Severe Injury or Death.

Always release air pressure from the compressor, air receiver and associated tubing and components before servicing this compressor.

⚠ WARNING

Hazardous Voltage.

Can Cause Severe Injury or Death.

Always disconnect power supply before performing any maintenance or repair work on this compressor.

1. PURPOSE.

The purpose of this publication is to provide maintenance and parts list information regarding the latest design improvements on your Ingersoll-Rand air compressor. The information contained herein has not yet been incorporated in the Instruction and Parts List Manuals provided with your compressor.

2. SCOPE.

This supplement is applicable to all Type 30 (T30) air compressors manufactured after April 1, 1994. Depending on the air compressor purchased, the Low Oil Level Switch is available as either standard or optional equipment.

3. PRECEDENCE.

The maintenance procedures contained in Paragraph 6 supersede the corresponding data in the Instruction Manual supplied with your air compressor. When ordering spare or replacement parts, the part numbers listed in Paragraph 8 should be used in place of those shown in the Parts List. This publication, along with the Instruction Manual and Parts List should be kept in a location which is accessible to operation and maintenance personnel.

4. DESCRIPTION.

A properly functioning Low Oil Level Switch is critical to the operation of your compressor. Operating the compressor with a defective switch can cause extensive damage should the frame oil level drop to an unsafe point undetected. The switch is a single-pole, double-throw device, and is NEMA 4 rated. Switch data is listed in Table 1.

The low oil level switch does not alleviate the need to check the frame oil level in your compressor on a regular basis (Refer to the SCHEDULED MAINTENANCE table in your Instruction Manual). Ingersoll-Rand Company cannot assume responsibility for any damage which might occur as the result of operating the compressor without adequate lubrication.

AMPS	VOLTAGE
0.4	575 VAC PILOT DUTY
1/4	250 VDC - NON-INDUCTIVE
1/2	125 VDC - NON-INDUCTIVE
3-1/2	24 VDC - NON-INDUCTIVE
10	125, 250, 480 VAC

TABLE 1. SWITCH DATA.

5. OPERATION.

If the oil level in the compressor frame reaches an unsafe level, the float will cause the switch contacts to open and shut down the unit. When the proper lubricant level has been restored, the float will reset to its original position, closing the switch contacts. The compressor can then be restarted.

6. MAINTENANCE.

Under normal operation, the low oil level switch requires no operator intervention or routine maintenance. If the switch fails, as evidenced by frequently shutting off the motor, or failing to shut off the motor if the oil level drops to an unsafe point, it should be removed and

FORM SCD-599
March 1994

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 04/11/2010

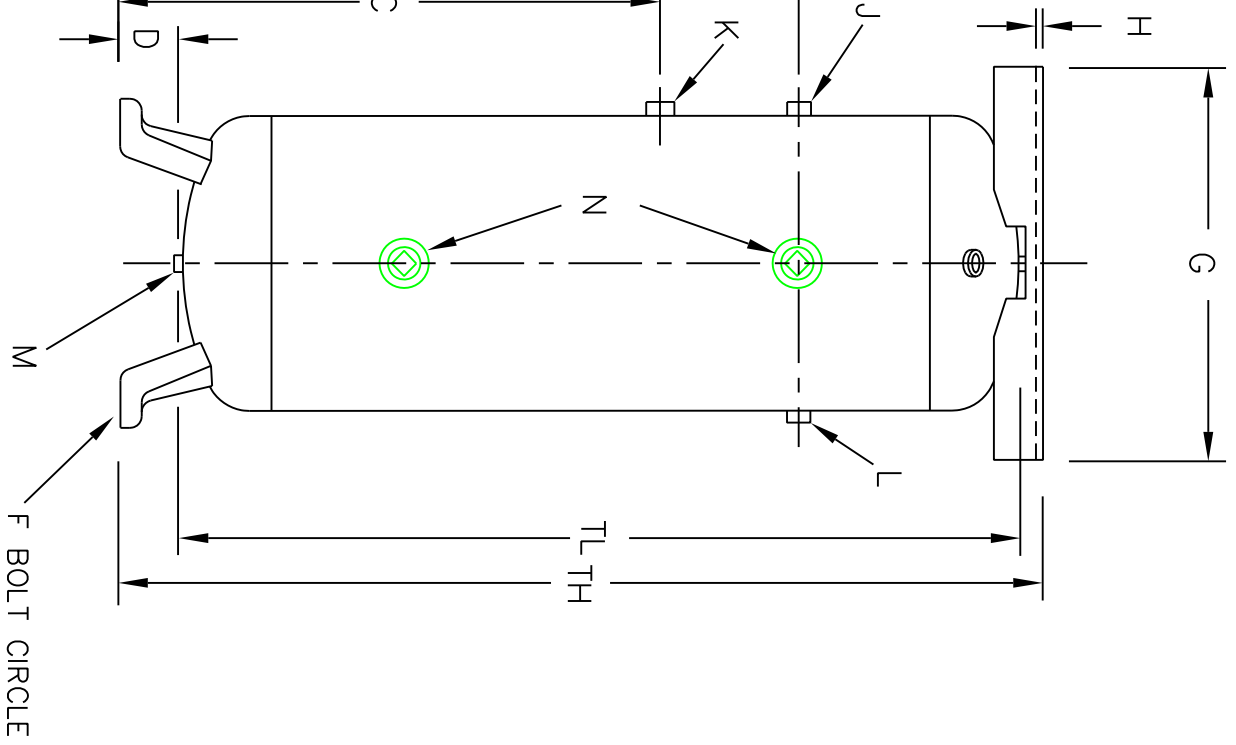
WILLIAMS ENGINEERING CANADA

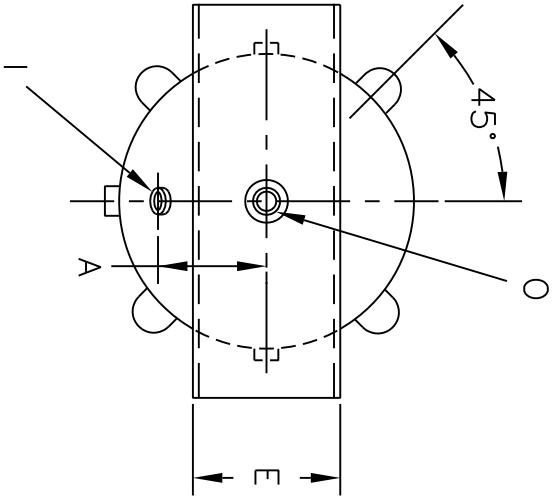
VERTICAL AIR RECEIVER

200 PSI AT 450 F

ASME CODE SECTION VIII

NAT'L BOARD REGISTERED





DESCRIPTION				DIMENSIONS								OPENINGS						
GAL	DIA	TL	TH	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
30	16	38	41 1/4	6 1/2	30 1/4	24 1/4	1 3/4	9	18	23	3/16	1/4	3/4	3/4	3/4	1/2	1 1/2	3/4
60	20	48	52	8 1/2	40	34	2 1/2	13	23	30	3/16	1/4	3/4	3/4	3/4	1/2	2	3/4
80	24	48	53 1/2	10	40 1/2	34 1/2	3 7/8	13	26	30	1/4	1/4	1 1/4	1 1/4	1 1/4	1/2	2	1 1/4

King Mechanical Specialty

VERT. AIR REC W/PLTF

1-1133 | 1

Ingersoll Rand®

EDV-2000™ Electric Drain Valve

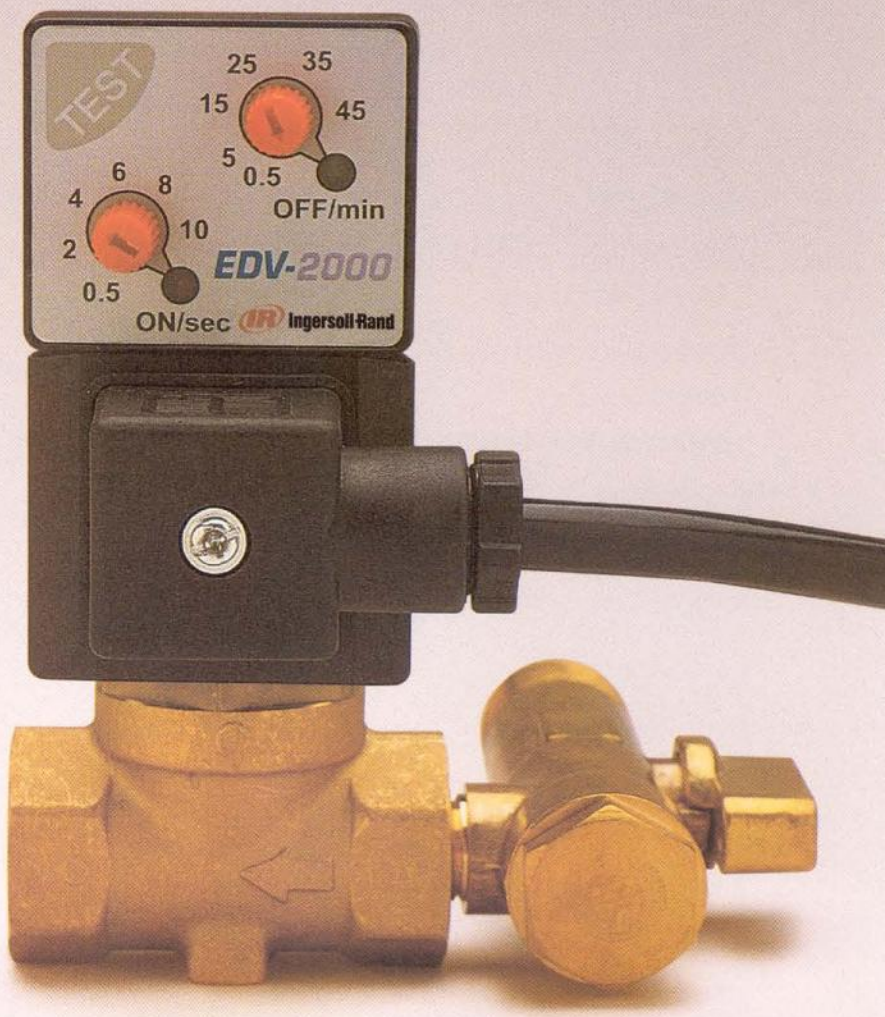
The EDV-2000 is a "user friendly" full feature automatic electric drain valve that cost effectively removes condensate from compressors, receivers, dryers, aftercoolers, filters and drip legs. Each EDV-2000 includes an electric drain valve and a strainer/ball valve.

The EDV-2000 is:

- Easy to read
- Easy to adjust
- Compact
- Reliable

The EDV-2000 provides the following features:

- **2 year warranty**
- 100% Continuous Duty.
- Large-scale, adjustable "time on" drain cycle of 0.5-10 seconds.
- Large-scale, adjustable "time off" timer interval of 0.5-45 minutes.
- Ultra bright LED to indicate power is on and to indicate valve is open.
- Soft touch TEST switch for manual override.
- Strainer/ball valve combination prevents valve from clogging and allows isolation for servicing.
- Ingersoll-Rand exclusive SBV hex cap with whistle notch to alarm if strainer is being serviced under pressure.
- Agency approvals (recognized components mark).
- NEMA 4 (IP65) enclosure
- 6' (1.83M) heavy duty power cord with AC plug.



Ingersoll Rand®

EDV-2000™ Specifications

110/120 V 50-60 Hz I-R Part No.	230/240 V* 50-60 Hz I-R Part No.	Max. Pressure psi (Bar)	Discharge Rate in gallons (liters) per 5 seconds valve "on time"	Connection Size	Orifice Size
EDV-2000					
37995925 (NPT)	37995933 (NPT)	250 (17.25)	up to 0.1 gal. (0.378ℓ)	1/4"	3/32"
EDV-2000 Field Retrofit Assembly					
97339352 (NPT)	97339402 (NPT)	250 (17.25)	up to 0.1 gal. (0.378ℓ)	1/4"	3/32"
EDV-2000					
54410931 (NPT)	37995909 (NPT)	250 (17.25)	up to 0.26 gal. (0.983ℓ)	1/4"	7/16"
38000865 (BSP)	38000873 (BSP)	250 (17.25)			
EDV-2000					
37995891 (NPT)	37995917 (NPT)	250 (17.25)	up to 1.6 gal. (6.048ℓ)	1/2"	7/16"
38000808 (BSP)	38000881 (BSP)	250 (17.25)			

*Based upon a 90 PSI (6.2 bar) air system and 5 seconds valve "on time." Flow rates may vary with installation.
**230 volt models are supplied without AC plugs.

Timer Interval.....0.5-45 minutes

Drain cycle.....0.5-10 seconds

Maximum Air Pressure.....250 psig (17.25 bar)

Dimensions.....4-3/4" x 3-1/2" x 2" (121mm x 89mm x 51mm)
(Small size is a distinct advantage for drain valves.)

Weight.....1-1/2 lbs.(680 grams)

Operating Temperature

Fluid.....33°F-265°F (1°C-129°C)

Ambient.....4°F-125°F (-16°C-52°C)

Manual Override.....Yes

Seals.....Viton

LEDs.....Ultrabrights
(Significantly brighter than competitors'.)

Controls.....Large, easy to read and adjust

Mounting.....NPT or BSP connections

NEMA 4 (IP) Enclosure.....Yes

Valve Plunger.....18FM

Valve Body.....Low lead brass (≤ 1/2%)

Size	NPT (Part No.)	BSP (Part No.)
1/4"	54381090	38002515
1/2"	37996337	38002523

The EDV-2000 Strainer/Ball Valve Assembly

- Prevents debris from clogging drain valves
- Hand turn isolation valve (1) (disconnects flow to valve)
- Trash trap hex cap (I-R exclusive) (2)
- Stainless steel filter screen, Part #38000154
- Maximum pressure 250 psi
- Brass body
- Height 3.30" (84mm), width 2.16" (55mm)
- 1/2" male NPT or BSP connection to air systems
- Available in 1/4" and 1/2" male NPT or BSP valve discharge connection

Ingersoll-Rand

 Form 3183-C Printed in U.S.A.

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

Date: 04/11/2010

WILLIAMS ENGINEERING CANADA

Ingersoll-Rand Company
Air Solutions
Davidson, NC
www.air.ingersoll-rand.com

ASHCROFT®

Pressure and Differential Pressure Switches, Watertight Enclosure, Type 400, B-Series

This general purpose Ashcroft® switch series is ideal for use in virtually all Industrial and OEM applications.

- ***Watertight NEMA 4X enclosure, IP66***
- ***Choice of switch elements for all applications, including hermetically sealed***
- ***Wide choice of wetted materials, including all-welded Monel or stainless steel***
- ***Fixed or limited adjustable deadband***
- ***Approved for UL, CSA and FM ratings***
- ***Choice of actuators, including designs for fire-safe and NACE applications(8)***
- ***Readily available***
- ***Standard pressure connection materials:***

  Pressure psi ranges
  - 316 SS

  Differential psid ranges
  - Nickel-plated brass

  Pressure and differential inches of water ranges
  - Carbon steel

1 - ENCLOSURE

B4 - Pressure switch, type 400, watertight enclosure meets NEMA 3, 4, 4X and 13, IP66 requirements

D4 - Differential pressure switch, type 400, watertight enclosure meets NEMA 3, 4, 4X and 13, IP66 requirements

2 - SWITCH ELEMENTS

Order Code	Description/Maximum Electrical Ratings UL/CSA listed SPDT	
20(4)	Narrow deadband	15A, 125/250 Vac
21	Ammonia service	5A, 125/250 Vac
22(3)	Hermetically sealed switch, narrow deadband	5A, 125/250 Vac
23	Heavy duty ac	20A,125/250 Vac
24(1)	General purpose	15A,125/250/480 Vac 1/2A, 125 Vdc 1/4A, 250 Vdc
25	Heavy duty dc	10A,125/ Vac or dc 1/8HP 125/ Vac or dc
26(4)	Sealed environment proof	15A, 125/250 Vac
27	High temp. 300°F	15A, 125/250 Vac
28	Manual reset trip on increasing	15A, 125/250 Vac
29	Manual reset trip on decreasing	15A, 125/250 Vac
31	Low level (gold) contacts	1A,125/250 Vac
32	Hermetically sealed switch, general purpose	11A, 125/250 Vac 5A, 30Vdc
50	Variable deadband	15A,125/250 Vac
	UL/CSA listed dual SPDT(2)	
61(4)	Dual narrow deadband	15A, 125/250 Vac
62(4)	Dual narrow environment proof	15A, 125/250 Vac
63	Dual high temp. 300°F	15A, 125/250 Vac
64	Dual general purpose	15A, 125/250/480 Vac 1/2A, 125 Vdc 1/4A, 250 Vdc
65	Dual ammonia service	5A, 125/250/480

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Date: 04/11/2010

WILLIAMS ENGINEERING CANADA

3 - ACTUATOR SEAL(7)

Code & Material	Process Temp.(6) Limits °F	Range Vac "H_2O	0-600 psi	1000 psi	2000-3000 psi
B-Buna N	0 to 150	●	●	●	●
V-Viton	20 to 300	●	●	●	
T-Teflon	0 to 150	●	●	●	●
S-SS(6)	0 to 300		●	●	
P-Monel(6)	0 to 300		●	●	

4 - OPTIONS

See page 158

5 - STANDARD PRESSURE RANGES

See page 155

NOTES:

1. Standard switch.
2. Dual switches are 2 SPDT snap-action switches not independently adjustable.
3. Estimated dc rating, 2.5A, 28 Vdc (not UL listed).
4. Estimated dc rating, .4A, 120 Vdc (not UL listed).
5. Available on pressure only.
6. Ambient operating temperature limits –20 to 150°F, all styles. Setpoint shift of ±1% of range per 50°F is normal.
7. Items are wetted by process fluid.
8. Refer to Option Table.

TO ORDER THIS B-SERIES PRESSURE SWITCH:

Select: **B4 20 B XPK 600 psi**

1. Enclosure: B4
2. Switch Element: 20
3. Actuator Seal: B
4. Options (page 158): XPK
5. Pressure Range (page 155): 600 psi

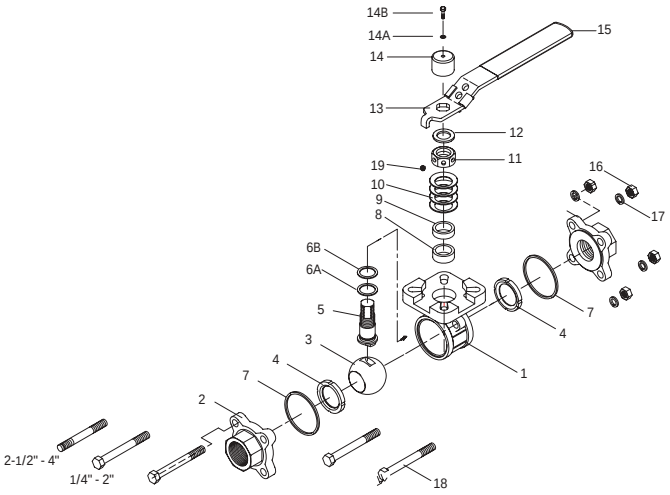
Consult factory for guidance in product selection
Phone (203) 878-5641 FAX (203) 877-8519

INSTRUMENT DIVISION DRESSER

SHARPE® SERIES 13 DIR-ACT® 3 PIECE BALL VALVES

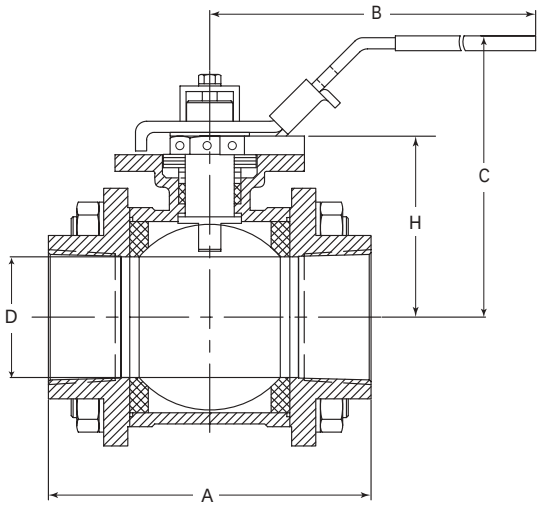
STANDARD FEATURES	ADVANTAGES
Compact Dependable Automated Assemblies	Actuator Bracket couplings are eliminated resulting in a lower profile and reliable automated assembly.
In-Service Adjustable Stem Packing	The large oversized packing nut, "Mc-Nut" is drilled on each flat. This allows the use of a standard allen wrench to make stem packing nut adjustments while the valve is in service and without removal of the actuator, **U.S. Patent No. 6,446,935 B1.**
Live Loaded Multiple Packing Stem Seal System	The stem seal system uses a combination of an internal thrust washer, an internal stem seal made from Peek, and Nova, two large Nova upper stem seals, and four Belleville spring washers to insure high cycle leak free service.
Heavy Duty Large Diameter Stem	The heavy duty stem is larger than comparable valves, which insures extended service life, less down time and overall lower cost.
Integral ISO Mounting Pads	The cast mounting pad is precision machined to ISO standards and will allow for actuation variations depending on application requirements.
Steam Rated	TFM® and RTFE seats are designed to handle 150 lb. steam.
Vented Ball	Drilled stem slot insures the ball cavity is vented to the process stream. This prevents cavity over-pressurization especially in steam service.
Full Port Design 1000 WOG	The full port design insures full flow and minimal cavitation or pressure drop in critical applications. The valve carries a pressure rating of 1000 WOG.
Three Piece Body Design 1/4" - 4"	The three piece body design provides a stable compact valve platform, with a variety of end connection options.
Option - Manual	Regular lever handle is available, also oval handle that extends 2-1/4" high.

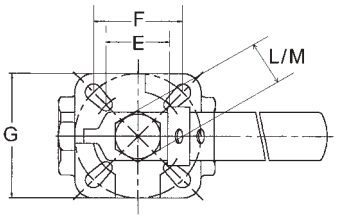
SERIES 13 PARTS AND DIMENSIONS

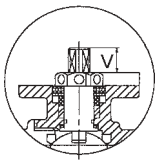


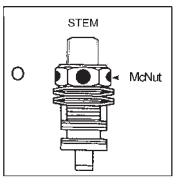
PART NO.	PART	QTY.	MATERIAL
1	Body	1	316 Stainless Steel ASTM A351 CF8M Carbon Steel ASTM A216 WCB
2	Pipe Ends	2	316 Stainless Steel ASTM A351 CF8M Carbon Steel ASTM A216 WCB
3	Ball	1	316 Stainless Steel
4	Seat	2	TFM® (1/4" - 2) RTFE (2-1/2" - 4")
5	Stem	1	316 Stainless Steel
6A	Thrust Bearing	1	PEEK
6B	Thrust Bearing	1	Nova
7	Body Seal	2	TFE
8	Stem Packing	1	Nova
9	Gland Packing	1	304 Stainless Steel
10	Belleville Washers	4	Stainless Steel
11	McNut® (Packing Nut)	1	316 Stainless Steel
12	Handle Washer	1	Stainless Steel
13	Handle	1	Stainless Steel
14	Stem Cover	1	304 Stainless Steel
14A	Washer	1	304 Stainless Stel
14B	Cover (Bolt)	1	304 Stainless Steel
15	Handle Sleeve	1	PVC
16	Bolt Nut	4/8/12*	Stainless Steel
17	Bolt Washer	4/8/12*	304 Stainless Steel
18	Bolt	4/8/12*	304 Stainless Steel
19	Set Screw	1	Stainless Steel

* 4 = 1/4"-2", 8 = 2-1/2"-3", 12 = 4"

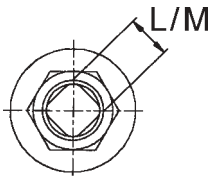


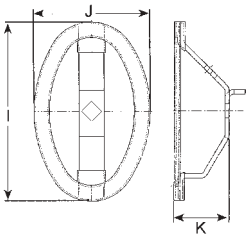






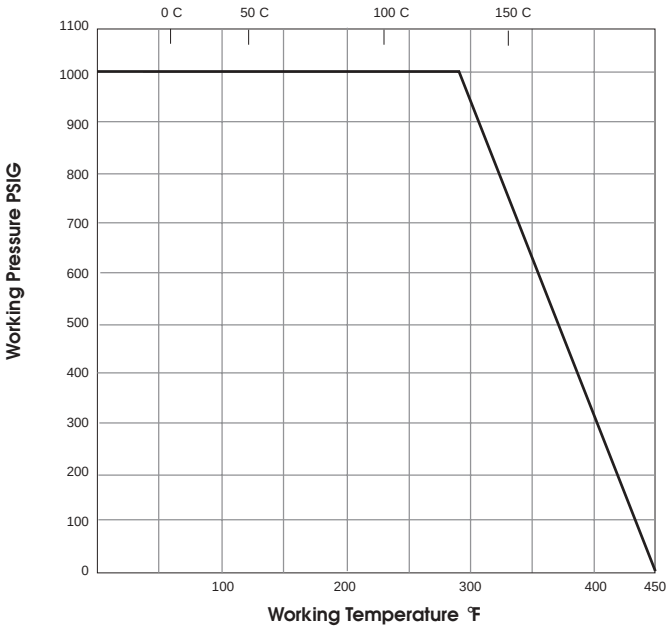
STEM ARRANGEMENTS





SIZE	A	B	C	D	E	F	G	H	I	J	K	L/M	O	V
1/4"	2.55	4.93	2.42	0.45	1.00	1.17	1.65	1.50	3.90	2.50	2.50	0.35	9/64	0.43
3/8"	2.55	4.93	2.42	0.50	1.00	1.17	1.65	1.50	3.90	2.50	2.50	0.35	9/64	0.43
1/2"	2.84	4.93	2.42	0.60	1.00	1.17	1.65	1.50	3.90	2.50	2.50	0.35	9/64	0.43
3/4"	3.35	4.93	2.74	0.78	1.17	1.39	1.97	1.85	4.15	2.50	2.50	0.35	9/64	0.45
1"	3.62	7.50	3.19	1.00	1.39	1.95	2.75	2.20	4.15	2.50	2.50	0.35	9/64	0.58
1-1/4"	4.34	7.50	3.26	1.25	1.39	1.95	2.75	2.55	6.45	4.15	2.50	0.43	9/64	0.63
1-1/2"	4.84	7.50	3.47	1.50	1.39	1.95	2.75	2.75	6.45	4.15	2.50	0.43	9/64	0.63
2"	5.58	7.50	3.84	2.00	1.39	1.95	2.75	3.15	6.45	4.15	2.50	0.43	9/64	0.63
2-1/2"	6.84	9.85	5.90	2.50	1.95	2.84	4.00	3.85	X	X	X	0.67	7/32	0.78
3"	7.59	9.85	6.30	3.00	1.95	2.84	4.00	4.25	X	X	X	0.67	7/32	0.78
4"	10.77	15.00	6.90	4.00	2.84	3.48	4.90	4.90	X	X	X	0.67	7/32	1.00

PRESSURE TEMPERATURE RATINGS



PERFORMANCE DATA

SIZE	CV	BREAKAWAY TORQUE*
1/4”	8	40 LB. IN.
3/8”	8	40 LB. IN.
1/2”	38	40 LB. IN.
3/4”	71	80 LB. IN.
1”	110	110 LB. IN.
1-1/4”	230	160 LB. IN.
1-1/2”	350	190 LB. IN.
2”	600	250 LB. IN.
2-1/2”	320	500 LB. IN.
3”	580	720 LB. IN.
4”	820	800 LB. IN.

* THE TORQUE CAN VARY DUE TO PRESSURE AND TEMPERATURE. THE TORQUE FIGURES REPRESENT MAXIMUM LINE PRESSURE.

HOW TO ORDER

VALVE SIZE	VALVE SERIES	BODY BALL & STEM	ENDS	SEATS	PNEUMATIC ACTUATOR	DOUBLE ACTING & SPRING RETURN	ELECTRIC ACTUATOR	OPTIONS
1/4”	13	6 = 316 Stainless	6 = 316 Stainless	M = TFM®	SPN 032	DA= Double Acting	SEA II RX	Pneumatic
3/8”			4 = Carbon Steel	R = RTFE	SPN 050	SR5 = Spring Return	(100 IN. LB.)	Hi-Temp
1/2”					SPN 063	5 Springs	SEA II SX	V = VITON O-Rings
3/4”			TE = Threaded Ends		SPN 075	SR6 = Spring Return	(200 IN. LB.)	Electric
1”			SW = Socket Weld		SPN 085	6 Springs	SEA II SXX	S = 2 Aux. Individually Adjustable
1-1/4”			BW = Butt Weld		SPN 100	SR7 = Spring Return	(300 IN. LB.)	M =Modulating 4-20mA, 0-10 VDC[2]
1-1/2”			SCH 5, 10, 40		SPN 125	7 Springs	SEA II MRX	H = Heater
2”					SPN 145	SR8 = Spring Return	(675 IN. LB.)	A = Indicator Arrow
2-1/2”					SPN 160	8 Springs	SEA II MLX	T = Override T-Handle
3”						SR9 = Spring Return	(1000 IN. LB.)	B = External Battery Back-up
4”						9 Springs	SEA II MHX	L = Regular Lever
						SR10 = Spring Return	(1500 IN. LB.)	OH =Oval Handle
						10 Springs		7 = 17-4PH Stem
						SR11 = Spring Return		
						11 Springs		
						SR12 = Spring Return		
						12 Springs		

3/4” 13 6 6TE M SPN 050 DA

SHARPE® VALVES
A DIVISION OF Sharon Piping & Eqpt. Inc.

Toll-Free 1-877-7SHARPE
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E-Mail: info@sharpevalves.com
www.sharpevalves.com
1260 Garnet Drive
Northlake, Illinois 60164 U.S.A.

Rev. 8/06

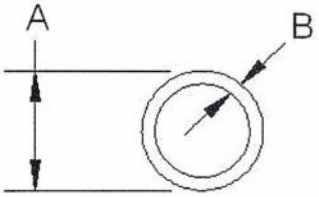
Construction
Automotive
Industry

REHAU®
Unlimited Polymer Solutions

PRODUCT SUBMITTAL 101

Product: **RAUPEX® UV Shield Pipe (Red/~~White/Blue~~)**

Date: **21-April-09 (supersedes, 1-October-09)**



Article #	Nominal Diameter	Average OD (A) inches (mm)	Wall Thickness (B) inches (mm)	Weight lb/ft (kg/m)	Capacity Gal/ft (l/m)
235331*	3/8"	0.500±0.003 (12.70±0.08)	$0.070_{+0.010/-0.000}$ ($1.78_{+0.25/-0.00}$)	0.04 (0.07)	0.0050 (0.0624)
235351	1/2"	0.625±0.004 (15.88±0.10)	$0.070_{+0.010/-0.000}$ ($1.78_{+0.25/-0.00}$)	0.06 (0.08)	0.0098 (0.1222)
235371	3/4"	0.875±0.004 (22.22±0.10)	$0.097_{+0.010/-0.000}$ ($2.47_{+0.25/-0.00}$)	0.10 (0.15)	0.0189 (0.2356)
235381	1"	1.125±0.005 (28.58±0.12)	$0.125_{+0.013/-0.000}$ ($3.18_{+0.33/-0.00}$)	0.17 (0.26)	0.0316 (0.3939)
132571+	1 ¼"	1.375±0.005 (34.92±0.12)	$0.153_{+0.015/-0.000}$ ($3.88_{+0.38/-0.00}$)	0.25 (0.37)	0.0467 (0.5827)
132581+	1 ½"	1.625±0.006 (41.28±0.16)	$0.181_{+0.019/-0.000}$ ($4.59_{+0.48/-0.00}$)	0.35 (0.52)	0.0650 (0.8118)
132591+	2"	2.125±0.006 (53.98±0.16)	$0.236_{+0.024/-0.000}$ ($6.00_{+0.61/-0.00}$)	0.60 (0.90)	0.1114 (1.3906)

*Only available in Red or Blue
+ Only available in White

TECHNICAL DESCRIPTION

Specification	English	SI	Standard
Minimum Density	58 lb/ft³	926 kg/m³	ASTM F 876 DIN 53479
Degree of Cross-Linking	70 - 89%	70 - 89%	ASTM F 876 DIN 16892
Thermal Conductivity	0.24 BTU/(hr ft °F)	0.41 w/(m°K)	DIN 52612
Linear Exp.	9.33 x 10-4 in/ft°F @ 68°F 1.33 x 10-3 in/ft°F @ 212°F	0.14 mm/(m°C) @ 20°C 0.2 mm/(m°C) @ 100°C	DIN 42328
Modulus of Elasticity	87,000 - 130,500 psi @ 68°F 43,500 - 58,000 psi @176°F	600 - 900 N/mm2 @ 20°C 300 – 400 N/mm2 @ 80°C	DIN 53457

Specification	English	SI	Standard
Tensile Strength	4194-4355 psi @ 68°F 2610-2900 psi @ 176°F	26-30 N/mm2 @ 20°C 18-20 N/mm2 @ 80°C	DIN 53455
IZOD Impact Res.	No Break	No Break	DIN 53453
Temperature Working Range	-40°F to 200°F	-40°C to 93°C	N/A
Roughness	e=0.00028 in	e=0.007 mm	N/A
Max. Short-term Exposure	150 psig @ 210°F (48 hr)	1035 kPa @ 99°C (48 hr)	ASTM F 876
Red/Blue UV Resistance	One year	One year	PPI TN-33
White UV Resistance	3 Months	3 Months	PPI TN-33

Reviewed (X)
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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

FUNCTIONAL DESCRIPTION

RAUPEX UV Shield pipes are manufactured using REHAU's high-pressure peroxide method for cross-linked polyethylene (Engel method, PEXa). All RAUPEX UV Shield pipe meets or exceeds the requirements of ASTM F 876, F 877, CSA B 137.5 and PPI TR-3, and is certified to NSF Standards 14/61. RAUPEX UV Shield pipe also meets the requirements of NSF P 171 and ASTM F 2023 for chlorine resistance. RAUPEX UV Shield pipe is produced in REHAU's ISO 9001 certified manufacturing facilities.

RAUPEX UV Shield pipe is rated for continuous operation of 160 psi @ 73.4°F (1105 kPa @ 23°C), 100 psi @ 180°F (690 kPa @ 82.2°C) and 80 psi @ 200°F (550 kPa @ 93.3°C). It is compatible with brass crimp ring fittings certified to ASTM F 1807, RAUPEX compression nut fittings, and compression-sleeve fittings certified to ASTM F 2080 and CSA B 137.5. Use of RAUPEX UV Shield pipe in heating systems requires corrosion protection and/or isolation by using a heat exchanger or non-ferrous components throughout the system.

2. EVERLOC FITTINGS

EVERLOC fittings are ideal for fire protection applications. EVERLOC fittings and sleeves create reliable connections that can be embedded directly in a thermal mass (when walled-in or wrapped in chloride-free tape or RAUCROSS™ heat shrink tubing to help reduce corrosion caused by the surrounding environment – check local codes for compliance) or walled in. Installation is easy with EVERLOC tools.

EVERLOC fittings are produced from solid brass stock. Elbows and tees are hot-forged for superior strength and durability, while straight fittings are machined from solid brass rod. The EVERLOC fittings and sleeves listed below are produced to ASTM F2080 and meet the performance requirements of NSF 61, ASTM F877, CSA B137.5, UL 1821 and UL 1713.

EVERLOC Sleeves

		Package Quantity		Unit Weight		Minimum
Article No.	Description	Box	Carton	g	lb	Order
260577	3/4" EVERLOC Sleeve	80	480	37	0.08	1 box
260877 ✶	1" EVERLOC Sleeve	40	240	73	0.16	1 box

Sleeves are unplated brass. Tapered end installs toward fitting.

EVERLOC Couplings

		Package Quantity		Unit Weight		Minimum
Article No.	Description	Box	Carton	g	lb	Order
260317	3/4" x 3/4" EVERLOC	35	210	82	0.18	1 box
260427 ✶	1" x 1" EVERLOC	20	120	136	0.30	1 box

Order EVERLOC sleeves separately.

EVERLOC Plugs

		Package Quantity		Unit Weight		Minimum
Article No.	Description	Box	Carton	g	lb	Order
260397	3/4" EVERLOC Plug	60	360	54	0.12	1 box
260497	1" EVERLOC Plug	30	180	91	0.20	1 box

Order EVERLOC sleeves separately.

EVERLOC Copper Adapters

		Package Quantity		Unit Weight		Minimum
Article No.	Description	Box	Carton	g	lb	Order
260837	3/4" EVERLOC x 1" C Male (Street) or 3/4" C Female (Sweat)	25	150	118	0.26	1 box
260947	1" EVERLOC x 1 1/4" C Male (Street) or 1" C Female (Sweat)	20	120	163	0.36	1 box

Copper adapters connect RAUPEX pipe to copper pipe in sizes indicated. Many of these copper adapters can be used as male (street) or female (sweat) fittings. Make solder connection before connecting to RAUPEX pipe. Order EVERLOC sleeves separately.

EVERLOC Dual MPT/Copper Adapters

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
260327	3/4" EVERLOC x 3/4" MPT or 1/2" C Female (Sweat)	25	150	122	0.27	1 box
260597	3/4" EVERLOC x 1" MPT or 3/4" C Female (Sweat)	20	120	109	0.24	1 box
260437 ✳	1" EVERLOC x 1" MPT or 3/4" C Female (Sweat)	15	90	195	0.43	1 box

Dual adapters connect RAUPEX pipe to either female threaded fittings (first size) or copper pipe (second size) in sizes indicated. Make threaded or solder connections before connecting to RAUPEX pipe. Order EVERLOC sleeves separately.

EVERLOC Straight Tees

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
260617	3/4" x 3/4" x 3/4" EVERLOC Tee	15	90	191	0.42	1 box
260977 ✳	1" x 1" x 1" EVERLOC Tee	8	48	349	0.77	1 box

Order EVERLOC sleeves separately.

EVERLOC Run Reducing Tees

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
260687	1" x 3/4" x 1" EVERLOC Tee	10	60	322	0.71	1 box

Order EVERLOC sleeves separately.

EVERLOC Branch Reducing Tees

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
260707	1" x 1" x 3/4" EVERLOC Tee	10	60	295	0.65	1 box

Order EVERLOC sleeves separately.

EVERLOC FPT Tees

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
244077	3/4" x 3/4" EVERLOC x 1/2" FPT Tee	10	60	190	0.42	1 box
244087	1" x 1" EVERLOC x 1/2" FPT Tee	5	30	290	0.63	1 box

These EVERLOC tees are specially designed for installation of the residential sprinklers. Order EVERLOC sleeves separately.

90° Elbows – EVERLOC to EVERLOC

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
260677	3/4" x 3/4" EVERLOC Elbow	25	150	132	0.29	1 box
260717	1" x 1" EVERLOC Elbow	10	60	254	0.56	1 box

Order EVERLOC Sleeves separately.

90° Elbows – EVERLOC to FPT, Drop Ear

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
244027	3/4" EVERLOC x 1/2" FPT Drop Ear Elbow	15	90	150	0.33	1 box
244057	1" EVERLOC x 1/2" FPT Drop Ear Elbow	10	60	200	0.43	1 box

These EVERLOC elbows are specially designed for installation of the residential sprinklers. Order EVERLOC sleeves separately.

EVERLOC FPT Side Outlet Elbow

Article No.	Description	Package Quantity Box	Carton	Unit Weight g	lb	Minimum Order
244037	3/4" EVERLOC x 3/4" EVERLOC x 1/2" FPT Side Outlet Elbow	15	90	220	0.48	1 box
244067	1" EVERLOC x 1" EVERLOC x 1/2" FPT Side Outlet Elbow	10	60	310	0.67	1 box

These EVERLOC elbows are specially designed for installation of the residential sprinklers. Order EVERLOC sleeves separately.

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

NCI
Your Single Source Solution

FP600
FULL PORT FORGED
BRASS BALL VALVES
600 CWP

TFP600

SFP600

APPLICATIONS

Multi-purpose shut-off valve for use in engineered hot and cold water systems, gas applications and compressed air services.

MATERIALS AND CONSTRUCTION

- Forged brass body and patented "Raised V" end pieces for increased strength.
- Full port construction for high flow coefficient.
- Durable chrome-plated brass ball.
- Viton® "O" Ring and PTFE packing for upper-stem seal.
- Stem-threaded packing nut for easy adjustment.
- Blow-out Proof Stem.
- Conforms to MSS SP-110 standards

DESIGN CRITERIA

Threaded (IPS) only:

- CAN/CGA 3.16
  (1/2" through 2")
  125 psig
- AGA3-88 / CGA CR91-002
  (1/4" through 2")
  5 psig
- UL Listed Subject 258 for Trim and Drain (1/4" through 2")
- 150 WSP
- Available up to 4" in threaded and solder ends.
- cULus 300 PSI (Threaded only)

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WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Kevin Rattray EIT, Williams Engir

Date: 26/10/2010

NCI MARKETING INC
66 Don Hillock Drive
Aurora, Ontario L4G 0H6

Tel: 905.727.5545 or 1.800.268.3509
Fax: 905.727.4088

www.nci-marketing.com

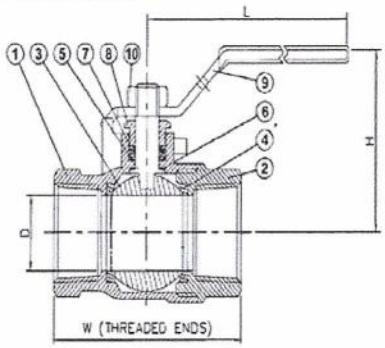
FP600 FULL PORT FORGED BRASS BALL VALVE

T-FP600 Threaded End (IPS)
1/4" through 2" 600 CWP
2½" through 4" 400 CWP

NCI
Your Single Source Solution

MATERIALS LIST		
	PART	SPECIFICATION
1	BODY	FORGED BRASS ASTM B124 C37700
2	END CAP	FORGED BRASS ASTM B124 C37700
3	SEAT	PTFE
4	BALL	BRASS ASTM B16 C36000/B124 C37700
5	STEM	BRASS ASTM B16 C36000
6	THRUST WASHER	PTFE
7	STEM PACKING	PTFE
8	GLAND	PTFE
9	HANDLE	BRASS ASTM B16 C36000
10	NUT	STEEL

Size (IN)	L	D	H	W
1/4"	3.23	0.37	1.37	1.81
3/8"	3.23	0.37	1.37	1.81
1/2"	3.23	0.50	1.45	2.12
3/4"	3.94	0.75	1.78	2.41
1"	4.72	0.98	2.29	2.96
1-1/4"	4.72	1.22	2.44	3.28
1-1/2"	7.09	1.50	3.00	3.67
2"	7.09	1.97	3.30	4.21
2-1/2"	8.66	2.50	4.59	5.38
3"	8.66	3.00	4.92	6.06
4"	9.84	3.98	5.73	7.39



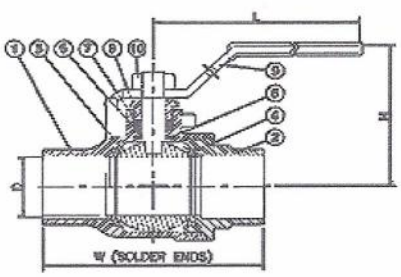
Above port dimensions meet or exceed full MSS 110 standards.

S-FP600 Solder End (C x C)
1/2" through 2" 600 CWP
2-1/2" through 4" 400 CWP

MATERIALS LIST		
	PART	SPECIFICATION
1	BODY	FORGED BRASS ASTM B124 C37700
2	END CAP**	FORGED BRASS ASTM B124 C37700
3	SEAT	PTFE
4	BALL	BRASS ASTM B16 C36000/B124 C37700
5	STEM	BRASS ASTM B16 C36000
6	THRUST WASHER	PTFE
7	STEM PACKING	PTFE
8	GLAND	PTFE
9	HANDLE	BRASS ASTM B16 C36000
10	NUT	STEEL

** *Patented "Raised V" design negates body joint leakage.*

Size (IN)	L	D	H	W
1/2"	3.23	0.50	1.45	1.94
3/4"	3.94	0.75	1.78	2.73
1"	4.72	0.98	2.29	3.29
1-1/4"	4.72	1.22	2.44	3.74
1-1/2"	7.09	1.50	3.00	4.30
2"	7.09	1.97	3.30	5.31
2-1/2"	8.66	2.50	4.59	6.29
3"	8.66	3.00	4.92	7.19
4"	9.84	3.98	5.73	9.26



FP600-0110

Raychem

BTV *

Visit www.tycothermal.com for more information on our ten-year extended warranty.

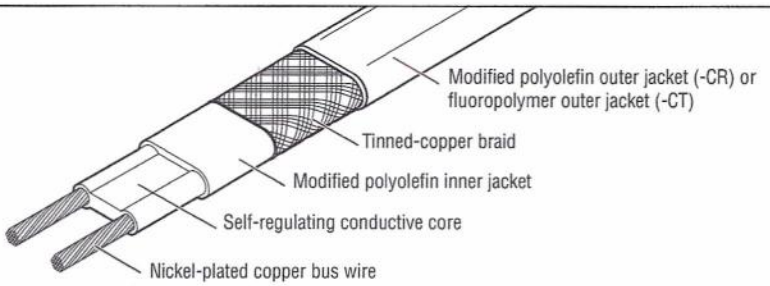
Self-regulating heating cables

Electrical freeze protection for both nonhazardous and hazardous locations.

The BTV family of self-regulating heating cables provides the solution to freeze-protection and process-temperature maintenance applications. BTV heating cables maintain process temperatures up to 150°F (65°C) and can withstand intermittent exposure to temperatures up to 185°F (85°C). The heating cables are configured for use in nonhazardous and hazardous locations, including areas where corrosives may be present.

Raychem® BTV cables meet the requirements of the U.S. National Electrical Code and the Canadian Electrical Code. For additional information, contact your Tyco Thermal Controls representative or call Tyco Thermal Controls at (800) 545-6258.

Heating cable construction



Application	
Area classification	Nonhazardous and hazardous locations
Traced surface type	Metal and plastic
Chemical resistance	Exposure to aqueous inorganic chemicals: Use -CR (modified polyolefin outer jacket) Exposure to organic chemicals or corrosives: Use -CT (fluoropolymer outer jacket) For aggressive organics and corrosives: Consult your Tyco Thermal Controls representative.
Supply Voltage	
BTV1	100–130 Vac
* BTV2	200–277 Vac
Temperature Rating	
Maximum maintain or continuous exposure temperature (power on)	150°F (65°C)
Maximum intermittent exposure temperature, 1000 hours (power on)	185°F (85°C)
Temperature ID Number (T-Rating)	T6: 185°F (85°C) Temperature ID numbers are consistent with North America national electrical codes.

Approvals

IECEx BAS 06.0043X
Ex e II T6 Ex tD A21 IP66

(1) BTV-CR is not CSA Certified for Division 1
(2) BTV-CT only

Hazardous Locations

FM APPROVED
Class I, Div. 2, Groups A, B, C, D
Class II, Div. 2, Groups F, G
Class III

Class I, Div. 1(1) & 2, Groups A, B, C, D
Class II, Div. 1(1) & 2, Groups E, F, G
Class III

Zone Approvals

FM APPROVED
CLI, ZN1, AEx e II T6(2)

Ex e II T6(2)

BTV heating cables also have many other approvals, including Baseefa (2001) Ltd., PTB, DNV, and ABS.

Design and Installation

For proper design and installation, use TraceCalc® Pro design software or the Design section of the *Industrial Product Selection and Design Guide* (H56550). Also, refer to the *Industrial Heat-Tracing Installation and Maintenance Manual* (H57274). Literature is available via the Tyco Thermal Controls Web site, www.tycothermal.com.

Raychem

BTV *

Visit www.tycothermal.com for more information on our ten-year extended warranty.

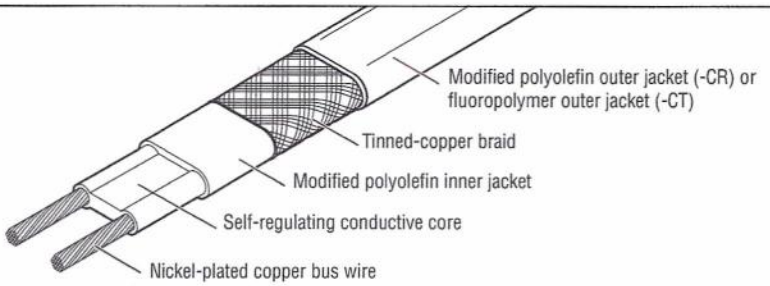
Self-regulating heating cables

Electrical freeze protection for both nonhazardous and hazardous locations.

The BTV family of self-regulating heating cables provides the solution to freeze-protection and process-temperature maintenance applications. BTV heating cables maintain process temperatures up to 150°F (65°C) and can withstand intermittent exposure to temperatures up to 185°F (85°C). The heating cables are configured for use in nonhazardous and hazardous locations, including areas where corrosives may be present.

Raychem® BTV cables meet the requirements of the U.S. National Electrical Code and the Canadian Electrical Code. For additional information, contact your Tyco Thermal Controls representative or call Tyco Thermal Controls at (800) 545-6258.

Heating cable construction



Application	
Area classification	Nonhazardous and hazardous locations
Traced surface type	Metal and plastic
Chemical resistance	Exposure to aqueous inorganic chemicals: Use -CR (modified polyolefin outer jacket) Exposure to organic chemicals or corrosives: Use -CT (fluoropolymer outer jacket) For aggressive organics and corrosives: Consult your Tyco Thermal Controls representative.
Supply Voltage	
BTV1	100–130 Vac
* BTV2	200–277 Vac
Temperature Rating	
Maximum maintain or continuous exposure temperature (power on)	150°F (65°C)
Maximum intermittent exposure temperature, 1000 hours (power on)	185°F (85°C)
Temperature ID Number (T-Rating)	T6: 185°F (85°C) Temperature ID numbers are consistent with North America national electrical codes.

Approvals

IECEx BAS 06.0043X
Ex e II T6 Ex tD A21 IP66

(1) BTV-CR is not CSA Certified for Division 1
(2) BTV-CT only

Hazardous Locations

FM APPROVED
Class I, Div. 2, Groups A, B, C, D
Class II, Div. 2, Groups F, G
Class III

Class I, Div. 1(1) & 2, Groups A, B, C, D
Class II, Div. 1(1) & 2, Groups E, F, G
Class III

Zone Approvals

FM APPROVED
CLI, ZN1, AEx e II T6(2)

Ex e II T6(2)

BTV heating cables also have many other approvals, including Baseefa (2001) Ltd., PTB, DNV, and ABS.

Design and Installation

For proper design and installation, use TraceCalc® Pro design software or the Design section of the *Industrial Product Selection and Design Guide* (H56550). Also, refer to the *Industrial Heat-Tracing Installation and Maintenance Manual* (H57274). Literature is available via the Tyco Thermal Controls Web site, www.tycothermal.com.

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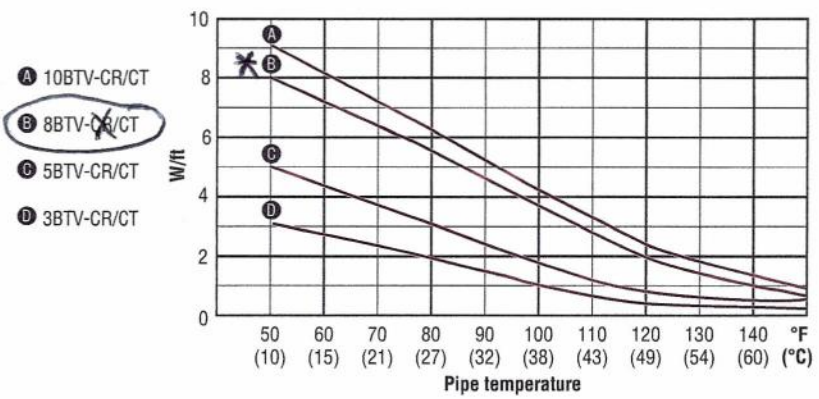
Fax: 86-21-5426-2937 / 5426-3167

tyco
Thermal Controls

Nominal Power Output Rating on Metal Pipes at 120 V/240 V

	Adjustment factors	
	Power output	Circuit length
208 V		
3BTV2-CR/CT	0.82	0.96
5BTV2-CR/CT	0.85	0.94
8BTV2-CR/CT	0.89	0.92
10BTV2-CR/CT	0.89	0.92
277 V		
3BTV2-CR/CT	1.13	1.08
5BTV2-CR/CT	1.12	1.09
8BTV2-CR/CT	1.08	1.11
10BTV2-CR/CT	1.08	1.11



Note: To choose the correct heating cable for your application, use the Design section of the *Industrial Product Selection and Design Guide* (H56550). For more detailed information, use TraceCalc Pro design software.

Maximum Circuit Lengths Based on Circuit Breaker Sizes

	Ambient temperature at start-up		Maximum circuit length (in feet) per circuit breaker							
			120 V				240 V			
			15 A	20 A	30 A	40 A	15 A	20 A	30 A	40 A
3BTV-CR/CT	50°F	(10°C)	330	330	330	330	660	660	660	660
	0°F	(–18°C)	200	265	330	330	395	530	660	660
	–20°F	(–29°C)	175	235	330	330	350	465	660	660
	–40°F	(–40°C)	155	205	310	330	310	410	620	660
5BTV-CR/CT	50°F	(10°C)	230	270	270	270	460	540	540	540
	0°F	(–18°C)	140	190	270	270	285	380	540	540
	–20°F	(–29°C)	125	165	250	270	250	330	500	540
	–40°F	(–40°C)	110	145	220	270	220	295	440	540
8BTV-CR/CT	50°F	(10°C)	150	200	210	210	300	400	420	420
	0°F	(–18°C)	100	130	200	210	200	265	400	420
	–20°F	(–29°C)	85	115	175	210	175	235	350	420
	–40°F	(–40°C)	80	105	155	210	155	210	315	420
10BTV-CR/CT	50°F	(10°C)	120	160	180	180	240	315	360	360
	0°F	(–18°C)	80	110	160	180	160	215	325	360
	–20°F	(–29°C)	70	95	140	180	145	190	285	360
	–40°F	(–40°C)	65	85	125	170	125	170	255	340

Ground-Fault Protection	Tyco Thermal Controls and national electrical codes require both ground-fault protection of equipment and a grounded metallic covering on all heating cables. The DigiTrace® HTPI and HTPG distribution panels meet this requirement. The following ground-fault breakers can also be used: Square D Type QOB-EPD or QO-EPD, TraceGuard 277®, Cutler Hammer Type QBGFEP.	
Product Characteristics	**3BTV, 5BTV**	**8BTV, 10BTV**
Minimum bend radius	@68°F (20°C):0.5 in (12.7 mm)	@68°F (20°C): 0.5 in (12.7 mm)
Weight (lb per 10 ft, nominal)	0.7	1.0
Bus wire size	16 AWG	16 AWG
Outer jacket color	Black	Black
Heating cable dimensions	0.46 in x 0.25 in (11.7 mm x 6.35 mm)	0.65 in x 0.26 in (16.5 mm x 6.6 mm)
Components	Tyco Thermal Controls offers a full range of components for power connections, splices, and end seals. These components must be used to ensure proper functioning of the product and compliance with warranty, code, and approvals requirements.	

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tyco
Thermal Controls

Raychem

E-100-A and E-100-L-A

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

D100 0AT0 011A

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

By:
WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.
Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

Visit www.tycothermal.com for more information on our ten-year extended warranty.

End seal and lighted end seal kits

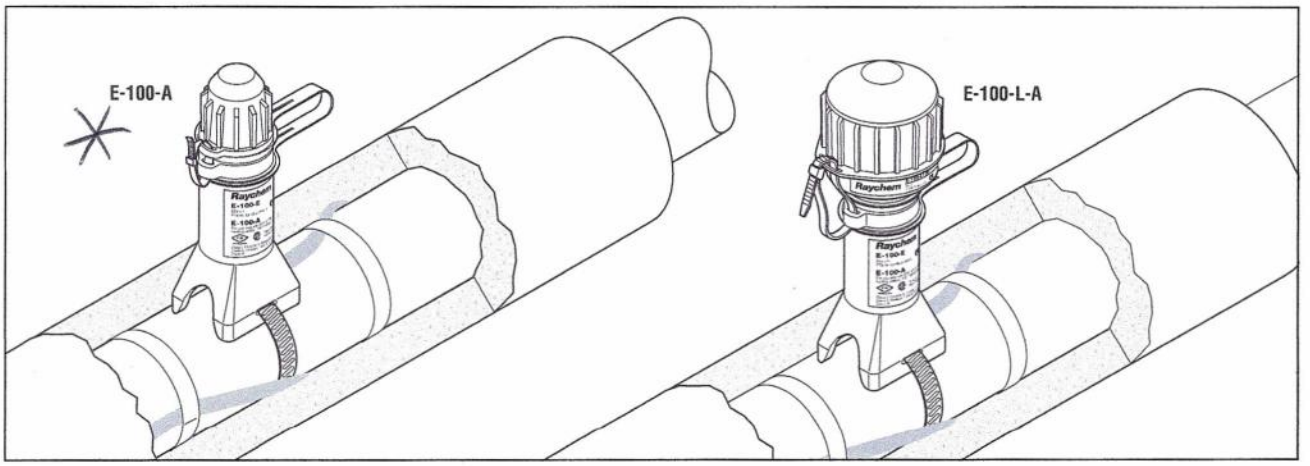
The E-100-A and E-100-L-A serve as above-insulation end seal kits for Raychem® brand BTV, QTVR, XTV, KTV, or VPL heating cables. They are approved by FM and CSA for use in hazardous locations.

Both the E-100-A and the E-100-L-A are mounted on the pipe and project through the thermal insulation and cladding for ease of maintenance. The E-100-L-A end seal with signal light uses an array of bright LEDs for exceptional visibility and long product life.

These rugged end seals are made from high-performance engineering polymer and resist impact, high temperature, and chemical and UV exposure. The stand allows for up to four inches (100 mm) of thermal insulation. The encapsulated light and boot reliably prevent moisture and dust ingress. The industrial-grade electronics used in the E-100-L-A are encapsulated.

Both the E-100-A and E-100-L-A are re-enterable, allowing easy access for testing. Voltage and continuity checks can be done by simply unscrewing the E-100-A cap and removing the reusable sealing boot. The E-100-L-A makes maintenance even easier by allowing for visual inspection of heating circuit continuity. The E-100-L-A is available in two voltages and can be retrofitted into previously installed E-100-A end seals. The light module is replaceable.

The kits contain all the necessary materials for a complete installation except for one pipe strap, which must be ordered separately.



	E-100-A	E-100-L-A*
Description	Above-insulation end seal, cold-applied	Above-insulation end seal with red signal light, cold-applied *Not for use with 480 V VPL
Kit Contents **Note:** Order appropriate pipe strap separately (one per kit)	1 end seal	1 end seal with red indicator light
Approvals	**Hazardous Locations** FM APPROVED: Class I, Div. 2, Groups A, B, C, D; Class II, Div. 1 and 2, Groups E, F, G; Class III CSA (1) FM APPROVED: CLI, ZN1, AEx e II T(2) CSA: Ex e II T(2)	**Hazardous Locations** FM APPROVED: Class I, Div. 2, Groups A, B, C, D; Class II, Div. 1 and 2, Groups E, F, G; Class III CSA (1) FM APPROVED: CLI, ZN1, AEx em II T(2) CSA: Ex em II T(2)

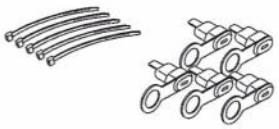
(1) Except VPL
(2) For T-rating, see heating cable or design documentation

	E-100-A	E-100-L-A	
Product Specifications			
Heating cable capability	BTV-CR, BTV-CT, QTVR-CT, XTV-CT, KTV-CT and VPL-CT		
Ingress protection	NEMA 4X (IP65)	NEMA 4X (IP65)	
Minimum installation temperature	–40°F (–40°C)	–40°F (–40°C)	
Minimum usage temperature	–60°F (–50°C)	–60°F (–50°C)	
Maximum pipe temperature	500°F (260°C)	500°F (260°C)	
Maximum operating voltage	480 Vac	120/277 Vac	
Overall height	7 in (175 mm)	8 in (200 mm)	
Outer diameter at insulation	2.0 in (50 mm) Usable with up to 4 in (100 mm) thermal insulation	3 in (75 mm)	
Materials	High-performance glass-filled engineered polymer	High-performance glass-filled engineered polymer	
Light source		Super-bright light-emitting diodes (LEDs), red	
Light source power supply		Linear (nonswitching)	
Power consumption		< 2 W	

Ordering Details

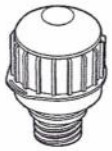
End seal			
Catalog number	E-100-A (100–480 Vac)	E-100-L1-A (100–120 Vac)	E-100-L2-A (200–277 Vac)
Part number	046567-000	583377-000	478767-000
Weight	0.6 lb (272 g)	1.3 lb (630 g)	1.3 lb (630 g)

Spare boot pack for E-100



Catalog number	E-100-BOOT-5-PACK
Part number	281053-000
Pack weight	0.25 lb (140 g)
Pack contents	Five sealant-filled boots and five cable ties

Replacement indicator light for E-100-LXX-A



Catalog number	E-100-LR1-A (100–120 Vac)	E-100-LR2-A (200–277 Vac)
Part number	552225-000	874485-000
Weight	0.9 lb (450 g)	0.9 lb (450 g)

#S

Use on 1-1/2" pipe and smaller

Internal Dimensions

9/16" H x 9/16" W

14.2 mm H x 14.2 mm W

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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Per,

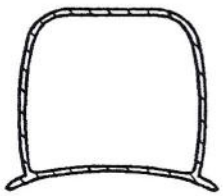
WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

#M



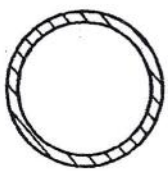
Use on 2" pipe and larger

Internal Dimensions

3/4" H x 7/8" W

19 mm H x 22 mm W

#R



LDPE Tubing for factory insulated fittings

Internal Dimensions

5/8" Dia.

15.8 mm Dia.

URECON LTD

CALMAR, AB ST-LAZARE, QC

URECON PLASTIC TRACE CONDUITS

Dwg No.	Date	Rev.
URE-010	Jan. 5/99	1

Raychem

JBM-100

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

D100 0ATO 011A

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For:
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engin
Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

Visit www.tycothermal.com for more information on our ten-year extended warranty.

Multiple-entry power/splice/tee connection with junction box

The JBM-100 kit serves as a power connection, splice, or tee for up to three Raychem® brand BTV, QTVR, XTV, KTV, or VPL heating cables. It is approved by FM, CSA, and PTB for use in hazardous locations.

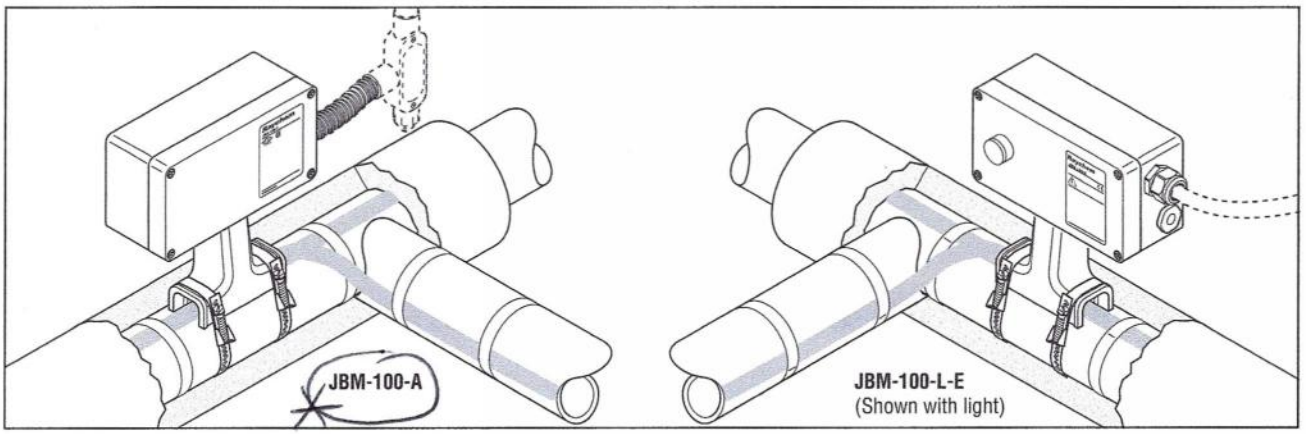
The JBM-100 integrates the functions of connection kits and insulation entries. The rugged stand protects the heating cable and allows for up to four inches (100 mm) of thermal insulation.

The cold-applied core sealer does not require a heat gun or torch for installation, so no hot work permit is necessary. The silicone-free, noncuring sealant allows easy installation and re-entry for maintenance.

Innovative spring clamp terminals provide fast installation and safe, reliable, maintenance-free operation.

Compared with other systems, this connection kit significantly reduces installation time. The kit is offered in three versions, customized for local installation practices. All kits are also available with a plug-in LED light (-L) that indicates when power is supplied to the heating cable circuit.

The kit contains all the necessary materials for a complete installation except for the pipe straps, which must be ordered separately.



	JBM-100-A* JBM-100-L-A* *Not for use with 480 V VPL	JBM-100-E JBM-100-L-E*	JBM-100-EP JBM-100-L-EP*
Description	This kit has a junction box with one 3/4 in through hole. The kit includes one stopping plug.	This kit has a junction box with two M25 threaded entries, one stopping plug and one plastic power cable gland.	This kit has a junction box with two M25 threaded entries, an earthing plate and an external earthing stud. It is designed for use with armored power cables.
Kit Contents **Note:** Order appropriate pipe straps separately (two straps per kit)	1 junction box with terminals 1 stand assembly 3 core sealers 3 green/yellow tubes 1 3/4 in stopping plug assembly 1 light module (for -L only) 2 grommet plugs	1 junction box with terminals 1 stand assembly 3 core sealers 3 green/yellow tubes 1 M25 gland for power cable 8–17 mm in diameter 2 M25 stopping plugs 1 light module (for -L only) 2 grommet plugs	1 junction box with terminals, earth continuity plate, and stud 1 stand assembly 3 core sealers 3 green/yellow tubes 2 M25 stopping plugs 1 light module (for -L only) 2 grommet plugs

	JBM-100-A ✂ JBM-100-L-A*	JBM-100-E JBM-100-L-E*	JBM-100-EP JBM-100-L-EP*

*Not for use with 480 V VPL

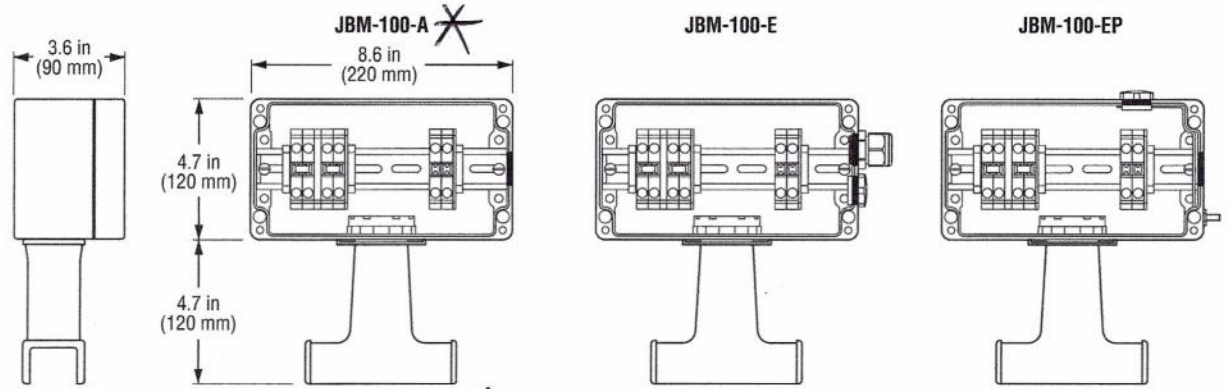
Approvals

Hazardous Locations

JBM-100-A ✂ JBM-100-L-A*	JBM-100-E JBM-100-L-E*	JBM-100-EP JBM-100-L-EP*
FM APPROVED: Class I, Div. 2, Groups A, B, C, D Class II, Div. 1 & 2, Groups E, F, G Class III	Ex: II 2 GD EEx e II II 2 GD EEx em II (for -L only) PTB 98 ATEX 1021 U	Ex: II 2 GD EEx e II II 2 GD EEx em II (for -L only) PTB 98 ATEX 1021 U
SP	SP: Ex e II T(2) Ex em II T(2) (for -L only)	SP: Ex e II T(2) Ex em II T(2) (for -L only)
(1) FM APPROVED: CLI, ZN1, AEx e II T(2) CLI, ZN1, AEx em II T(2) (for -L only)		
SP: Ex e II T(2) Ex em II T(2) (for -L only)		

(1) Except VPL
(2) For T-rating, see heating cable or design documentation

Dimensions



	JBM-100-A ✂	JBM-100-E	JBM-100-EP
Product Specifications			
Heating cable capability	BTV-CR, BTV-CT, QTVR-CT, XTV-CT, KTV-CT and VPL-CT		
Ingress protection	NEMA 4X	IP66	IP66
Entries	1 x 0.75 in	2 x M25	2 x M25
Minimum installation temperature	–40°F (–40°C)	–40°F (–40°C)	–40°F (–40°C)
Minimum usage temperature	–60°F (–50°C)	–60°F (–50°C)	–60°F (–50°C)
Maximum pipe temperature	500°F (260°C)	500°F (260°C)	500°F (260°C)
Terminals	Spring clamp EEx e 4 line, 2 ground	Spring clamp EEx e 2 phase, 2 neutral, 2 earth	Spring clamp EEx e 2 phase, 2 neutral, 2 earth
Maximum conductor size	8 AWG	10 mm^2	10 mm^2
Maximum operating voltage	480 Vac	480 Vac	480 Vac
Maximum circuit breaker rating	50 A	40 A	40 A
Materials			
Enclosure	Electrostatic charge-resistant glass-filled engineered polymer, black	Electrostatic charge-resistant glass-filled engineered polymer, black	Electrostatic charge-resistant glass-filled engineered polymer, black
Lid screws	Stainless steel	Stainless steel	Stainless steel
Lid gasket	Silicone rubber	Silicone rubber	Silicone rubber
Earth continuity plate	n/a	n/a	Steel, zinc-plated and yellow-chromated
Optional LED Indicator Light			
Color	Red	Green	Green
Voltage rating	100–277 Vac	100–277 Vac	100–277 Vac
Power consumption	< 1 W	< 1 W	< 1 W

	JBM-100-A	JBM-100-E	JBM-100-EP
Ordering Details			
Multiple-entry power/splice/tee connection			
Catalog number	JBM-100-A	JBM-100-E	JBM-100-EP
Part number	179955-000	831519-000	986415-000
Weight	4.3 lb (1.95 kg)	1.9 kg (4.2 lb)	2.1 kg (4.6 lb)
Multiple-entry power/splice/tee connection with light			
Catalog number	JBM-100-L-A	JBM-100-L-E	JBM-100-L-EP
Part number	656081-000	395855-000	300273-000
Weight	5.3 lb (2.4 kg)	2.3 kg (5.1 lb)	2.5 kg (5.5 lb)

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Shanghai 200233,
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tyco
Thermal Controls

Raychem

JBS-100

Visit www.tycothermal.com for more information on our ten-year extended warranty.

Single-entry power connection with ju

The JBS-100 kit is designed to connect power to a single Raychem® brand BTV, QTVR, XTV, KTV, or VPL heating cable. It is approved by FM, CSA, and PTB for use in hazardous locations.

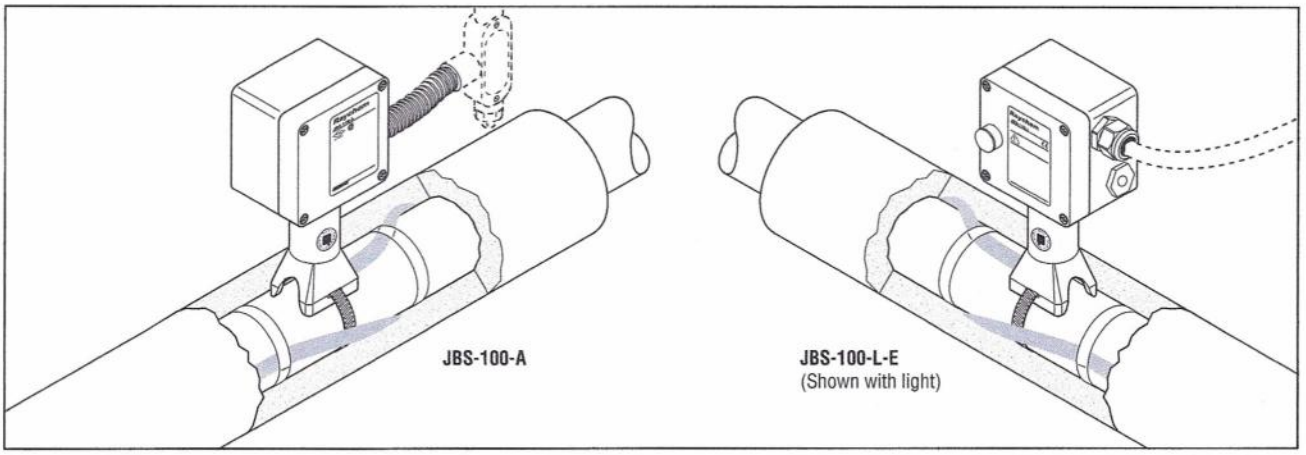
The JBS-100 integrates the functions of connection kits and insulation entries. The rugged stand protects the heating cable and allows for up to four inches (100 mm) of thermal insulation.

The cold-applied core sealer does not require a heat gun or torch for installation, so no hot work permit is necessary. The silicone-free, noncuring sealant allows easy installation and re-entry for maintenance.

Innovative spring clamp terminals provide fast installation and safe, reliable, maintenance-free operation.

Compared with other systems, this connection kit significantly reduces installation time. The kit is offered in three versions, customized for local installation practices, and is also available with a plug-in LED light (-L) that indicates when power is supplied to the heating cable circuit.

The kit contains all the necessary materials for a complete installation except for one pipe strap, which must be ordered separately.



JBS-100-A

JBS-100-L-E
(Shown with light)

	JBS-100-A, A6 JBS-100-L-A* *Not for use with 480 V VPL	JBS-100-E JBS-100-L-E*	JBS-100-EP JBS-100-L-EP*
Description	This kit has a junction box with one 3/4 in through hole.	This kit has a junction box with two M25 threaded entries, one stopping plug and one plastic power cable gland.	This kit has a junction box with two M25 threaded entries, an earthing plate and an external earthing stud. It is designed for use with armored power cables.
Kit Contents **Note:** Order appropriate pipe strap separately (one per kit)	1 junction box with terminals 1 stand assembly 1 core sealer 1 green/yellow tube 1 light module (for -L only) 1 cable tie	1 junction box with terminals 1 stand assembly 1 core sealer 1 green/yellow tube 1 M25 gland for power cable 8–17 mm in diameter 1 M25 stopping plug 1 light module (for -L only)	1 junction box with terminals, earth continuity plate, and stud 1 stand assembly 1 core sealer 1 green/yellow tube 1 M25 stopping plug 1 light module (for -L only)

	JBS-100-A, A6 JBS-100-L-A*	JBS-100-E JBS-100-L-E*	JBS-100-EP JBS-100-L-EP*

*Not for use with 480 V VPL

Approvals

Hazardous Locations

FM APPROVED — Class I, Div. 2, Groups A, B, C, D
Class II, Div. 1 & 2, Groups E, F, G
Class III

II 2 GD EEx e II
II 2 GD EEx em II (for -L only)
PTB 97 ATEX 1058 U

II 2 GD EEx e II
II 2 GD EEx em II (for -L only)
PTB 97 ATEX 1058 U

Ex e II T(2)
Ex em II T(2) (for -L only)

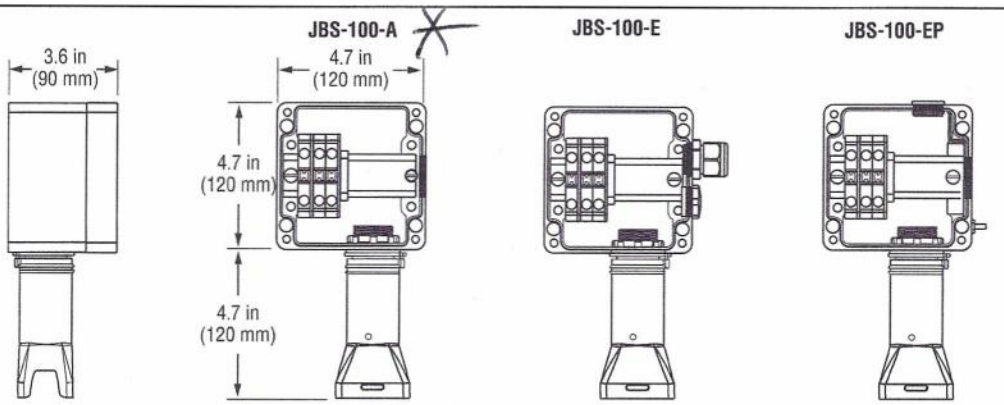
Ex e II T(2)
Ex em II T(2) (for -L only)

(1) FM APPROVED — CLI, ZN1, AEx e II T(2)
CLI, ZN1, AEx em II T(2) (for -L only)

Ex e II T(2)
Ex em II T(2) (for -L only)

(1) Except VPL
(2) For T-rating, see heating cable or design documentation

Dimensions



	JBS-100-A, A6	JBS-100-E	JBS-100-EP
Product Specifications			
Heating cable capability	BTV-CR, BTV-CT, QTVR-CT, XTV-CT, KTV-CT and VPL-CT		
Ingress protection	NEMA 4X	IP66/IP67	IP66/IP67
Entries	1 x 3/4 in	2 x M25	2 x M25
Minimum installation temperature	–40°F (–40°C)	–40°F (–40°C)	–40°F (–40°C)
Minimum usage temperature	–60°F (–50°C)	–60°F (–50°C)	–60°F (–50°C)
Maximum pipe temperature	500°F (260°C)	500°F (260°C)	500°F (260°C)
Terminals	Spring clamp EEx e 2 line, 1 ground	Spring clamp EEx e 1 phase, 1 neutral, 1 earth	Spring clamp EEx e 1 phase, 1 neutral, 1 earth
Maximum conductor size	8 AWG (A6 to 6 AWG)	10 mm^2	10 mm^2
Maximum operating voltage	480 Vac	480 Vac	480 Vac
Maximum circuit breaker rating	50 A	40 A	40 A
Materials			
Enclosure	Electrostatic charge-resistant glass-filled engineered polymer, black	Electrostatic charge-resistant glass-filled engineered polymer, black	Electrostatic charge-resistant glass-filled engineered polymer, black
Lid screws	Stainless steel	Stainless steel	Stainless steel
Lid gasket	Silicone rubber	Silicone rubber	Silicone rubber
Earth continuity plate	n/a	n/a	Steel, zinc-plated and yellow-chromated
Optional LED Indicator Light			
Color	Red	Green	Green
Voltage rating	100–277 Vac	100–277 Vac	100–277 Vac
Power consumption	< 1 W	< 1 W	< 1 W

	JBS-100-A, A6	JBS-100-E	JBS-100-EP
Ordering Details			
Power connection			
Catalog number	JBS-100-A / JBS-100-A6	JBS-100-E	JBS-100-EP
Part number	085947-000 / C26470-000	829939-000	158251-000
Weight	2.5 lb (1.1 kg)	1.2 kg (2.6 lb)	1.3 kg (2.9 lb)
Power connection with light			
Catalog number	JBS-100-L-A	JBS-100-L-E	JBS-100-L-EP
Part number	944699-000	054363-000	075249-000
Weight	3.5 lb (1.6 kg)	1.6 kg (3.5 lb)	1.7 kg (3.7 lb)

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tyco
Thermal Controls

Raychem

T-100

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

D100 0AT0 011A

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engin.

Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

Visit www.tycothermal.com for more information on our ten-year extended warranty.

Splice or tee connection kit

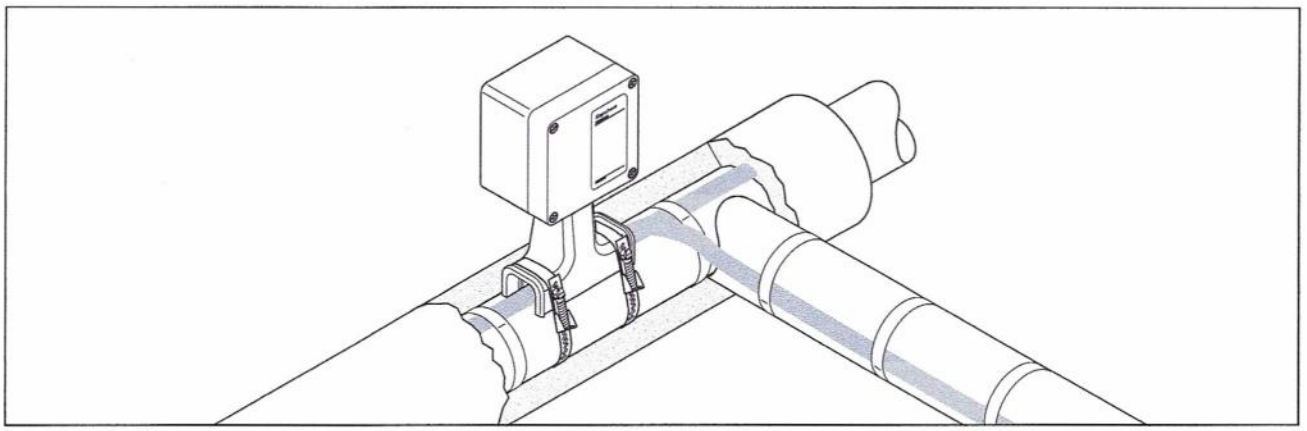
The T-100 serves as an above-insulation splice or tee for up to three Raychem® brand BTV, QTVR, XTV, KTV, or VPL heating cables. It is approved by FM, CSA, and PTB[1] for use in hazardous locations.

The T-100 integrates the functions of connection kits and insulation entries. The rugged stand protects the heating cable and allows for up to four inches (100 mm) of thermal insulation.

The cold-applied core sealer does not require a heat gun or torch for installation, so no hot work permit is necessary. The silicone-free, noncuring sealant in the core sealer allows easy installation and re-entry for maintenance.

The electrical connections in the T-100 are made with insulated crimps. For a splice or tee connection with terminal blocks, use the JBM-100.

Each kit contains all the necessary materials for a complete installation except for the pipe straps, which must be ordered separately.



Description	Above-insulation splice/tee kit appropriate for use in hazardous locations
Kit Contents	1 splice/tee enclosure and lid 1 stand assembly 3 core sealers 3 green/yellow tubes 3 compression crimps 3 crimp insulating boots 2 grommet plugs 1 spanner wrench 1 strain relief assembly **Note:** Order appropriate pipe straps separately (two straps per kit).

Approvals

Hazardous Locations

FM APPROVED — Class I, Div. 2, Groups A, B, C, D
Class II, Div. 1 and 2, Groups E, F, G
Class III

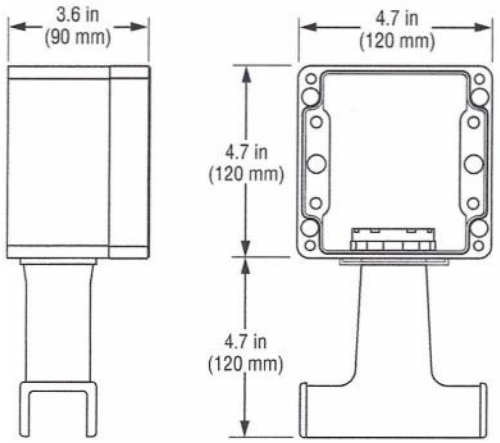
FM APPROVED[1] — CLI, ZN1, AEx e II T[2]

Ex e II T[2]

II 2 GD EEx e II
PTB 98 ATEX 1020 U

(1) Except VPL
(2) For T-rating, see heating cable or design documentation

Dimensions (nominal)



Product Specifications

Heating cable capability	BTV-CR, BTV-CT, QTVR-CT, XTV-CT, KTV-CT, and VPL-CT
Ingress protection	NEMA 4X/IP66/IP67
Minimum installation temperature	–40°F (–40°C)
Minimum usage temperature	–60°F (–50°C)
Maximum pipe temperature	500°F (260°C)
Maximum operating voltage	480 Vac
Maximum circuit breaker rating	50 A for FM, CSA; 40 A for PTB

Materials

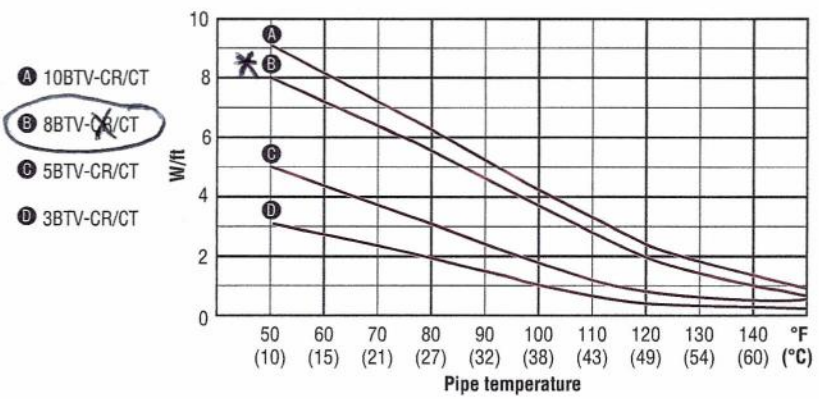
Enclosure	Electrostatic charge-resistant glass-filled engineered polymer, black
Lid screws	Stainless steel
Lid gasket	Silicone rubber

Ordering Details

Catalog number	T-100
Part number	447379-000
Weight	2.5 lb (1.2 kg)
Crimp tool	T-100-CT (not included in kit; equivalent to Panduit CT-1570) PN 954799-000
Spare crimps and insulating tubes	T-100-CRIMP-KIT PN 577853-000

Nominal Power Output Rating on Metal Pipes at 120 V/240 V

	Adjustment factors	
	Power output	Circuit length
208 V		
3BTV2-CR/CT	0.82	0.96
5BTV2-CR/CT	0.85	0.94
8BTV2-CR/CT	0.89	0.92
10BTV2-CR/CT	0.89	0.92
277 V		
3BTV2-CR/CT	1.13	1.08
5BTV2-CR/CT	1.12	1.09
8BTV2-CR/CT	1.08	1.11
10BTV2-CR/CT	1.08	1.11



Note: To choose the correct heating cable for your application, use the Design section of the *Industrial Product Selection and Design Guide* (H56550). For more detailed information, use TraceCalc Pro design software.

Maximum Circuit Lengths Based on Circuit Breaker Sizes

	Ambient temperature at start-up		Maximum circuit length (in feet) per circuit breaker							
			120 V				240 V			
			15 A	20 A	30 A	40 A	15 A	20 A	30 A	40 A
3BTV-CR/CT	50°F	(10°C)	330	330	330	330	660	660	660	660
	0°F	(–18°C)	200	265	330	330	395	530	660	660
	–20°F	(–29°C)	175	235	330	330	350	465	660	660
	–40°F	(–40°C)	155	205	310	330	310	410	620	660
5BTV-CR/CT	50°F	(10°C)	230	270	270	270	460	540	540	540
	0°F	(–18°C)	140	190	270	270	285	380	540	540
	–20°F	(–29°C)	125	165	250	270	250	330	500	540
	–40°F	(–40°C)	110	145	220	270	220	295	440	540
8BTV-CR/CT	50°F	(10°C)	150	200	210	210	300	400	420	420
	0°F	(–18°C)	100	130	200	210	200	265	400	420
	–20°F	(–29°C)	85	115	175	210	175	235	350	420
	–40°F	(–40°C)	80	105	155	210	155	210	315	420
10BTV-CR/CT	50°F	(10°C)	120	160	180	180	240	315	360	360
	0°F	(–18°C)	80	110	160	180	160	215	325	360
	–20°F	(–29°C)	70	95	140	180	145	190	285	360
	–40°F	(–40°C)	65	85	125	170	125	170	255	340

Ground-Fault Protection	Tyco Thermal Controls and national electrical codes require both ground-fault protection of equipment and a grounded metallic covering on all heating cables. The DigiTrace® HTPI and HTPG distribution panels meet this requirement. The following ground-fault breakers can also be used: Square D Type QOB-EPD or QO-EPD, TraceGuard 277®, Cutler Hammer Type QBGFEP.	
Product Characteristics	**3BTV, 5BTV**	**8BTV, 10BTV**
Minimum bend radius	@68°F (20°C):0.5 in (12.7 mm)	@68°F (20°C): 0.5 in (12.7 mm)
Weight (lb per 10 ft, nominal)	0.7	1.0
Bus wire size	16 AWG	16 AWG
Outer jacket color	Black	Black
Heating cable dimensions	0.46 in x 0.25 in (11.7 mm x 6.35 mm)	0.65 in x 0.26 in (16.5 mm x 6.6 mm)
Components	Tyco Thermal Controls offers a full range of components for power connections, splices, and end seals. These components must be used to ensure proper functioning of the product and compliance with warranty, code, and approvals requirements.	

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
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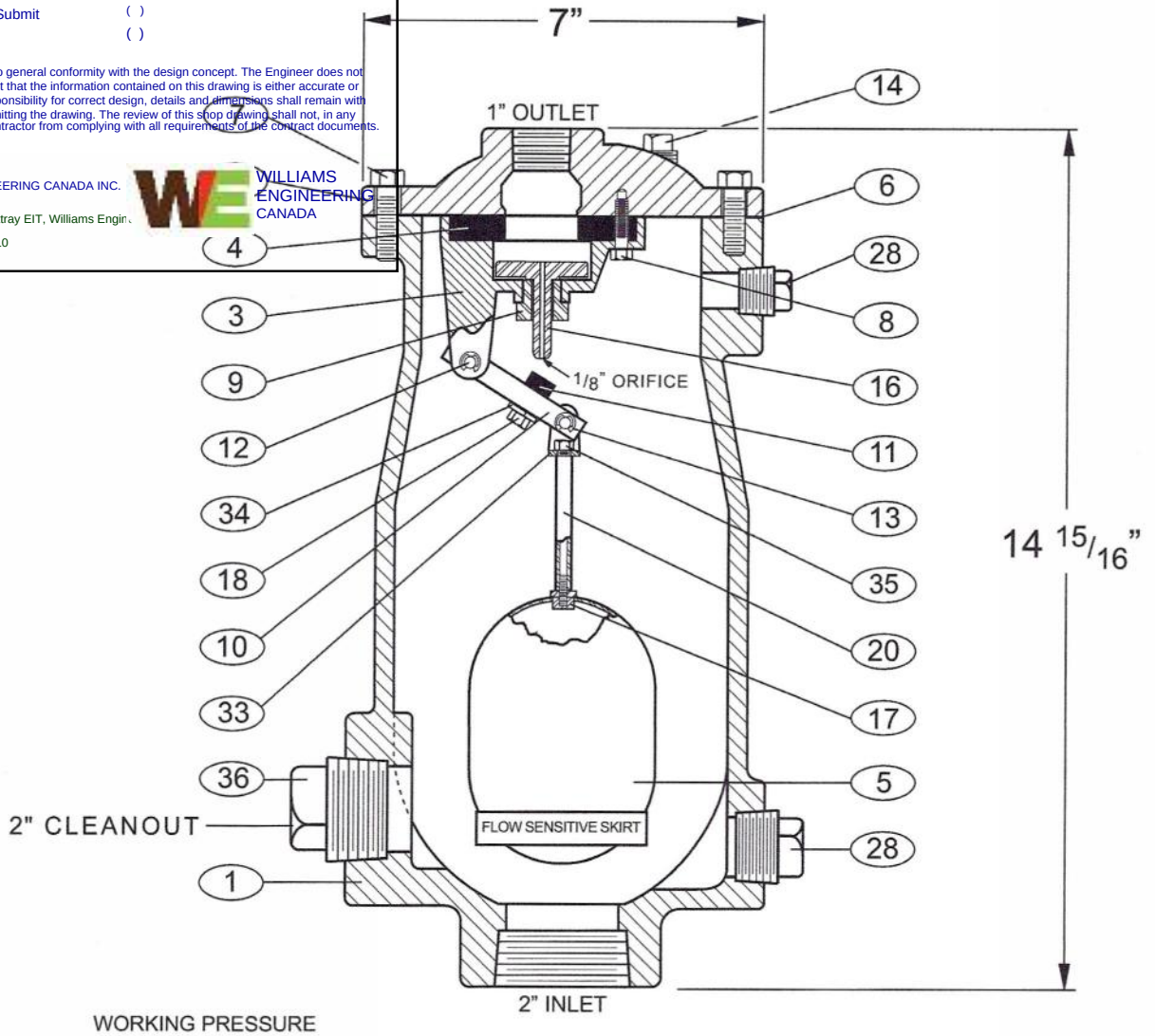
Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engin.

Date: 26/10/2010

WILLIAMS ENGINEERING CANADA



WORKING PRESSURE
150 P.S.I. COLD WORKING PRESSURE-C.W.P.

TEST PRESSURE
1.5 TIMES COLD WORKING PRESSURE-C.W.P.

1. BODY
2. COVER
3. BAFFLE
4. SEAT
5. FLOAT
6. GASKET
7. COVER BOLT
8. RETAINING SCREW
9. BUSHING
10. FLOAT ARM
11. ORIFICE BUTTON
12. PIVOT PIN
13. RETAINING RING
14. PIPE PLUG
16. PLUG
17. FLOAT RETAINER
18. LOCK NUT
20. GUIDE SHAFT
28. PIPE PLUG
33. CLEVIS
34. LOCK WASHER
35. GUIDE SHAFT RETAINER
36 PIPE PLUG

SEE DRAWING NO. VM-801A-M FOR STANDARD MATERIALS OF CONSTRUCTION.
SEE DRAWING NO. VM-801ASV-M FOR SUPER VALVE MATERIALS OF CONSTRUCTION.

Revised 2-3-10

WASTEWATER COMBINATION AIR VALVE

DATE 3-17-00

VAL-MATIC® VALVE AND MANUFACTURING CORP.

DRWG. NO. VM-801A

WASTEWATER COMBINATION AIR VALVE

SERIES NO. 801A

STANDARD MATERIALS OF CONSTRUCTION

PART NO.	PART NAME	MATERIAL
1	BODY	CAST IRON ASTM A126, CLASS B
2	COVER	CAST IRON ASTM A126, CLASS B
3	BAFFLE (1"-2") BAFFLE (3"-4")	CAST IRON ASTM A126, CLASS B DUCTILE IRON ASTM A536, GRADE 65-45-12
4	SEAT	BUNA-N
5	FLOAT	STAINLESS STEEL T316, ASTM A240
6	GASKET	COMPRESSED NON-ASBESTOS FIBER
7	COVER BOLT	ALLOY STEEL SAE, GRADE 5
8	RETAINING SCREW	STAINLESS STEEL T316, ASTM F593
9	GUIDE BUSHING	STAINLESS STEEL T316, ASTM A582
10	FLOAT ARM	STAINLESS STEEL T316, ASTM A582
11	ORIFICE BUTTON	STAINLESS STEEL & BUNA-N
12	PIVOT PIN	STAINLESS STEEL T316, ASTM A276
13	RETAINING RING	STAINLESS STEEL PH 15-7 MO
14	PIPE PLUG	STEEL
16	PLUG	STAINLESS STEEL T316, ASTM A276
17	FLOAT RETAINER	STAINLESS STEEL T316, ASTM F880
18	LOCK NUT	STAINLESS STEEL T316, ASTM A594
20	GUIDE SHAFT	STAINLESS STEEL T316, ASTM A582
28	PIPE PLUG	STEEL
33	CLEVIS	STAINLESS STEEL T316, ASTM A240
34	LOCK WASHER	STAINLESS STEEL T316, ASTM A240
35	GUIDE SHAFT RETAINER	STAINLESS STEEL T316, ASTM A593
36	PIPE PLUG	STEEL

NOTE: ALL SPECIFICATIONS AS LAST REVISED.

Revised 8-12-03

MATERIALS OF CONSTRUCTION	DATE 3/17/00
VAL-MATIC® VALVE AND MANUFACTURING CORP.	DRWG. NO. VM-801A-M

PROJECT	
OWNER	
CONTRACTOR	
DISTRIBUTOR	
CONSULTANT	

CLOW CANADA

2"-12" R/W VALVE NRS FLANGED ENDS GENERAL DIMENSIONS

MODEL F6102

FUSION EPOXY - NSF 61 AND AWWA C550

COMPLIES WITH AWWA C509

Reviewed (X)
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Revise ( )
Revise and Re-Submit ( )
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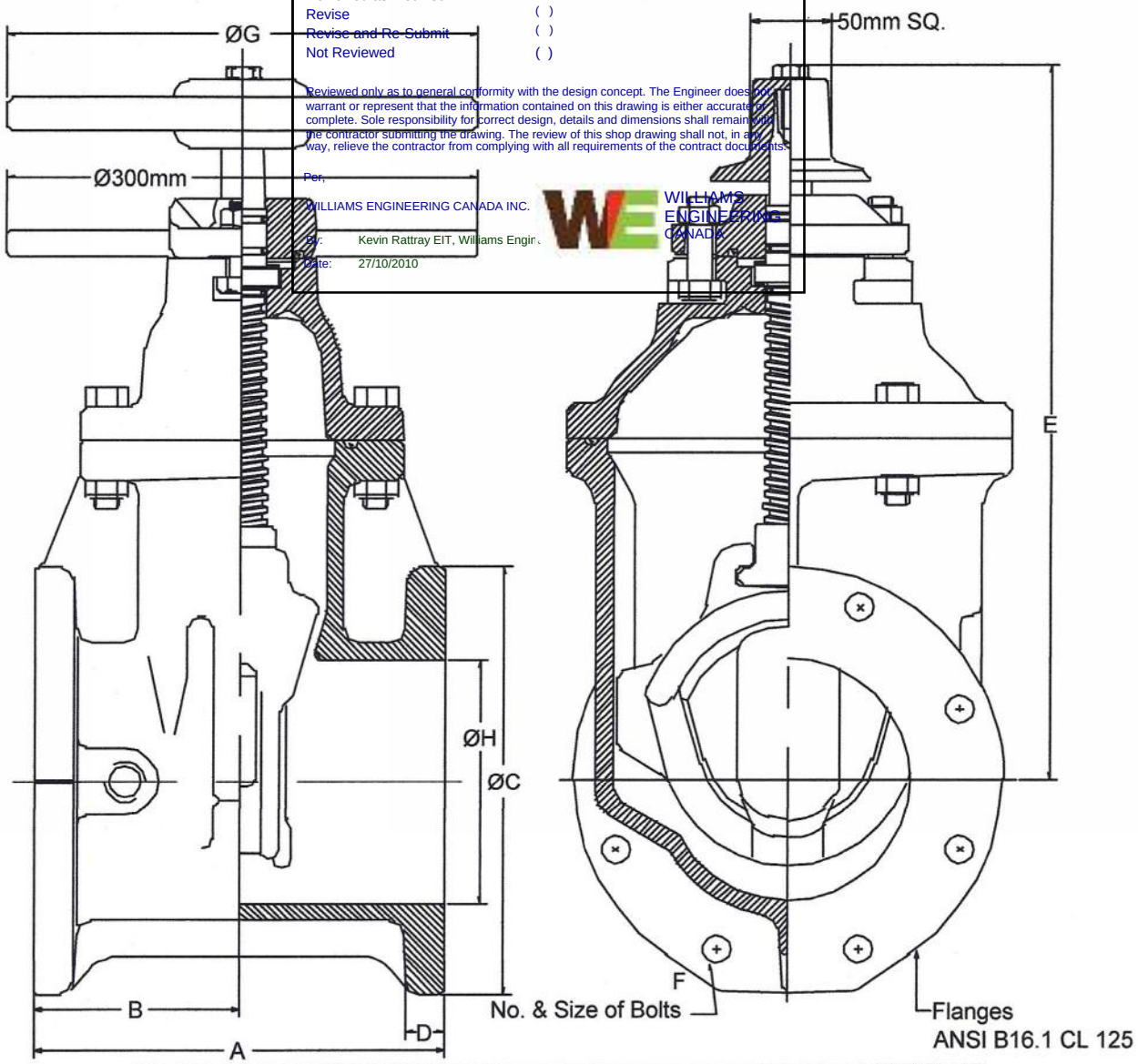


METRIC DIMENSIONS

VALVE SIZE	A	B	C	D	E	F	G	H
50	180	90	150	16	275	4-5/8	185	50
62.5	190	95	180	18	290	4-5/8	185	62.5
75	200	100	190	19	315	4-5/8	250	75
100	230	115	230	23	375	8-5/8	250	108
150	265	130	280	25	480	8-3/4	300	160
200	290	145	140	28	570	8-3/4	350	210
250	330	165	400	30	670	12-7/8	450	260
300	350	180	480	32	750	12-7/8	450	310

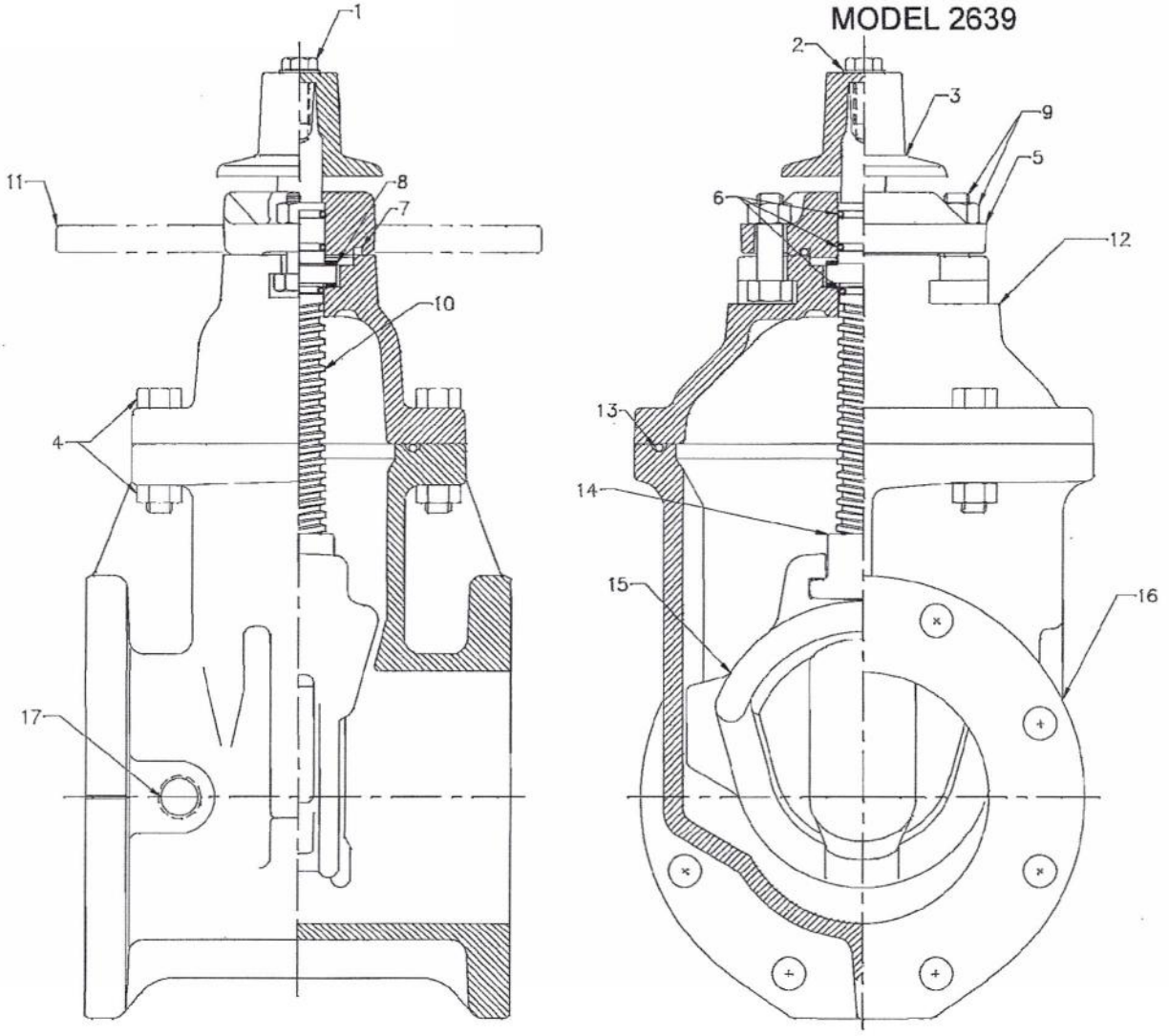
2640-01
A 7/29/02

Complies with applicable requirements of AWWA C509

2"-12" R/S VALVE MATERIAL LIST

CLOW VALVE COMPANY

MODEL 2639



ITEM	DESCRIPTION	MATERIAL	ASTM SPEC.
1	Hex Head Bolt	Stainless Steel	ASTM F593 304 SST
2	Flat Washer	Stainless Steel	304 SST
3	Operating Nut	Gray Iron	ASTM A126 Cl B
4	Hex Head Bolts & Nuts	Stainless Steel	ASTM F593/4 304 SST
5	Follower Plate	Ductile Iron	ASTM A536 65-45-12
6	Stem O-Ring	EPDM	------
7	Follower Plate O-Ring/gasket	EPDM	------
8	Thrust Washer Bearing	Delrin	------
9	Hex Head Bolts & Nuts	Stainless Steel	ASTM F593/4 304 SST
10	Stem	Bronze	ASTM B584 C86700
11	Indicator Post Plate (Optional 3-12")	Gray Iron	ASTM A126 Class B
12	Cover	Ductile Iron	ASTM A536 65-45-12
13	Cover O-Ring	EPDM	------
14	Stem Nut	Bronze	ASTM B584 C83600
15	Wedge	Gray Iron & EPDM	ASTM A126 Cl B
16	Body - all types	Ductile Iron	ASTM A536 65-45-12
17	Pipe Plug (Optional Some Styles)	Stainless Steel	------

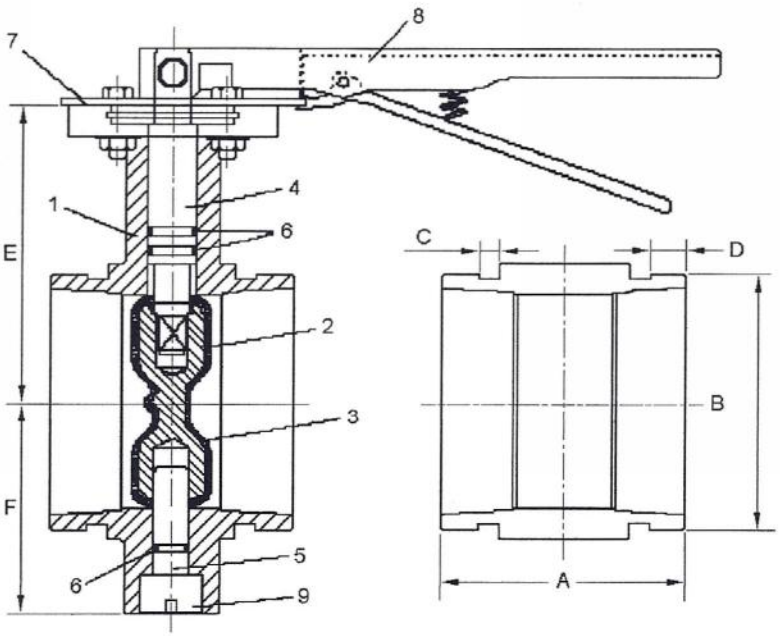
2639-02
C 7/19/05

KVC Industries Corp.

300# GROOVED END BUTTERFLY VALVE – Lever Handle

Figure: GBV-3000 Series

Valves to MSS-SP67 & API 609
Valves conform to AWWA C-606
Maximum operating temperature:
EPDM encapsulated disc: 121ºC (250ºF)
Buna-N encapsulated disc: 88ºC (190ºF)



Materials:

No.	Part Name	Specifications
1	Body	Ductile iron A536
2	Disc	Ductile iron A536
3	Rubber lining	EPDM aa
4	Upper stem	Stainless steel A433 410
5	Lower stem	Stainless steel A433 410
6	O-Ring	Buna-N aa
7	Position plate*	Carbon steel A27-91 65-35
8	Lever handle	Malleable iron A47-90 22010
9	Plug	Steel

Test Pressure	Shell: 450 psi
	Seat: 330 psi

Options:
- Buna-N lining on disc
- Manual gear operator, electric or pneumatic actuation.

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Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir
Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

Dimensions:

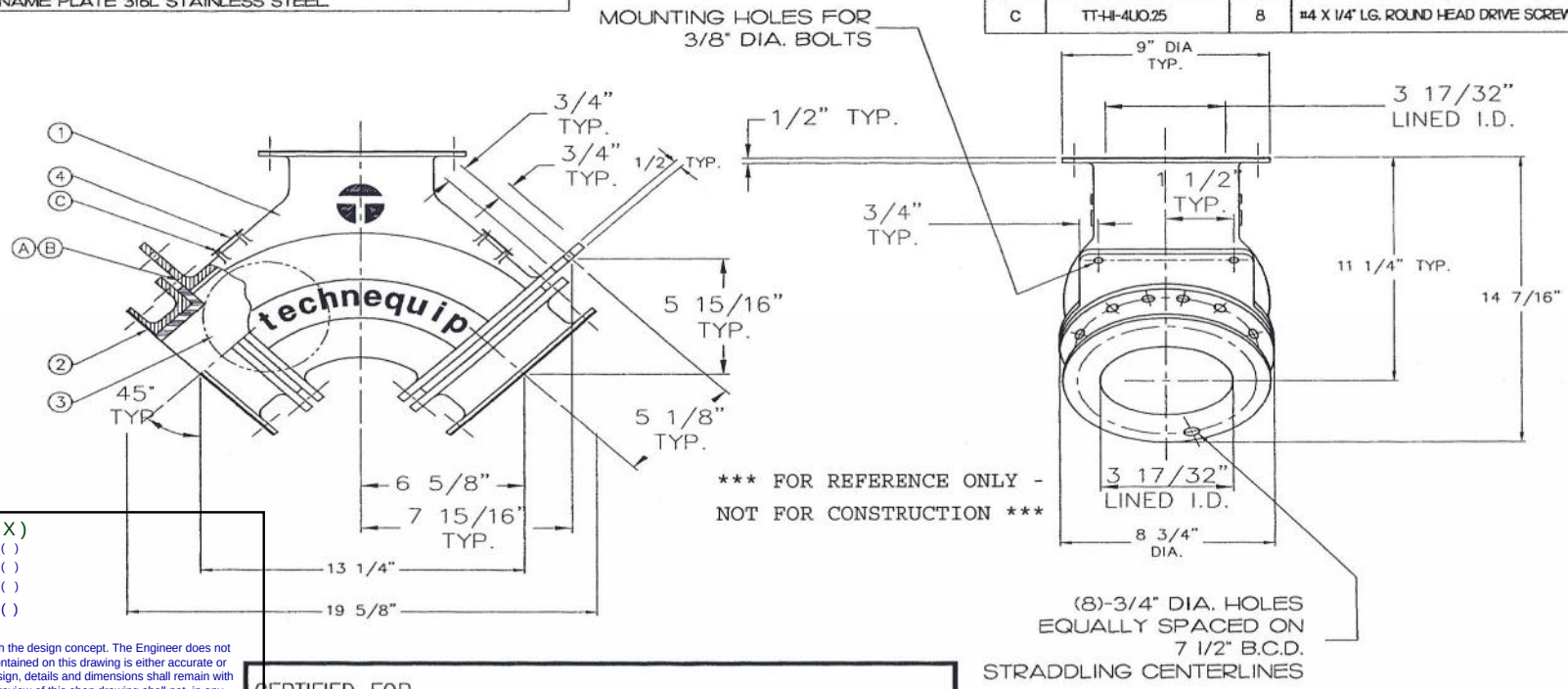
Size		A		B		C		D		E		F		Weight	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg
2	50	3.2	81	2.4	60	.31	8	.63	16	3.3	85	2.2	57	5.9	2.7
2½	65	3.8	97	2.9	73	.31	8	.63	16	4.2	106	2.6	65	7.5	3.4
3	80	3.8	97	3.5	89	.31	8	.63	16	4.4	113	3.0	75	8.6	3.9
4	100	4.6	116	4.5	114	.39	10	.63	16	5.3	135	3.5	90	11.9	5.4
5	125	5.8	148	5.6	141	.39	10	.63	16	5.8	148	4.3	110	20	9.1
6	150	5.8	148	6.6	168	.39	10	.63	16	7.1	181	4.9	124	23	10.5
8	200	5.3	134	8.6	219	.43	11	.75	19	8.0	204	6.1	155	37.4	17
10	250	6.3	159	10.7	273	.51	13	.75	19	9.1	230	7.5	190	84	38.1
12	300	6.5	166	12.8	324	.51	13	.75	19	10.6	270	9.1	230	100	45.4

308 – 20701 Langley Bypass, Langley, BC, Canada, V3A 5E8 Tel: (604) 533-2073 Fax: (604) 533-2074

1.	TT-H4R-A	VALVE HOUSING, PURE GUM RUBBER LINED.
2.	TT-AF4R-A	VALVE INLET ADAPTER, PURE GUM RUBBER LINED. (2 REQUIRED).
3.	TT-AHR5	TTV BALL PURE GUM RUBBER LINED.
4.	TT-NP-MEDIUM	NAME PLATE 316L STAINLESS STEEL.

HARDWARE LIST

ITEM No.	PART No.	QTY	DESCRIPTION
A	TT-HI-38W	16	3/8" WASHERS
B	TT-HI-38BL5O	16	3/8" SIZE X 1 1/2" LG. UNC BOLT
C	TT-HI-4UO.25	8	#4 X 1/4" LG. ROUND HEAD DRIVE SCREW TYPE U STEEL.



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Reviewed as Modified ( )
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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

CERTIFIED FOR _____
P.O. No. _____
REQ. No. _____ S.O. No. _____
QUAN. _____ MODEL _____
SERIAL NO. _____
BY _____ DATE _____

FLSmidth KREBS
5505 WEST GILLETTE ROAD TUCSON, ARIZONA 85743
PHONE: (520) 744-8200 FAX: (520) 744-8300

INLET CONNECTION:	4"
OUTLET CONNECTION:	4"
CONNECTION TYPE:	FLANGE (ANSI 150# DRILLING)
MAX. OPERATING TEMPERATURE:	150°F (65°C)
VALVE LINING:	PURE GUM RUBBER
MAX. OPERATING PRESSURE:	150 PSI (1000 KPa)
EMPTY WEIGHT:	73 LBS (33.1 kg)
VOLUME:	0.33 CU.FT.
REPLACEABLE BALL: No.:	TT-AHR5
SIZE:	5" DIA.
MATERIAL:	PURE GUM RUBBER

NO.	DATE	REVISION DESCRIPTION
1	2-11-10	CHANGED CUSTOMER NAME & PO NUMBER

REVISION 3
Rev. By: NP
Rev. Date: 2/12/10
Appvd. By: BTO 2/12/10

FLSmidth KREBS
5505 WEST GILLETTE ROAD
TUCSON, AZ 85743
www.krebs.com

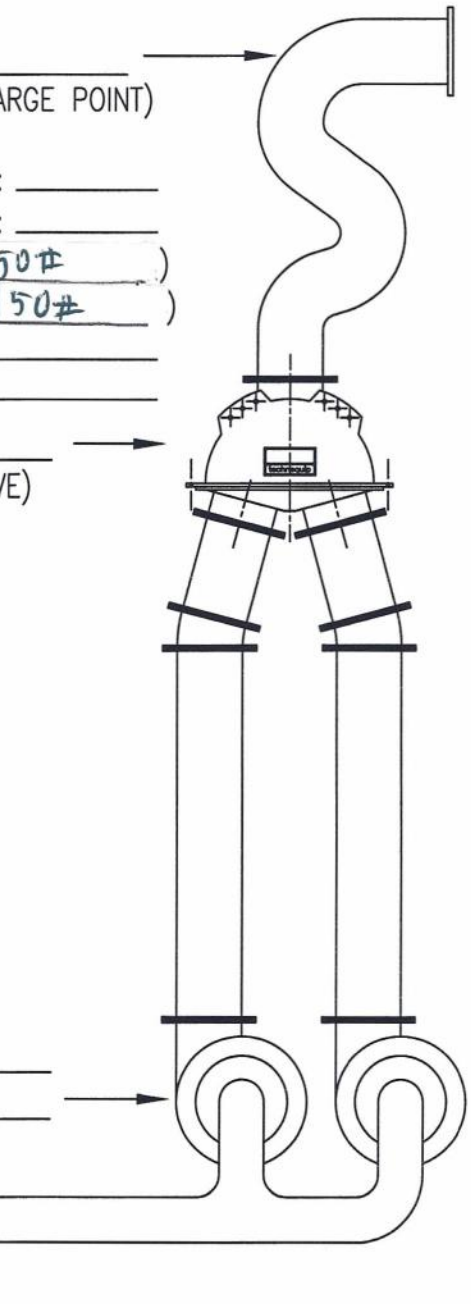
Scale:	Dwn. By:	Date Drawn:	Appvd. By:	Sheet:
---	NP	1/6/10	BTO DSS	1 OF 1

GENERAL PARTS ARRANGEMENT
TECH-TAYLOR VALVE
MODEL: T2F4R-150C-ANSI150
PART NO. TT4-150-00160

A DWG. NO. TT4-150-00160U

FLSmidth Krebs - Technequip Valves
5505 W. Gillette Rd., Tucson, AZ 85743
Tel: (520) 744-8200 Fax: (520) 744-8300
www.krebs.com

Tech-Taylor™ Valve T2 Application Sheet



PIPE LINE

CUSTOMER INLET/PIPE SIZE: 4" LINED? [YES / NO] LINED I.D.: _____
CUSTOMER OUTLET/PIPE SIZE: 4" LINED? [YES / NO] LINED I.D.: _____
INLET CONNECTION TYPE:(PLAIN END/VICTAULIC/FLANGED; DRILLING 150#)
OUTLET CONNECTION TYPE:(PLAIN END/VICTAULIC/FLANGED; DRILLING 150#)
DESIRED RATING (150,300,600 PSI): 150PSI
LINING MATERIAL: GUM RUBBER

PUMP

DISCHARGE OUTLET SIZE: 4"
FLOW RATE: _____
PUMP TYPE: _____
(PISTON, DIAPHRAGM, CENTRIFUGAL, ETC...)
GLAND SEAL WATER DRAINS INSTALLED: YES NO

SUMP

SLURRY S.G.: _____
SLURRY TEMP: _____
MAX. PARTICLE SIZE: _____
UNIQUE PROPERTIES (PH, CARRIER IF OTHER THAN WATER, ETC): _____
_____
_____
_____

End User: _____
Approved by: _____
Date Approved: _____

TTVINFO.DWG REVE

ASHCROFT®

Type 3005/3005P
Metric Case Commercial Gauge

FEATURES

- *304 stainless steel case liquid-filled, dry or field-fillable (Type 3005)*
- *ABS case, liquid-filled, dry or field-fillable (Type 3005P)*
- *Patented PowerFlex™ movement with polyester segment*
- *Pressure ranges from vacuum to 15,000 psi and compound*
- *Two-year warranty on liquid-filled gauges*
- *True Zero™ indication, a unique safety feature*

Ashcroft® Type 3005/3005P gauges are an exceptional value. The materials, construction, and design of these gauges provide a product of superior quality, able to withstand the rigors of pressure spikes, mechanical shock and high vibration levels.

These gauges offer flexibility in fit and function. Type 3005 gauges are 63mm in diameter and available in lower or back connection. Type 3005P are also 63mm and available in ¼ NPT lower connection only. These gauges can be purchased either dry, liquid filled or field fillable. Back connection Type 3005 gauges can be panel mounted with a variety of optional panel mounting kits. Metric socket configurations and metric dials are also available.

As with other Ashcroft commercial gauges, both the Type 3005 and 3005P incorporate the patented PowerFlex™ movement, a proven performer, offering superior resistance to shock, vibration and pulsation. The result is a more durable, longer-lasting gauge.

True Zero™ indication, a standard feature on these gauges, is the accurate indication of zero pressure being applied to the gauge. In addition to increased safety benefits, this means reduced inspection and manufacturing cost for you and your customer.

PRODUCT SPECIFICATIONS

Ashcroft® Model No.: 3005/3005P

Size:	63mm (2½˝)
Case:	3005 – 304 stainless steel, dry or liquid filled 3005P – Black ABS, dry or liquid filled
Fill Fluid:	Glycerin (20° to 150°F ambient; –7°C to 65°C)
Ring:	None
Window:	Polycarbonate with O-ring seal
Dial:	Black figures on white background, aluminum
Pointer:	Black, aluminum
Bourdon Tube:	– C-shaped bronze (vac.-600 psi and compound) – Helical bronze (1000 psi-6000 psi) – Helical stainless steel (10,000 psi-15,000 psi)
Movement:	Patented Power*Flex*™ movement
Socket:	Brass, with O-ring case seal
Restrictor:	Brass throttle plug, 0.013˝ orifice (no throttle plug in vacuum or 15 psi ranges)
Connection:	3005 – ¼ NPT lower and back 3005P – ¼ NPT lower only
Ranges:	Vac thru 15,000 psi and compound. Equivalent metric ranges available
Accuracy:	ASME B40.100, Grade B, ±3-2-3%
Operating Temp.:	–40°F to 150°F (dry gauge) –40°C to 65°C

OPTIONAL FEATURES

Case:	Sealed case, field fillable (LJ) Silicone filled (GV) (–40°F to 150°F; –40°C to 65°C)
Movement:	FlutterGuard™
Mounting Hardware:	U-clamp (UC), front flange (FF), retrofit flange (RF) – back connect only
Socket:	Throttle Plugs, 0.007,˝ 0.020,˝ 0.063˝ JIS, DIN and other connections on application
Others:	Customized dials Nonstandard ranges Special calibration on application

COMMONLY USED ON

Hydraulic systems, machine tools, pressure washers/sprayers, compressors, irrigation equipment, a variety of other applications

HOW TO ORDER (Typical example)

63	W	3005	H	L	02L	1000#

Dial Size: 63mm
Movement: Patented Power*Flex*™
Case Type Number: 3005 (Stainless Steel)
Socket Material: Brass
Liquid Filled Case:
Connection Size/Location: ¼ NPT Lower
Range: 1000 psi

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 27/10/2010

WILLIAMS ENGINEERING CANADA

* 63-W-3005HL02B
300PSI

ISO 9001
REGISTERED FIRM

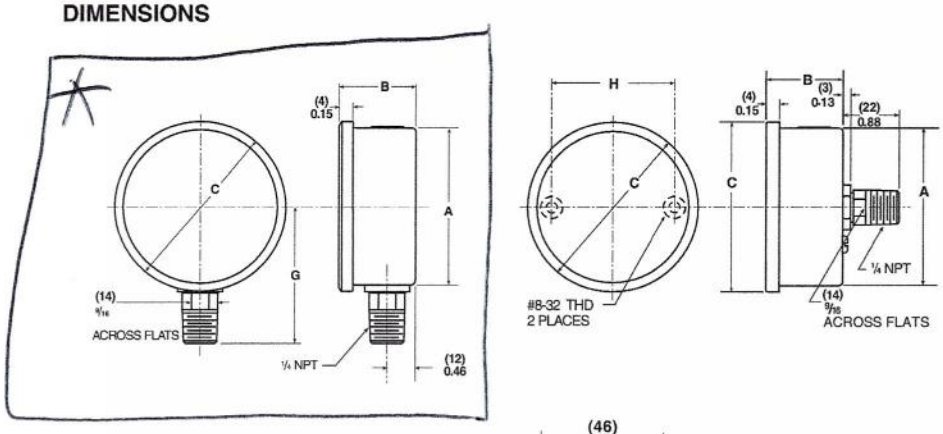
BULLETIN CG-35

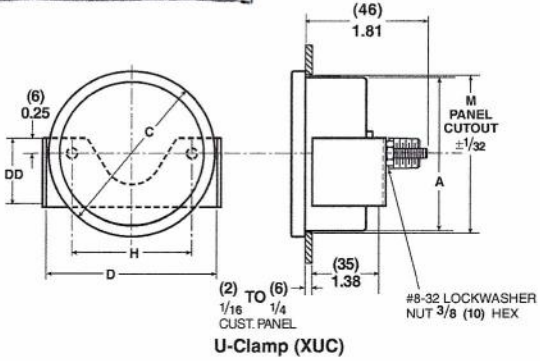
Ashcroft Inc., 250 East Main Street, Stratford, CT 06614 USA
Tel: 203-378-8281 • Fax: 203-385-0408
email: info@ashcroft.com • www.ashcroft.com

ASHCROFT®

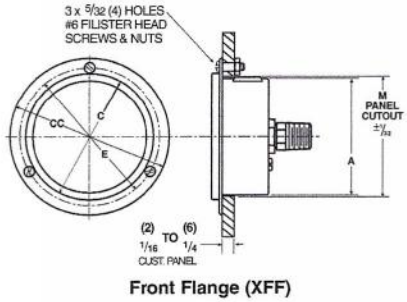
Type 3005/3005P
Metric Case Commercial Gauge

DIMENSIONS

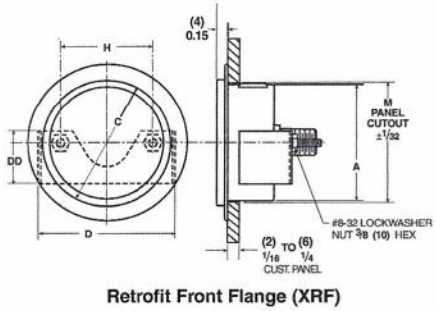




U-Clamp (XUC)



Front Flange (XFF)



Retrofit Front Flange (XRF)

Size/Type	A	B	C	CC	D	DD	E	G	H	M
63mm, 3005	(63) 2.48	(29) 1.16	(68) 2.67	(86) 3.36	(75) 2.95	(28) 1.12	(75) 2.95	(56) 2.20	(49) 1.94	(65) 2.54
63mm, 3005P*	(64) 2.53	(31) 1.22	(68) 2.67	—	—	—	—	(56) 2.20	—	—

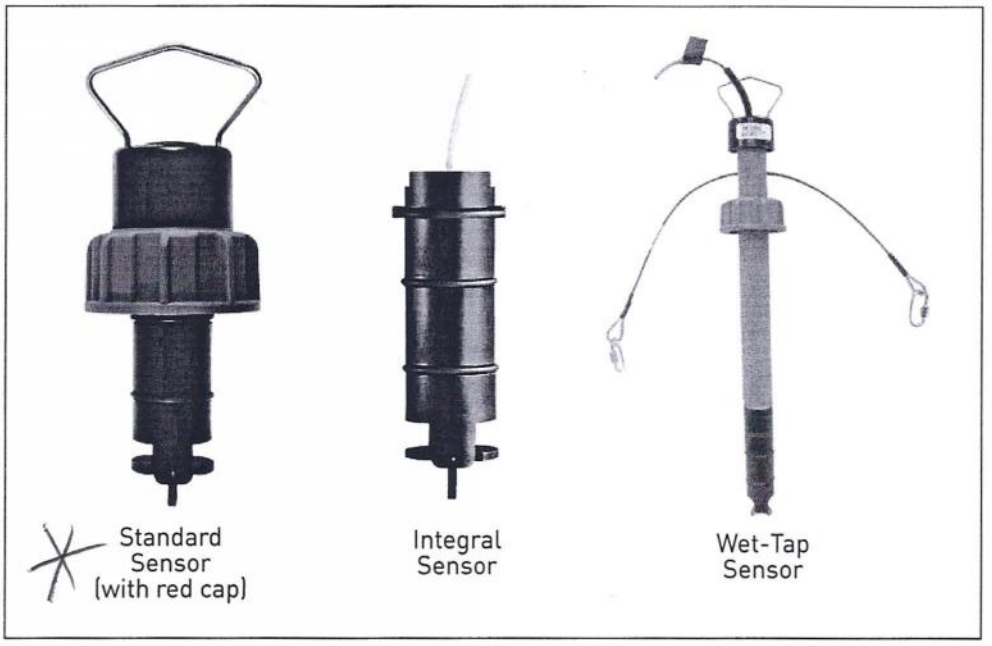
*Lower connect only Dimensions in (mm) inches.

ISO 9001
REGISTERED FIRM

BULLETIN CG-35

Ashcroft Inc., 250 East Main Street, Stratford, CT 06614 USA
Tel: 203-378-8281 • Fax: 203-385-0408
email: info@ashcroft.com • www.ashcroft.com

Signet 515 Rotor-X Paddlewheel Flow Sensors



Features

- Operating range 0.3 to 6 m/s (1 to 20 ft/s)
- Wide turndown ratio of 20:1
- Highly repeatable output
- Simple, economical design
- Installs into pipe sizes DN15 to DN900 (½ to 36 in.)
- Self-powered/no external power required
- Test certificate included for -X0, -X1
- Chemically resistant materials

Description

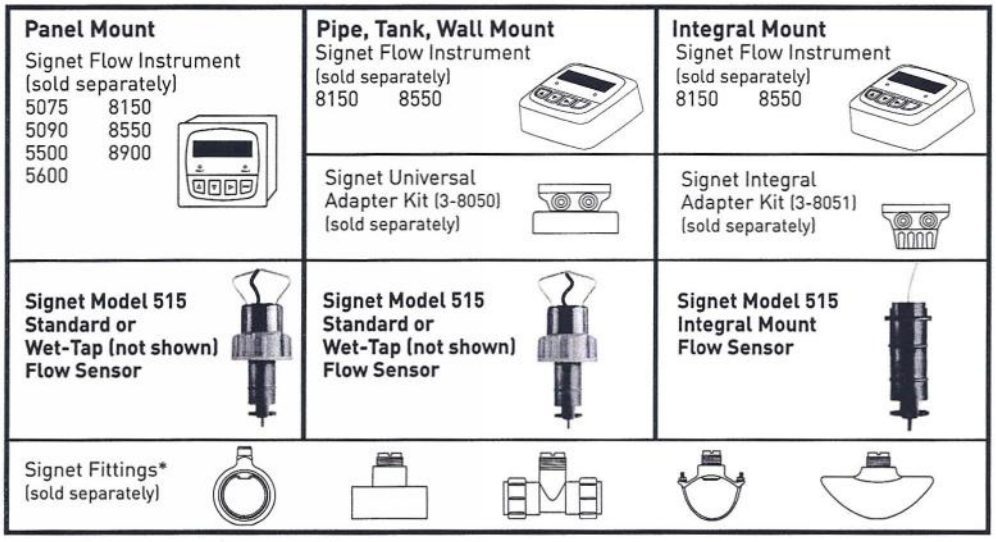
Simple to install with time-honored reliable performance, Signet 515 Rotor-X Paddlewheel Flow Sensors are highly repeatable, rugged sensors that offer exceptional value with little or no maintenance. The output signal of the Model 515 is a sinusoidal frequency capable of driving a self-powered flowmeter (Model 3-5090). The wide dynamic flow range of 0.3 to 6 m/s (1 to 20 ft/s) allows the sensor to measure liquid flow rates in full pipes and can be used in low pressure systems.

The Model 515 sensors are offered in a variety of materials for a wide range of pipe sizes and insertion configurations. The many material choices including PP and PVDF make this model highly versatile and chemically compatible to many liquid process solutions. Sensors can be installed in up to DN900 (36 in.) pipes using Signet's comprehensive line of custom fittings. These custom fittings, which include tees, saddles, and weldolets, seat the sensor to the proper insertion depth into the process flow. The sensors are also offered in configurations for wet-tap and intrinsically safe installation requirements.

Applications

- Pure Water Production
- Filtration Systems
- Chemical Production
- Liquid Delivery Systems
- Pump Protection
- Scrubber Systems
- Water Monitoring
- Not suitable for gases

System Overview (For overview of Wet-Tap System, see 3519 product page)



FM APPROVED

LEAD FREE Pb RoHS COMPLIANT

Reviewed (X)
Reviewed as Modified ( )
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Not Reviewed ( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

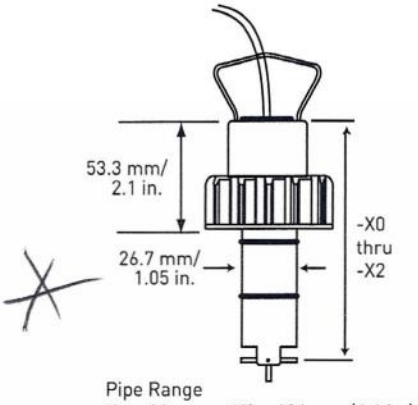
Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

* See Fittings section for more information.

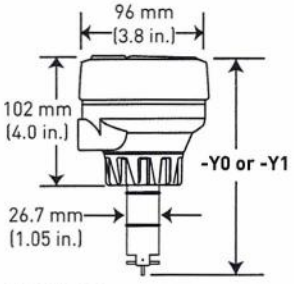
Dimensions

515 Standard Mount Sensor



Pipe Range
½ to 4 in.: **-X0** = 104 mm (4.1 in.)
5 to 8 in.: **-X1** = 137 mm (5.4 in.)
10 in. and up: **-X2** = 213 mm (8.4 in.)

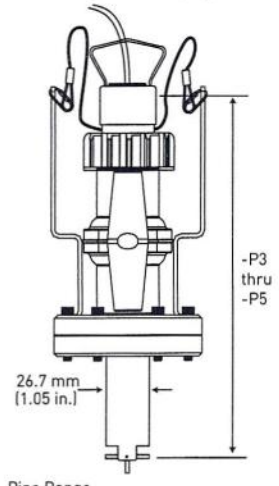
515 Integral Mount Sensor shown with Transmitter (sold separately)



Pipe Range
0.5 to 4 in. **-Y0** = 152mm (6.0 in.)
5 to 8 in. **-Y1** = 185mm (7.3 in.)

515 Wet-Tap Mount Sensor with 3519 Wet-Tap Valve

See more information on the 3519 Wet-Tap Valve, refer to the 3519 product page.



Pipe Range
½ to 4 in. **-P3** = 297 mm (11.7 in.)
5 to 8 in. **-P4** = 333 mm (13.1 in.)
10 in. and up **-P5** = 409 mm (16.1 in.)

Specifications

General

Operating Range:
0.3 to 6 m/s (1 to 20 ft/s)
Pipe Size Range:
DN15 to DN900 (½ to 36 in.)
Linearity:
±1% of max. range @ 25 °C (77 °F)
Repeatability:
±0.5% of max. range @ 25 °C (77 °F)
Min. Reynolds Number Required: 4500

Wetted Materials

- Sensor Body:
  Glass-filled PP (black) or PVDF (natural)
- O-rings:
  FPM (std)
  optional EPR (EPDM) or FFPM
- Rotor Pin:
  Titanium, Hastelloy-C or PVDF;
  optional Ceramic, Tantalum, or Stainless Steel
- Rotor:
  Black PVDF or Natural PVDF;
  optional Tefzel®, with or without Fluoroloy G® sleeve

Electrical

Frequency:
19.7 Hz per m/s nominal
(6 Hz per ft/s); sinusoidal
Amplitude:
3.3 V p/p per m/s nominal
(1 V p/p per ft/s)
Source Impedance: 8 KΩ
Cable Type:
2-conductor twisted pair with shield, 22 AWG
Cable Length:
7.6 m (25 ft) can be extended up to 60 m (200 ft) maximum

Max. Temperature/Pressure Rating Standard and Integral Sensor

- PP: 12.5 bar @ 20 °C,
  1.7 bar @ 90 °C
  (180 psi @ 68 °F, 25 psi @ 194 °F)
- PVDF: 14 bar @ 20 °C,
  1.4 bar @ 100 °C
  (200 psi @ 68 °F, 20 psi @ 212 °F)

Operating Temperature:

- PP: -18 °C to 90 °C (0°F to 194 °F)
- PVDF: -18 °C to 100 °C (0 °F to 212 °F)

Wet-Tap Sensor

- PP: 7 bar @ 20 °C, 1.4 bar @ 66 °C
  (100 psi @ 68 °F, 20 psi @ 150 °F)

Operating temperature:
-18 °C to 66 °C (0 °F to 150 °F)
Max. wet-tap sensor removal rating:
1.7 bar @ 22 °C (25 psi @ 72 °F)

See Temperature and Pressure Graphs for more information.

Shipping Weight

P51530-X0	0.454 kg	1.00 lb
P51530-X1	0.476 kg	1.04 lb
P51530-X2	0.680 kg	1.50 lb
P51530-X3	0.794 kg	1.75 lb
P51530-X4	0.850 kg	1.87 lb
P51530-X5	1 kg	2.20 lb
3-8510-X0	0.23 kg	.50 lb
3-8510-X1	0.23 kg	.50 lb

Standards and Approvals

- FM Class I, II, III/Div. 1/groups A-G
- RoHS compliant
- Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management

Application Tips:

- Use the Conduit Adapter Kit to protect the cable-to-sensor connection when used in outdoor environments. See Accessories section for more information.
- Use a sleeved rotor in abrasive liquids to reduce wear.
- Sensor plug can be used to plug installation fitting after extraction of sensor from pipe.
- For liquids containing ferrous particles, use Signet Magmeters.
- For systems with components of more than one material, the maximum temperature/pressure specification must always be referenced to the component with the lowest rating.

Please refer to Wiring, Installation, Accessories and Fittings sections for more information.

Ordering Information

Model 515 Standard Mount Paddlewheel

When choosing this style of sensor, the instrument can be mounted nearby on a pipe or wall or in a remote location up to 60 m/200 ft (standard cable length is 7.6 m/25 ft) by connecting the sensor through a standard 3-8050-1 universal junction box. Use Signet fittings for proper seating of the sensor into the process flow.

Model 515 Standard Paddlewheel Flow Sensor

Sensor Part Number			
P51530	Flow Sensor for use with remote mount instrument		
	Body/Rotor/Pin Material-Choose One*		
	- H	Polypropylene/Black PVDF/Hastelloy-C	
	- P	Polypropylene/Black PVDF/Titanium	
	- S	Polypropylene/Black PVDF/Natural PVDF	
	- T	Natural PVDF/Natural PVDF/Natural PVDF	
	- V	Natural PVDF/Natural PVDF/Hastelloy-C	
		Pipe Size - Choose One	
		0	½ to 4 in.
		1	5 to 8 in.
		2	10 to 36 in.
		↓	
P51530	**- P**	**0**	**Example Part Number**

Mfr. Part No.*	Code	Mfr. Part No.*	Code
P51530-H0	**198 801 659**	P51530-T0	**198 801 663**
P51530-P0	**198 801 620**	P51530-T1	**198 801 664**
P51530-P1	**198 801 621**	P51530-V0	**198 801 623**
P51530-P2	**198 801 622**	P51530-V1	**198 801 624**
P51530-S0	**198 801 661**	P51530-V2	**198 801 625**

***Model 515 Ordering Notes**

1) Most common part number combinations shown. For all other combinations contact factory.
2) Other rotor and pin materials are available for purchase from the factory and can be easily replaced in the field. See Accessories section.

Model 515 Integral Mount Paddlewheel

When choosing this style of sensor, the instrument is mounted directly onto the sensor for a local display. See Guideline below for instructions.

Sensor Part Number			
3-8510	Flow Sensor for integral mounting on the 8150 or 8550 instrument using the 3-8051 adapter (instrument and adapter sold separately)		
	Body/Rotor/Pin Material-Choose One*		
	- P	Polypropylene/Black PVDF/Titanium	
	- T	Natural PVDF/Natural PVDF/Natural PVDF**	
	- V	Natural PVDF/Natural PVDF/Hastelloy-C**	
		Pipe Size - Choose One	
		0	½ to 4 in.
		1	5 to 8 in.
		↓	
3-8510	**- P**	**0**	**Example Part Number**

**PVDF available ½ in. to 4 in. only

Model 515 Integral Mount Paddlewheel Flow Sensor

Mfr. Part No.*	Code	Mfr. Part No.*	Code
3-8510-P0	**198 864 504**	3-8510-T0	**159 000 622**
3-8510-P1	**198 864 505**	3-8510-V0	**198 864 506**

Guideline: Combining a 515 Integral mount flow sensor with an integrally mounted instrument

Option 1

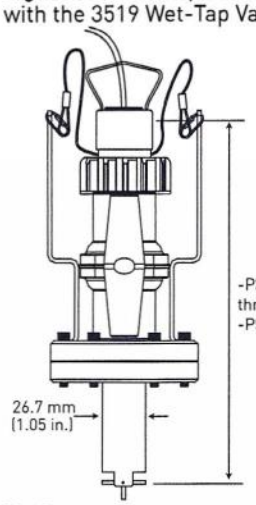
Once an integral mount sensor is chosen, it can be mounted directly to a field mount transmitter by following these guidelines:

a) Order the integral adapter kit 3-8051 (sold separately) to connect the sensor to an instrument.
b) Order a field mount transmitter (sold separately). The following part numbers are compatible: 3-8550-1, 3-8550-2, 3-8550-3, 3-8150-1.
c) Assembling the sensor with the integral adapter and instrument is quick and simple.

Option 2

These parts can also be ordered as an assembled part. See page 74 "Integral Mount" for more information.

Signet 515 Wet-Tap Sensor with the 3519 Wet-Tap Valve



Pipe Range
½ to 4 in. **-P3** = 297 mm (11.7 in.)
5 to 8 in. **-P4** = 333 mm (13.1 in.)
10 in. and up **-P5** = 409 mm (16.1 in.)

***Model 515 Ordering Notes**

1) Other rotor and pin materials are available for purchase from the factory and can be easily replaced in the field. See Accessories section.

Rotor

Rotor Pin

Sensor Cap

Sensor Plug

Conduit Adapter Kit

Ordering Information (continued)

Model 515 Wet-Tap Mount Paddlewheel Flow Sensor

When choosing this style of sensor, the instrument can be mounted nearby on a pipe or wall or in a remote location up to 60 m (200 ft) by connecting the sensor through a standard 3-8050-1 universal junction box. Standard cable length is 7.6 m (25 ft). This style of sensor uses the 3519 Wet-Tap valve only (see individual product page for more information).

Sensor Part Number			
P51530	Flow Sensor for wet-tap mounting with the 3519 Wet-Tap Valve (sold separately)		
	Body/Rotor/Pin Material*		
	- P	Polypropylene/Black PVDF/Titanium	
		Pipe Size - Choose One	
		3	½ to 4 in.
		4	5 to 8 in.
		5	10 to 36 in.
		↓	
P51530	**- P**	**3**	**Example Part Number**

Mfr. Part No.*	Code
P51530-P3	**198 840 310**
P51530-P4	**198 840 311**
P51530-P5	**198 840 312**

Guideline: Combining a 515 Wet-Tap Sensor with a 3519 Wet-Tap Valve

a) Sensor can be mounted in a 3519 Wet-Tap Valve (sold separately)
b) Assembling a sensor with a 3519 Wet-Tap valve is quick and simple. These parts can also be ordered as complete assemblies. See 3519 product page.

Accessories and Replacement Parts

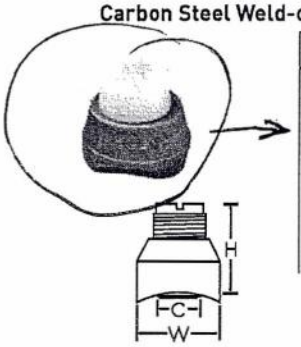
Mfr. Part No.	Code	Description
Rotors		
M1538-2	**198 801 181**	Rotor, PVDF Black
P51547-3	**159 000 474**	Rotor, PVDF Natural
M1538-4	**198 820 018**	Rotor, Tefzel®
P51550-3	**198 820 043**	Rotor and pin (matched set), PVDF Natural
3-0515.322-1	**198 820 059**	Sleeved rotor, PVDF Black
3-0515.322-2	**198 820 060**	Sleeved rotor, PVDF Natural
3-0515.322-3	**198 820 017**	Sleeved rotor, Tefzel®
Rotor Pins		
M1546-1	**198 801 182**	Pin, Titanium
M1546-2	**198 801 183**	Pin, Hastelloy-C
M1546-3	**198 820 014**	Pin, Tantalum
M1546-4	**198 820 015**	Pin, Stainless Steel
P51550-3	**198 820 043**	Rotor and pin, PVDF Natural
P51545	**198 820 016**	Pin, Ceramic
O-Rings		
1220-0021	**198 801 186**	O-ring, FPM (2 required per sensor)
1224-0021	**198 820 006**	O-ring, EPR (EPDM) (2 required per sensor)
1228-0021	**198 820 007**	O-ring, FFPM (2 required per sensor)
Miscellaneous		
P31536	**198 840 201**	Sensor plug, Polypropylene
P31542	**198 801 630**	Sensor cap, Red
P31934	**159 000 466**	Conduit cap
P51589	**159 000 476**	Conduit adapter kit
5523-0222	**159 000 392**	Cable (per foot), 2 cond. w/shield, 22 AWG
3-8051	**159 000 187**	Transmitter integral adapter (for use with 8510 and 8512) (see system overview for graphics)
6400-9001	**159 001 466**	Intrinsic safety barriers (2 required)
3-8051-1	**159 000 753**	Universal junction box

Rev A (3/09)

3401 Aerojet Avenue, El Monte, CA 91731-2882 U.S.A. • Tel. (626) 571-2770 • Fax (626) 573-2057 • www.gfsignet.com • e-mail: signet.ps@georgfischer.com

Installation Fittings

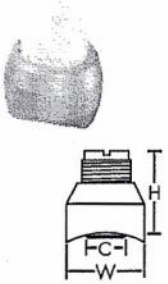
Carbon Steel Weld-on Weldolets for use with SCH 40 metal pipe (ASTM)



Part No.	Code	Size	W	H	C	Sensor Type
CS4W025	198 801 464	2.50 in.	2.60	2.48	1.31	Flow -X0, pH -XX
CS4W030	198 801 557	3.00 in.	2.60	2.47	1.31	Flow -X0, pH -XX
CS4W040	198 801 552	4.00 in.	2.60	2.45	1.31	Flow -X0, pH -XX
CS4W050	198 801 465	5.00 in.	3.50	2.24	2.10	Flow -X1
CS4W060	198 801 553	6.00 in.	3.50	3.11	2.10	Flow -X1
CS4W080	198 801 574	8.00 in.	3.50	2.88	2.10	Flow -X1
CS4W100	198 801 575	10.0 in.	3.50	5.63	2.10	Flow -X2
CS4W120	198 801 576	12.0 in.	3.50	5.40	2.10	Flow -X2

- For use with P51530-X0/-X1/-X2, 3-2536-X0/-X1/-X2, 3-8510-X0/-X1, 3-8512-X0/-X1, 3-2537-XC-X0/-X1, 3-2551-X0-XX/-X1-XX/-X2-XX, 3-272X-XX
- C - Clearance dimension
- Up to 8 in. - PVDF insert, over 8 in. - PVC insert
- PTFE wetted material. Contact factory for available options.

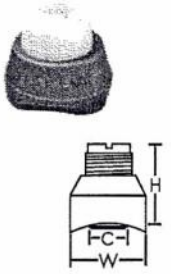
Brass Brazolet with PVDF insert for use with copper pipe (SCH 40 ASTM)



Part No.	Code	Size	W	H	C	Sensor Type
BR4B025	198 801 794	2.5 in.	2.50	2.48	1.31	Flow -X0, pH -XX
BR4B030	198 801 795	3.0 in.	2.50	2.47	1.31	Flow -X0, pH -XX
BR4B040	198 801 796	4.0 in.	2.50	2.45	1.31	Flow -X0, pH -XX
BR4B050	198 801 797	5.0 in.	3.50	2.24	2.10	Flow -X1
BR4B060	198 801 798	6.0 in.	3.50	3.11	2.10	Flow -X1
BR4B080	198 801 799	8.0 in.	3.50	2.88	2.10	Flow -X1
BR4B100	198 801 800	10.0 in.	3.50	5.63	2.10	Flow -X2
BR4B120	198 801 801	12.0 in.	3.50	5.40	2.10	Flow -X2

- For use with P51530-X0/-X1/-X2, 3-2536-X0/-X1/-X2, 3-8510-X0/-X1, 3-8512-X0/-X1, 3-2537-XC-X0/-X1, 3-2551-X0-XX/-X1-XX/-X2-XX, 3-272X-XX
- C - Clearance dimension
- Up to 8 in. - PVDF insert, over 8 in. - PVC insert
- PTFE wetted material. Contact factory for available options.

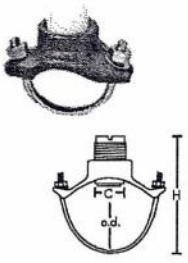
316 SS (1.4401) Weldolets with PVDF insert for use with SCH 40 metal pipe (ASTM)



Part No.	Code	Size	W	H	C	Sensor Type
CR4W025	198 801 786	2.50 in.	2.50	2.48	1.31	Flow -X0, pH -XX
CR4W030	198 801 787	3.00 in.	2.50	2.47	1.31	Flow -X0, pH -XX
CR4W040	198 801 788	4.00 in.	2.50	2.45	1.31	Flow -X0, pH -XX
CR4W050	198 801 789	5.00 in.	3.50	2.24	2.10	Flow -X1
CR4W060	198 801 790	6.00 in.	3.50	3.11	2.10	Flow -X1
CR4W080	198 801 791	8.00 in.	3.50	2.88	2.10	Flow -X1
CR4W100	198 801 792	10.0 in.	3.50	5.63	2.10	Flow -X2
CR4W120	198 801 793	12.0 in.	3.50	5.40	2.10	Flow -X2

- For use with P51530-X0/-X1/-X2, 3-2536-X0/-X1/-X2, 3-8510-X0/-X1, 3-8512-X0/-X1, 3-2537-XC-X0/-X1, 3-2551-X0-XX/-X1-XX/-X2-XX, 3-272X-XX
- Up to 8 in. - PVDF insert, over 8 in. - PVC insert
- C - Clearance dimension
- PTFE wetted material. Contact factory for available options.

Iron Strap-on Saddle for use with SCH 80 metal pipe (ASTM)



Part No.	Code	Size	H	o.d min	o.d max	C	Sensor Type
IR8S020	198 801 425	2.00 in.	5.50	2.35	2.56	1.44	Flow -X0, pH -XX
IR8S025	198 801 426	2.50 in.	5.50	2.44	2.91	1.44	Flow -X0, pH -XX
IR8S030	198 801 427	3.00 in.	6.50	2.97	3.54	1.44	Flow -X0, pH -XX
IR8S040	198 801 420	4.00 in.	7.50	3.74	4.55	2.25	Flow -X0, pH -XX
IR8S050	198 801 429	5.00 in.	9.00	4.74	5.63	2.25	Flow -X1
IR8S060	198 801 430	6.00 in.	10.5	5.94	6.70	2.25	Flow -X1
IR8S080	198 801 431	8.00 in.	12.0	7.69	8.72	2.25	Flow -X1
IR8S100	198 801 432	10.0 in.	18.0	10.64	12.12	2.25	Flow -X2
IR8S120	198 801 433	12.0 in.	20.0	12.62	14.32	2.25	Flow -X2

- For use with P51530-X0/-X1/-X2, 3-2536-X0/-X1/-X2, 3-8510-X0/-X1, 3-8512-X0/-X1, 3-2537-XC-X0/-X1, 3-2551-X0-XX/-X1-XX/-X2-XX, 3-272X-XX
- C - Clearance dimension
- Up to 8 in. - PVDF insert, over 8 in. - PVC insert
- Buna-N O-ring
- Larger sizes may be available and PTFE wetted material. Contact factory.

Signet 8550 Flow Transmitters

Member of the ProcessPro® Family of Instruments

Panel Mount

Pipe, Wall, Tank and Integral Mount

Description

Signet 8550 Flow Transmitters are advanced instruments that convert the signal from frequency and digital (S^3L) flow sensors into a 4 to 20 mA signal for long distance transmission. Configuration flexibility is maximized with single or dual input/output, two optional relays for process control, two packaging options for integral/pipe mount or panel installation, and scalability for virtually any flow range or engineering unit. State-of-the-art electronic design ensures long-term reliability, signal stability, and simple user setup and operation.

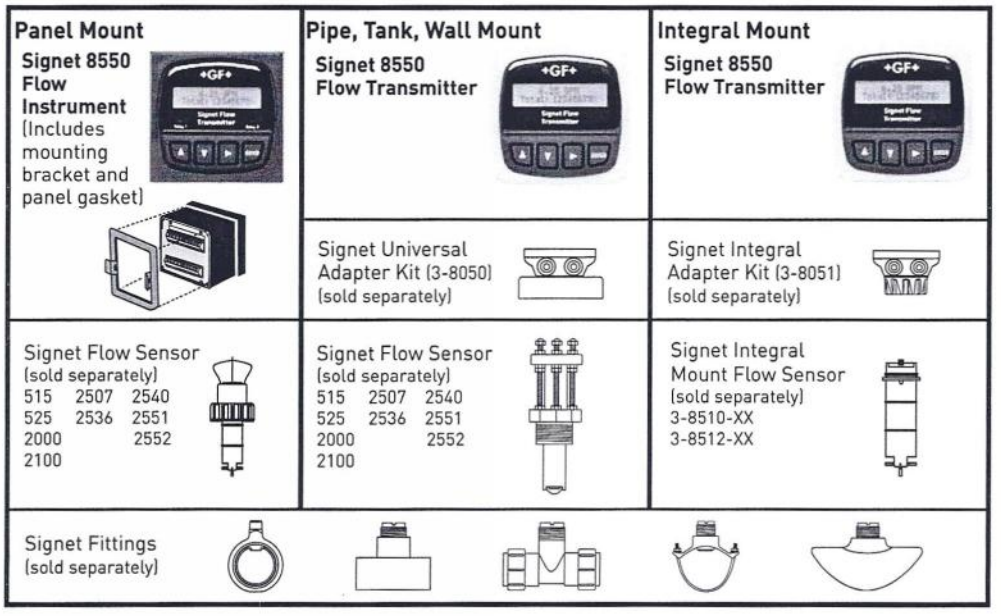
Features

- **2 or 4 wire power**
- **Available with single or dual input/output**
- **4 to 20 mA scaleable outputs**
- **Permanent & resettable totalizers**
- **Relay options available**
- **NEMA 4X enclosure with self-healing window**
- **Output simulation for complete system testing**

Applications

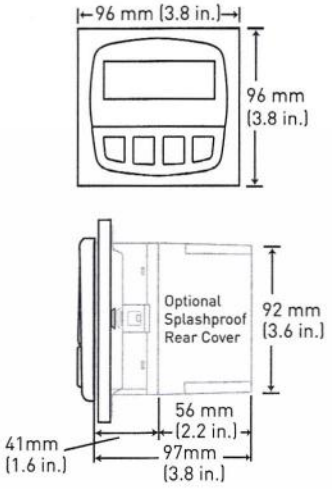
- **Flow Control and Monitoring**
- **Filtration or Softener Regeneration**
- **Effluent Totalization**
- **Pump Protection**
- **Feed Pump Pulsing**
- **Ratio Control**
- **Water Distribution**
- **Leak Detection**

System Overview

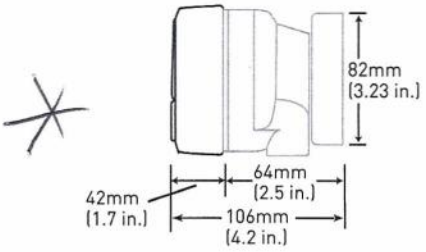


Dimensions

3-8550-XP



Field version with universal mount



Model 8550
Ordering Notes

1) Use the field mount version to directly mount the instrument to the Model 515 or 2536 integral mount sensor. See sensor data sheet for more information.
2) Field mount and sensor can be ordered in a package. See Integral Mount for more information.
3) Panel Cutout should be 92 mm X 92 mm (3.62 in X 3.62 in.).
4) An optional splash proof rear cover for the panel mount version can be ordered separately if needed.

Please refer to Wiring, Installation, and Accessories sections for more information.

Specifications

General
Compatibility:
Signet Flow Sensors with frequency outputs
Accuracy: ± 0.5% of reading
Display: Alphanumeric 2 x 16 LCD
Update Rate: 1 second
Contrast: User selectable, 5 levels

Materials
- Enclosure: PBT
- Panel Case Gasket: Neoprene
- Window: Polyurethane coated polycarbonate
- Keypad: Sealed 4-key silicone rubber

Electrical
Power: 12 to 24 VDC ±10%, regulated
(-1) 90 mA max.
(-2) 220 mA max.
(-3) 100 mA max.
Sensor Input Range: 0.5 to 1500 Hz
Sensor Power:
- 2-wire: 5 VDC ± 1% @ 1.5 mA
- 3 or 4 wire: 5 VDC ± 1% @ 20 mA
Optically isolated from current loop
Short circuit protected

Current Output
- 4 to 20 mA, isolated, passive, fully adjustable and reversible
- Max. Loop Impedance:
50 Ω max. @ 12 V
325 Ω max. @ 18 V
600 Ω max. @ 24 V
- Update Rate: 100 ms
- Accuracy: ±0.03 mA

Electrical (continued)
Relay Output:
- Mechanical SPDT contacts: High, Low, Pulse, Off
- Maximum Voltage Rating: 30 VDC @ 5 A , 250 VAC @ 5 A resistive load
- Hysteresis: User selectable
- Maximum 400 pulses/min.

Open-Collector Output:
- High, Low, Pulse, Off
- Optically isolated, 50 mA max. sink, 30 VDC max. pull-up voltage.
- Hysteresis: User selectable for exiting alarm condition
- Maximum 400 pulses/min.

Environmental
Operating Temperature:
-10 °C to 70 °C (14 °F to 158 °F)
Storage Temperature:
-15 °C to 80 °C (5 °F to 176 °F)
Relative Humidity:
0 to 95%, non-condensing
Enclosure: NEMA 4X/IP65 (front)

Shipping Weight 0.325 kg 0.8 lb

Standards and Approvals
- CE, UL, CUL
- RoHS compliant
- Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management

Ordering Information

Instrument Part Number			
3-8550	ProcessPro® Flow Transmitter		
	Sensor Input, Sensor Power, Outputs - Choose One		
	-1		One input, 2 or 4 wire, 4 to 20 mA and open collector for Hi, Lo, Pulse, or Frequency
	-2		One input, 4 wire, 4 to 20 mA and 2 relays for Hi, Lo, or Pulse
	-3		Two inputs, 2 or 4 wire, two 4 to 20 mA outputs and 2 open collectors for Hi, Lo, Pulse, or Frequency
		Field or Panel Mount - Choose One	
		-	Field mount
		P	Panel mount; includes mounting bracket and panel gasket
3-8550	**- 1**		**Example Part Number - Field mount**

Mfr. Part No.	Code
3-8550-1	**159 000 047**
3-8550-1P	**159 000 048**
3-8550-2	**159 000 049**

Mfr. Part No.	Code
3-8550-2P	**159 000 050**
3-8550-3	**159 000 051**
3-8550-3P	**159 000 052**

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
Mounting Accessories		
3-8050	**159 000 184**	Universal mounting kit
3-8051	**159 000 187**	Flow integral mount NPT
3-0000.596	**159 000 641**	Heavy duty wall mount bracket (panel mount only)
3-5000.598	**198 840 225**	Surface mount bracket (panel mount only)
3-8050.395	**159 000 186**	Splashproof rear cover (panel mount only)
Liquid Tight Connectors and Other		
3-9000.392	**159 000 368**	Liquid tight connector kit for rear cover (includes 3 connectors)
3-9000.392-1	**159 000 839**	Liquid tight connector kit, NPT (1 connector)
3-9000.392-2	**159 000 841**	Liquid tight connector kit, PG 13.5 (1 connector)
3-8050.396	**159 000 617**	RC filter kit (for relay use)

3-8550.099 Rev C (03/10)

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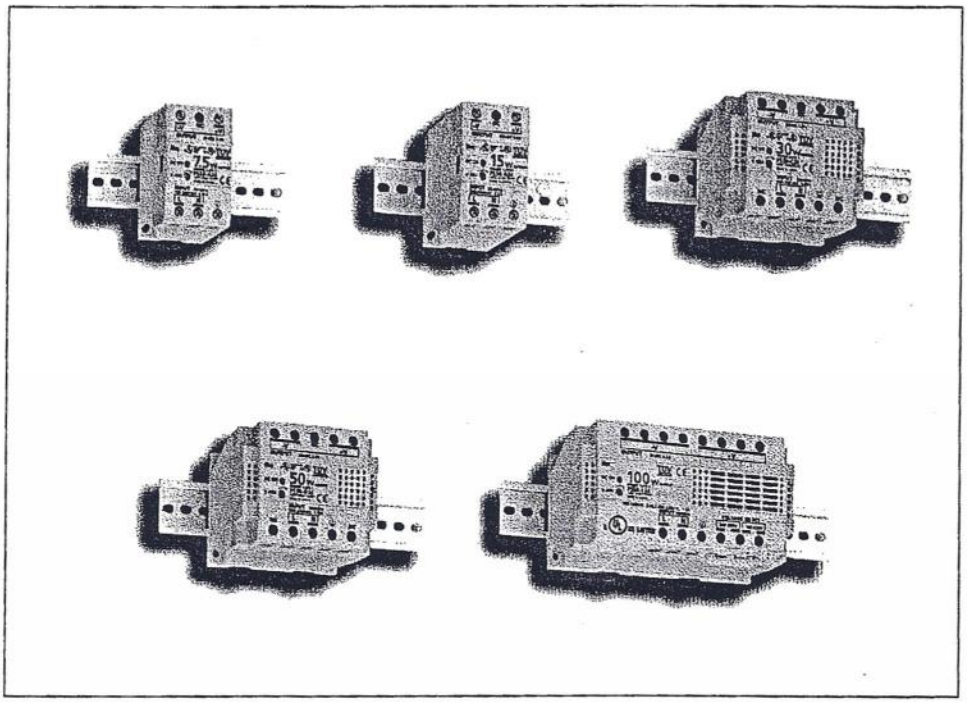
Signet 7300 Switching Power Supplies



Features

- Regulated 24 VDC output voltage
- Five output capacities: 300 mA, 600 mA, 1.3 A, 2.1 A and 4.2 A
- DIN rail or surface mount
- Universal AC input (85 to 264 VAC)
- DC compatible input (105 to 370 VDC)
- Fused input
- Auto resetting output overcurrent protection
- Unique spring-up, finger-safe terminals
- Short-circuit protection
- Output voltage adjust (+/- 10%)
- Light-weight plastic housing

Description

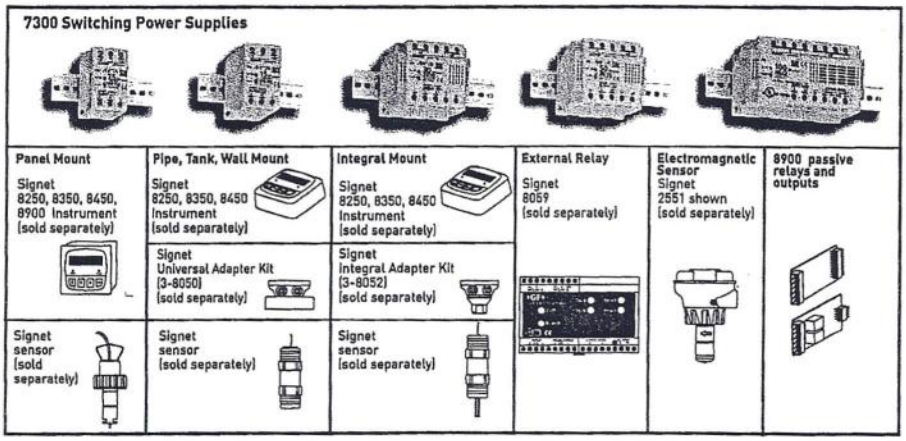
Signet 7300 Switching Power Supplies provide regulated output voltage in compact and lightweight plastic housings that can be DIN Rail or surface mounted. The series includes five different output capacities from 300 mA to 4.2 A (7.5W to 100W), all of which accept universal AC line voltage input and meet worldwide standards for performance and safety. These units meet the power requirements for a single system, multiple Signet instruments or other devices requiring 24 VDC operation.

Applications

- Signet Instruments
- Electromagnetic Flow Sensors
- Suitable for Electric Actuated Valves, including Solenoid
- Suitable for powering passive outputs and relays

CE cULus E177168

System Overview



Specifications

	7300-7524	7300-1524	7300-3024	7300-5024	7300-1024
Output Capacity	300 mA	600 mA	1.3 A	2.1 A	4.2 A
General					
Operation Indicator	LED				
Dielectric Strength	Between input and output terminals: 3,000 VAC, 1 minute				
	Between input terminals and housing: 2,000 VAC, 1 minute				
	Between output terminals and housing: 500 VAC, 1 minute				
Insulation Resistance	Between input and output terminals/input terminals and housing: 100 MΩ min. (500 VDC megger)				
Termination	Spring-up, fingersafe terminals with captive M3.5 screws				
Materials	Housing: PPHOX (polyphenylene oxide)				
Mounting	DIN Rail or Surface Mount				
Dimensions (L/W/H)	75/45/70 mm	75/45/95 mm	75/90/95 mm	75/90/95 mm	75/145/95 mm
	2.9/1.7/2.7 in.	2.9/1.7/3.7 in.	2.9/3.5/3.7 in.	2.9/3.5/3.7 in.	2.9/5.7/3.7 in.
Package Dimensions (L/W/H)	108/82/51 mm	133/89/51 mm	133/95/89 mm	133/95/89 mm	209/101/89 mm
	4.25/3.25/2.0 in.	5.25/3.5/2.0 in.	5.25/3.75/3.5 in.	5.25/3.75/3.5 in.	8.25/4.0/3.5 in.
Input					
Input Voltage	100 to 240 VAC nominal (85 to 264 VAC), ±10% regulated, 50/60 Hz (47 to 63 Hz)				
Input Current (typical)	0.17 A @ 100 VAC	0.3 A @ 100 VAC	0.68 A @ 100 VAC	1.15 A @ 100 VAC	2.5 A @ 100 VAC
Internal Fuse Rating	2 A	2 A	3.15 A	3.15 A	4 A
Inrush Current	50 A maximum (at cold start at 200 VAC				
Leakage Current (at no load)	0.75 mA maximum (60 Hz, measured in conformance with UL, CSA, VDE)				
Typical Efficiency	75% at 24 V	79% at 24 V	75% at 24 V	79% at 24 V	85% at 24 V
Overvoltage Protection	Outputs turn off at 105% (typical)				
Output					
Voltage & Current Ratings	24 V, 0.3 A	24 V, 0.6 A	24 V, 1.3 A	24 V, 2.1 A	24 V, 4.2 A
Voltage Adjustments	± 10% (V.ADJ screw on top)				
Output Holding Time	20 minutes maximum (at full rated input and output)				
Rise Time	200 minutes maximum (at full rated input and output)				
Fluctuation due to Input Voltage change	0.4% maximum				
Fluctuation due to Load Change	1.5% maximum				
Fluctuation due to Ambient Temperature Change	0,05% maximum				
Ripple Voltage	2% peak to peak maximum (including noise)				
Overload Protection	120% typical (Zener-limiting)		120% typical, auto reset		
Shipping Weight	.40 lb (.18 kg)	.48 lb (.22 kg)	.92 lb (.42 kg)	.98 lb (.44 kg)	1.54 lb (.70 kg)
Environmental					
Operating Temperature	-10 °C to 60 °C (14 °F to 140 °F) - see derating curves				
Storage Temperature	-30 °C to 85 °C (-22 °F to 185 °F)				
Operating Humidity	20% to 90% relative humidity (no condensation)				
Vibration Resistance	45m/s², 10 to 55 Hz, 2 hours on each of 3 axes				
Shock Resistance	294 m/s², 3 shocks in each of 6 directions				

Standards and Approvals

- CE, UL, UL508 Listed

WALCHEM
An Iwaki America Company

WEC/WDEC410 | Electrodeless Conductivity Controllers

OVERVIEW

The WEC/WDEC410 Series Single and Dual Input Electrodeless Conductivity Controllers measure conductivity of a solution via an encapsulated, non-contacting sensor to control replenishment pumps and alarms. They may be installed in a variety of very harsh chemical control applications, including oily cleaner baths, chromates, rinse tanks, fume scrubbers and other concentrated chemicals up to a conductivity of 1000 mS/cm.

Four conducivity ranges may be selected to configure the controller over a wide range of applications. Choice of measurement units is µS/cm, mS/cm, ppm and % concentration. The non-contacting, toroidal sensor technology is immune to thin coatings and the contamination and calibration problems that direct contacting sensors are prone to.

Integrated datalogging is available to validate performance. A USB memory stick is all that's needed to extract data and event logs that include conductivity measurements, temperature and relay status. Download log files from the USB stick to a PC at your convenience. It couldn't be easier!

SUMMARY OF KEY BENEFITS

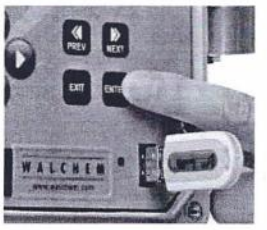
Dual Input Reduces Cost
WDEC can accept two electrodeless conductivity sensor inputs, allowing one controller to take the place of two, reducing cost and space requirements, and simplifying installation.

Versatility for a Broad Range of Applications
Choose PEEK sensors for higher temperature, more aggressive chemical applications, or CPVC sensors for lower temperature, less aggressive chemical applications. Both are available for in-line or submersible applications. On/Off and Time Proportional control modes are menu selectable.

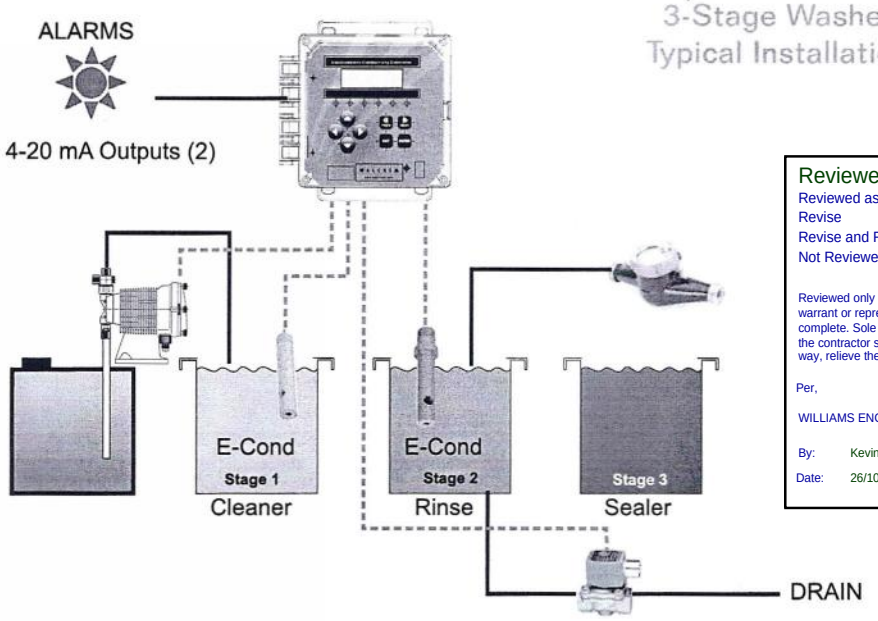
Ideal for Harsh Environments
The rugged, NEMA 4X enclosure, combined with Walchem's electrodeless conductivity sensors, provides a waterproof system with no metallic parts exposed to wet or corrosive environments.

Built-in Safety Features
Programmable output limit timers prevent run-away chemical addition. Digital Interlock Input may be used from a flow switch or level input to prevent chemical addition based on a stagnant sample, or control of an empty tank. The alarm relay notifies plant personnel of alarm conditions as soon as they occur.

Simple, Integrated Data Collection
Download stored data from the controller to a USB stick with the press of a button. Use the data to simply and easily validate system performance, document compliance, and reduce liability. The data and event logs show conductivity and temperature values, as well as accumulated chemical feed and alarm relay activation times.



WEC/WDEC410 Series | Electrodeless Conductivity Controller



3-Stage Washer
Typical Installation

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

Date: 26/10/2010

WILLIAMS ENGINEERING CANADA

Single or Dual Input
One unit monitors two baths with control and alarm relay for each, resulting in considerable cost savings

Electrodeless sensor design
Measures accurately over a wide dynamic range can can be used in applications from 50 μS to 1000 mS

Time proportional and control option
Selectable on front panel keypad
Varies the pump or valve on time depending on deviation from set point

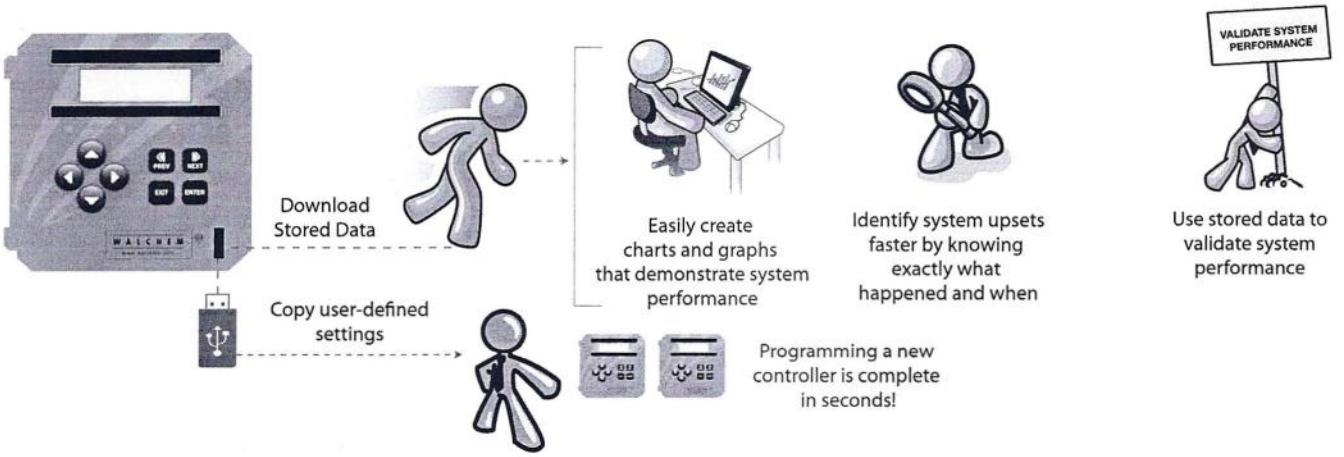
Self-diagnostics
Monitor performance without taking the unit off-line, permitting faster troubleshooting and less downtime

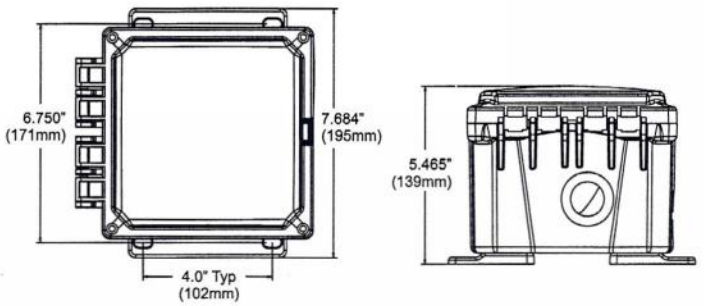
USB Flashstick Support
Optional for data logs, event/relay and reset logs, and user configuration file import/export

Measurement Units
Choice of μS/cm, mS/cm, ppm or % concentration
% Concentration allows the user to enter up to 5 calibration data points

Optional USB Features

Integrated datalogging collects analytical measurements at 10 minute intervals and captures all relay activations.





AGENCY CERTIFICATIONS

UL	ANSI/UL 61010-1:2004, 2nd Edition*
CAN/CSA	C22,2 No.61010-1:2004 2nd Edition*
CE Safety	EN 61010-1 2nd Edition (2001)*
CE EMC	EN 61326 :1998 Annex A*

Note: For EN61000-4-6,-3 the controller met performance criteria B.

*Class A equipment: Equipment suitable for use in establishments other than domestic, and those directly connected to a low voltage (100-240 VAC) power supply network which supplies buildings used for domestic purposes.

Inputs

Input Power

100-240 VAC, 50/60 Hz, 8A
Fuse: 1.0 ampere, 5 x 20 mm

Input Signals

Conductivity:	±2000 mV
Temperature Compensation:	100 kohm
Interlock (optional):	Isolated, dry contact closure required (i.e. reed switch)

Outputs

Mechanical Relays (5)

Internally powered relays switching line voltage
6A (resistive), 1/8 HP
All relays are fused together in one group, total current for this group must not exceed 6A

4 - 20 mA 1 or 2 (optional)

Internally powered
Fully isolated
600 Ohm max resistive load
Resolution .001% of span
Accuracy ± 1% of reading

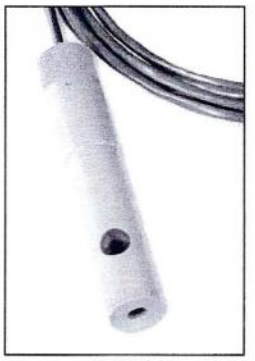
Sensor Power: ±5VDC, 5mA

Measurement Performance

Conductivity Range	50-1000 µS/cm	1000-10,000 µS/cm	10-100 mS/cm	100-1000 mS/cm
Resolution	1 µS	1 µS	0.1 mS	1 mS
Accuracy	±3% of reading below 50 µS/cm accuracy ±25%	±1% of reading below 1000 µS/cm accuracy ±25%	±1% of reading below 10 mS/cm accuracy ±25%	±1% of reading below 100 mS/cm accuracy ±25%

Temperature Range	32 to 212°F (0 to 100°C)
Resolution	1°F (1°C)
Accuracy	±1°F (±1°C)

CPVC



PEEK

Mechanical (controller)

Enclosure	Polycarbonate
NEMA Rating	NEMA 4X (IP65)
Display	2 x 16 character backlit liquid crystal
Ambient Temperature	32 to 122°F (0 to 50°C)
Storage Temperature	-20 to 180°F (-29 to 80°C)
Shipping weight	7 lbs (3 kg) (approximately)

Sensor Specifications

	CPVC	PEEK
O-ring	FKM (in-line mounting)	N/A
Adapter	CPVC (in-line mounting)	316 SS
Dimensions	7" (178mm) L x 1.75" (44mm) diameter	7" (178mm) L x 1.75" (44mm) diameter
Sensing Coil	0.5" (13mm aperture)	0.5" (13mm aperture)
Temperature Limitations	20° to 180°F (-5° to 80°C)	20° to 190°F (-5° to 88°C)
Pressure Rating	-15 to 140 psi (-0.1 to 0.98 MPa)	-15 to 250 psi (-0.1 to 1.75 MPa)
Mounting	Submersion: 1" NPTM thread In-line: 2" NPTM adapter	1" NPTM thread 2" NPTM adapter
Cable	20 ft. (6 m)	20 ft. (6 m)

ORDER INFORMATION

WEC410 – [I] [N] [D] [N]
voltage output sensor 1 USB

WDEC410 – [ ] [ ] [ ] [ ] [ ]
voltage output sensor 1 sensor 2 USB

VOLTAGE
1 = 120 VAC, prewired
5 = Hardwired, cable glands

OUTPUT
N = No 4-20 mAdata output
4 = One (1) Isolated 4-20 mA output
2 = Two (2) Isolated 4-20 mA outputs

SENSOR (SELECT 2 IN ALPHABETICAL ORDER FOR WDEC)
N = No sensor

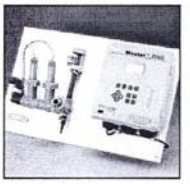
0.1 to 1.0 mS/cm
A = Submersion PEEK sensor
B = In-line PEEK sensor w/SS adapter
C = Submersion CPVC sensor
D = In-line CPVC sensor w/CPVC adapter

1.0 to 10.0 mS/cm
E = Submersion PEEK sensor
F = In-line PEEK sensor w/SS adapter
G = Submersion CPVC sensor
H = In-line CPVC sensor w/CPVC adapter

10.0 to 100 mS/cm
I = Submersion PEEK sensor
J = In-line PEEK sensor w/SS adapter
K = Submersion CPVC sensor
L = In-line CPVC sensor w/CPVC adapter

100 to 1000 mS/cm
M = Submersion PEEK sensor
O = In-line PEEK sensor w/SS adapter
P = Submersion CPVC sensor
Q = Submersion CPVC sensor

USB FEATURES
N = Software upgrade capability only
U = Integrated datalogging, event/reset logging, and configuration file import/export



WebMaster®ONE
WebMasterONE is the most advanced online cooling tower and boiler controller in the water treatment industry. The flexible multi-I/O platform allows you to control multiple cooling towers, boilers, closed loops, and condensate lines with just one controller. An extensive assortment of integrated communications and data handling features are included that enable water treatment professional to provide more effective water management services to their customers.

Metering Pumps
The E-Class is the most innovative and comprehensive metering pump product line in the world. Over 50 years of pump experience and a commitment to superior mechanical design has led to development of many industry firsts, including 360 stroke-per-minute technology, IP67 waterproof construction, and the world's highest capacity solenoid metering pumps.

WIND WebMaster® Industrial Water Controllers
Walchem's WebMaster Industrial (WIND) Controller sets a new standard for Industrial Water Treatment Controllers. WIND has a flexible multi-I/O platform, a wide range of analytical sensor measurement capabilities, and an extensive assortment of integrated communications and data handling features.

WebAlert® Remote Monitor
Walchem's WebAlert is the first stand alone remote monitoring device that can web enable your installed equipment without having to replace or upgrade it.

ABOUT US

Walchem integrates its advanced sensing, instrumentation, fluid pumping and communications technologies to deliver reliable and innovative solutions to the global water treatment market

Our in-house engineering is driven by quality, technology and innovation. For more information on the entire Walchem product line, visit: www.walchem.com

nqa. ISO 9001 Registered
ANAB ACCREDITED

WALCHEM
An Iwaki America Company

Walchem, An Iwaki America Incorporated Company
Five Boynton Road Hopping Brook Park
Holliston, MA 01746 USA
Phone: 508-429-1110
Fax: 508-429-7433
www.walchem.com

180373.B1 Jun 2009

RGS*NX Battery Unit

6, 12 and 24 volts, NEMA-4X rated

LUMACELL

Harsh environment emergency lighting units:
The **RGS*NX** Series battery units are specifically designed for use in industrial facilities where equipment is exposed to dust, water, oil or corrosive substances. NEMA-4X standard to protect circuitry from harmful dust or liquid sprays, sealed and gasketed unit made of fiberglass reinforced polyester.

nexus®

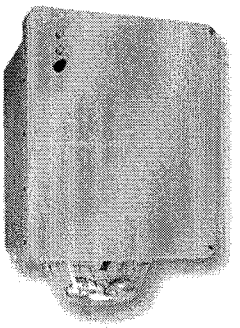
Made in Canada

NEMA-4X

Features

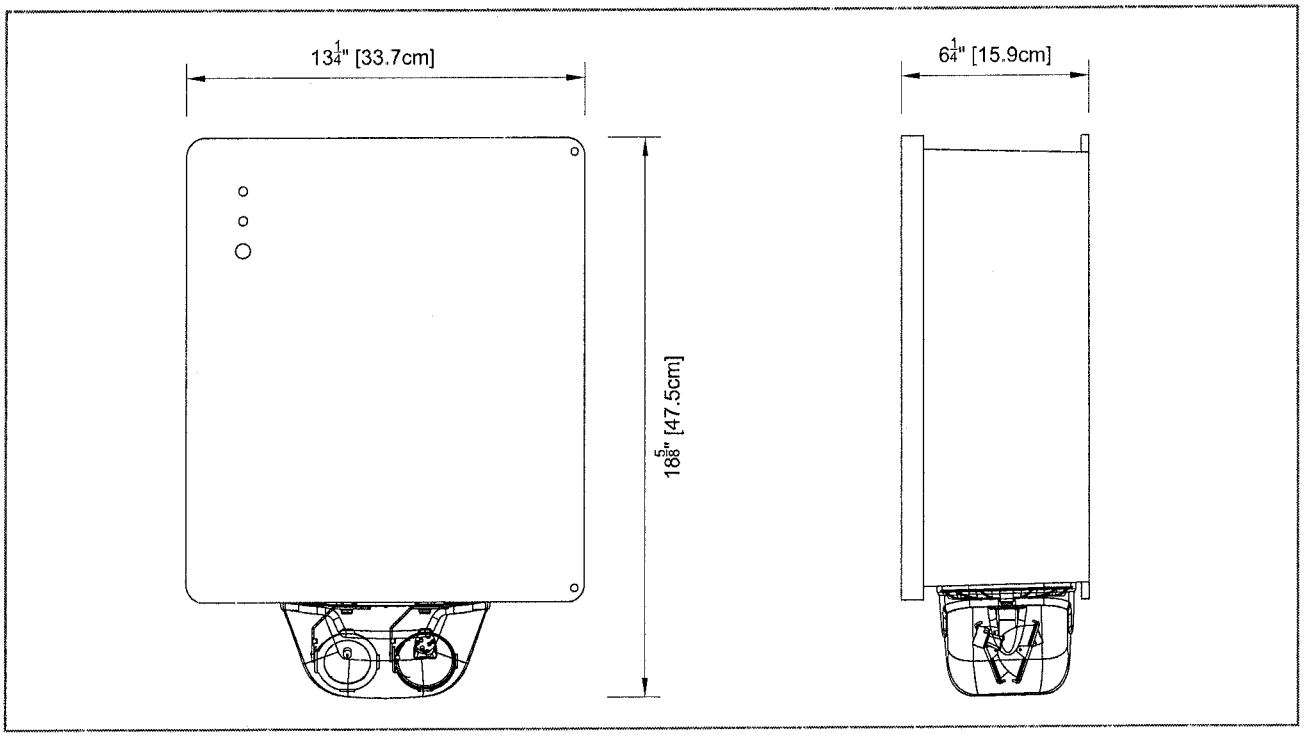
- Delivers great pathway illumination up to 70 feet, center to center (with M20WH lamp)
- Fully gasketed fiberglass reinforced polyester housing - NEMA 4X
- Solid-state pulse-type charger – current-limited, temperature-compensated, short-circuit proof and reverse-polarity protected.
- Unit comes standard with electronic lockout and brownout circuits
- Sealed dust-proof transfer relay, test switch and LED indicator lights
- Long-life, maintenance-free sealed lead acid battery
- Standard 120/347Vac input voltage with line cord kit
- Auto-test and diagnostic (optional)
- **NEXUS®** compatible (for more information on **NEXUS®**, please consult your sales representative)

Project/Location		Date
Contractor	Prepared by	
LUMACELL model		



RGS*NX SERIES

Dimensions



Wire Guard

460.0034-L Wall Mount

Continued >>

RGS*NX Battery Unit

6, 12 and 24 volts, NEMA-4X Rated

LUMACELL

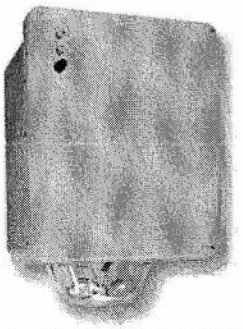
Typical Specification

Supply and install the **Lumacell** NEMA-4X Rated **RGS*NX Series** battery unit. Specifically designed for high abuse areas and wet locations, the fiberglass reinforced polyester housing shall be fully gasketed as well as the clear heavy-duty UV resistant polycarbonate lamp enclosure. The lamps shall be fully adjustable without tools and shall be high efficiency halogen or LED MR16. The Lumacell Smart Diagnostic Micro controller board shall supply the rated load for a minimum of a 1/2 hour to 87.5% of the rated battery voltage. The unit shall be rated 120V or 347V, 60 Hz and shall have an output of _____ volts.

The charger shall be fully computer tested and its charge voltage factory set to ± 1% tolerance. Chargers with field-adjusted potentiometers are not acceptable. A pulse-type charger shall be employed to promote long battery life and reduce the potential for grid corrosion. The charger shall provide a continuous high charge to recharge the battery, when the battery is at full capacity, the charger will shut-off. Periodically the charger shall provide a pulse of energy to keep the battery topped off. The Pulse charge shall be current limited and precisely regulated by a micro-processing circuit, which samples the battery in relation to its temperature, state or charge and input voltage fluctuations. The charger shall be current limited, temperature compensated, short-circuit proof and reverse polarity protected. The unit shall be furnished with an electronic lockout circuit, which will connect the battery when the AC circuit is activated, and an electronic brownout circuit, which will activate the emergency lights when utility power dips below 75% of nominal voltage. A low voltage battery protection circuit shall be provided and will disconnect the battery form the fused output circuit at the end of discharge. The unit shall self-test for 1 minute every 30 days, 10 minutes on the 6th month and 30 minutes every 12 months. The unit shall be capable of full recharge in compliance with CSA specifications. The unit shall be furnished with sealed dust tight relay, a test switch and diagnostic LED indicator lights to continuously monitor the status of the unit: Battery Failure, Battery Disconnected, Charger Failure, Lamp Failure, Service Alarm, AC "ON", Charger High Rate.

The unit shall be Lumacell model: _____.

Project/Location	kuqluktuk	Date	
Contractor	Lyfar	Prepared by	
LUMACELL model	RGS36NX M6W		



RGS*NX SERIES

Power Consumption and Unit Rating

Model	AC Specs		Wattage Capacity				
			30min	1h00	1h30	2h00	4h00
RGS36NX	120/347 Vac	0.10/0.04 Amp	36	21	15	12	6
RGS72NX		0.22/0.08 Amp	72	42	30	24	12
RGS108NX		0.22/0.08 Amp	108	63	45	36	18
RGS180NX		0.22/0.08 Amp	180	105	75	60	30
RG12S36NX	120/347 Vac	0.09/0.03 Amp	36	21	15	12	6
RG12S72NX		0.15/0.06 Amp	72	42	30	24	12
RG12S100NX		0.34/0.12 Amp	100	58	42	33	17
RG12S144NX		0.40/0.14 Amp	144	84	60	48	24
RG12S200NX		0.41/0.14 Amp	200	117	83	67	33
RG12S250NX		0.41/0.14 Amp	250	144	100	83	42
RG24S144NX	120/347 Vac	0.55/0.20 Amp	144	84	60	48	24
RG24S288NX		0.67/0.23 Amp	288	168	120	96	48
RG24S350NX	120/347 Vac	0.67/0.23 Amp	350	200	144	120	60

Ordering Information

Series	Capacity	Housing	# of Heads	Lamp Wattage	A.C. Voltage	Options
RGS= 6V	36= 36 watts 72= 72 watts 108= 108 watts 180= 180 watts	NX= fiberglass NEMA 4X	Blank= no head 1= one head 2= two heads	M6W= 6V6W MR16 M10W= 6V10W MR16 M12W= 12V12W MR16 M20W= 12V, 24V 20W MR16 M20HW= 12V, 20W high output LD7= 12V, 4W LED	Blank= 120/347Vac input ZC= 277Vac input	A= ammeter AT= autotest HTR= heater & thermostat 120V HTR3= heater & thermostat 347V LD= lamp disconnect LTS= light activated test switch NEX*= NEXUS® system interface (6 &12V only) RRT= remote test reciever T3= time delay 15 Min TMBB= A.C./D.C. terminal block TMBD= D.C. terminal block TMBK= A.C. terminal block V= voltmeter
RG12S= 12V	36= 36 watts 72= 72 watts 100= 100 watts 144= 144 watts 200= 200 watts 250= 250 watts					
RG24S= 24V	144= 144 watts 288= 288 watts 350= 350 watts					

*Not all options available with Nexus®. Please consult your sales representative.

EXAMPLE: RG24S350NX2M20W

Catalogue Numbering System

This information is presented only as an aid to understanding Catalogue numbers.

For Basic Assembled Enclosed Thermal Magnetic Circuit Breakers with Standard Line and Load Terminals

R	-	N	-	HLD	-	3	-	500		
S	-	N	-	FD	-	3	-	125	-	L
W	-	N	-	JD	-	3	-	250		
S		N		FDB		3		035		L

F - Flush, EEMAC 1A
S - Surface, EEMAC 1
R - Rain Tight, EEMAC 3R
J - Dust Tight, EEMAC 12
W - Water Tight, EEMAC 4/4X, 5

N: Neutral Assembly
Specify when Neutral Assembly is required

GHC, GCH, GD	2, 3	15 - 100
ED, EHD, EDC	2, 3	100 - 225
EHD	2, 3	15 - 100
FDB, FD, HFD, FDC	2, 3	15 - 225
JD, HJD, JDC	2, 3	70 - 250
DK	2, 3	100 - 400
KD, HKD, KDC	2, 3	100 - 400
LD, HLD	2, 3	300 - 600
LGE, LGS, LGH	2, 3	250 - 600
MDL, HMDL	2, 3	300 800

L: Line and Load Terminals.
Must be specified for F-Frame enclosed circuit breaker to form a complete catalogue number. (Not required for other breaker frames)

For specifying Enclosed Circuit Breakers with a complex catalolgue number, such as the thermal magnetic breaker c/w optional terminals and internal accessories or the electronics breakers c/w Digitrip 310 trip unit/Digitrip Optim trip unit, please utilize the Cutler-Hammer's Bid Manager pricing and configuration software.

By using the Standard products' Enclosed Circuit Breaker Takeoff and make selection according to the following parameter, the program will configure and generate a detailed product catalogue number base on the user's specification.

Service Voltage
Continuous Ampere Rating
Required KA Rating
Number of Poles
Type of Circuit Breaker Frame
Type of Trip Unit (Thermal Magnetic, Digitrip 310 / Digitrip Optim 550)
Fix or Adjustable Rating Plug
Standard or Optional Line / Load Terminals
Type of Internal Accessory (Left Pole)
Type of Internal Accessory (Right Pole)
Type of Enclosure
Neutral Assembly
Type of Rain Tight Hub and Size (EEMAC 3R Enclosure)

APPROVED

By Jesse Mailloux - Ryfan Industrial Electric at 8:13 am, Oct 21, 2010

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray ET, Williams Engr.

Date: 24/11/2010

WILLIAMS ENGINEERING CANADA

Example: Catalogue Number RNHKD3400FZ15K09P24A13S10

This catalogue number specifies a Factory Assembled Enclosed 400A HKD Electronic circuit breaker in 3 enclosure. This enclosed cicuit breaker includes the 3 Pole 400A HKD breaker frame, KES 400A Digitrip RMS [illegible] unit, 400A fixed rating plug, standard Line/Load terminals, 2a/2b auxiliary switches mounted in right pole with pigtail leads exit to rear, a 120Vac shunt trip mounted in left pole with pigtail leads exit to rear and the 400A Neutral kit N400.

The assembled enclosed circuit breakers are completely factory assembled and packaged in single shipping cartons. Each enclosed circuit breaker assembly includes the enclosure, breaker frame, trip unit and rating plug (where applicable), standard or optional line and load pressure terminals. Customer specified optional breaker accessories and neutral assembly will also be factory installed.

The assembled enclosed circuit breakers are CSA approved for use as Service Entrance Equipment when optional neutral assembly is installed.

Catalogue Numbering System

This information is presented only as an aid to understanding Catalogue numbers.

For Basic Assembled Enclosed Thermal Magnetic Circuit Breakers with Standard Line and Load Terminals

R	-	N	-	HLD	-	3	-	500		
S	-	N	-	FD	-	3	-	125	-	L
W	-	N	-	JD	-	3	-	250		
S		N		FDB		3		100		L

F - Flush, EEMAC 1A
S - Surface, EEMAC 1
R - Rain Tight, EEMAC 3R
J - Dust Tight, EEMAC 12
W - Water Tight, EEMAC 4/4X, 5

N: Neutral Assembly
Specify when Neutral Assembly is required

GHC, GCH, GD
ED, EHD, EDC
EHD
FDB, FD, HFD, FDC
JD, HJD, JDC
DK
KD, HKD, KDC
LD, HLD
LGE, LGS, LGH
MDL, HMDL

2, 3
2, 3
2, 3
2, 3
2, 3
2, 3
2, 3
2, 3
2, 3
2, 3

15 - 100
100 - 225
15 - 100
15 - 225
70 - 250
100 - 400
100 - 400
300 - 600
250 - 600
300 800

L: Line and Load Terminals.
Must be specified for F-Frame enclosed circuit breaker to form a complete catalogue number. (Not required for other breaker frames)

For specifying Enclosed Circuit Breakers with a complex catalolgue number, such as the thermal magnetic breaker c/w optional terminals and internal accessories or the electronics breakers c/w Digitrip 310 trip unit/Digitrip Optim trip unit, please utilize the Cutler-Hammer's Bid Manager pricing and configuration software.

By using the Standard products' Enclosed Circuit Breaker Takeoff and make selection according to the following parameter, the program will configure and generate a detailed product catalogue number base on the user's specification.

Service Voltage
Continuous Ampere Rating
Required KA Rating
Number of Poles
Type of Circuit Breaker Frame
Type of Trip Unit (Thermal Magnetic, Digitrip 310 / Digitrip Optim 550)
Fix or Adjustable Rating Plug
Standard or Optional Line / Load Terminals
Type of Internal Accessory (Left Pole)
Type of Internal Accessory (Right Pole)
Type of Enclosure
Neutral Assembly
Type of Rain Tight Hub and Size (EEMAC 3R Enclosure)

APPROVED
Reviewed (X)
By Jesse Mailloux - Ryfan Industrial Electric at 8:13 am, Oct 21, 2010
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,
WILLIAMS ENGINEERING CANADA INC.
By: Kevin Rattray EIT, Williams Engir
Date: 24/11/2010
WILLIAMS ENGINEERING CANADA

Example: Catalogue Number RNHKD3400FZ15K09P24A13S10

This catalogue number specifies a Factory Assembled Enclosed 400A HKD Electronic circuit breaker in an EEMAC 3R enclosure. This enclosed cicuit breaker includes the 3 Pole 400A HKD breaker frame, KES 400A Digitrip RMS 310 LSI trip unit, 400A fixed rating plug, standard Line/Load terminals, 2a/2b auxiliary switches mounted in right pole with pigtail leads exit to rear, a 120Vac shunt trip mounted in left pole with pigtail leads exit to rear and the 400A Neutral kit N400.

The assembled enclosed circuit breakers are completely factory assembled and packaged in single shipping cartons. Each enclosed circuit breaker assembly includes the enclosure, breaker frame, trip unit and rating plug (where applicable), standard or optional line and load pressure terminals. Customer specified optional breaker accessories and neutral assembly will also be factory installed.

The assembled enclosed circuit breakers are CSA approved for use as Service Entrance Equipment when optional neutral assembly is installed.

Technical Data and Specifications

NEMA 1, 12, 12K, 3R

Note: Not to be used for construction purposes unless approved.

NEMA 1 Surface Mounted (See Figure 2)

Frame	Maximum Amperes	Dimensions in Inches (mm)						Approximate Weight in Lbs. (kg)
		A	B	C	D	E	F	
G	100	17.50 (444.5)	8.56 (217.4)	6.28 (159.5)	13.03 (331.0)	1.20 (30.5)	17.19 (436.6)	12 (5)
F ①	100	19.13 (485.9)	9.13 (231.9) ③	5.20 (132.1)	17.00 (431.8)	N/A ④	18.81 (477.8)	13 (6)
Earth Leakage (F)	100	23.25 (590.6)	8.56 (217.4)	6.28 (159.5)	18.75 (476.3)	1.20 (30.5)	22.94 (582.7)	15 (7)
F ②	225	23.25 (590.6)	8.56 (217.4)	6.28 (159.5)	18.75 (476.3)	1.20 (30.5)	22.94 (582.7)	15 (7)
J	250	34.70 (881.4)	10.92 (277.4)	7.20 (182.9)	30.00 (762.0)	1.88 (47.8)	34.39 (873.5)	31 (14)
K ⑤	400	38.81 (985.8)	11.06 (280.9)	10.94 (277.9)	34.00 (863.6)	9.28 (235.7)	38.50 (977.9)	53 (24)
LG	600	51.06 (1296.9)	21.87 (555.5)	9.96 (253.0)	51.63 (1311.5)	1.94 (49.3)	50.13 (1273.3)	90 (41)
Earth Leakage (LG)	600	51.06 (1296.9)	21.87 (555.5)	9.96 (253.0)	51.63 (1311.5)	1.94 (49.3)	50.13 (1273.3)	90 (41)
L	600	45.88 (1165.4)	14.31 (363.5)	12.38 (314.5)	46.56 (1182.6)	1.91 (48.5)	45.56 (1157.2)	81 (37)
M, N	1200	61.22 (1555.0)	21.44 (544.6)	15.41 (391.4)	61.84 (1570.7)	1.97 (50.0)	60.91 (1547.1)	178 (81)

① SFDN100 Series "B" released 9/15/01. (See Figure 1)
② Maximum wire size: 4/0.
③ Total width, including door clip is 9.95 inches (253 mm).
④ Single centered mounting hole provided.
⑤ Maximum wire size: 500 kcmil.

NEMA 1 Flush Mounted (See Figure 3)

Frame	Maximum Amperes	Dimensions in Inches (mm)						Approximate Weight in Lbs. (kg)
		A	B	C	D	E	F	
F	100	18.81 (477.8)	9.72 (246.9)	6.28 (159.5)	13.03 (331.0)	1.86 (47.2)	18.50 (469.9)	12 (5)
Earth Leakage (F)	100	24.56 (623.8)	9.72 (246.9)	6.28 (159.5)	18.75 (476.3)	1.86 (47.2)	24.25 (616.0)	15 (7)
F ⑥	225	24.56 (623.8)	9.72 (246.9)	6.28 (159.5)	18.75 (476.3)	1.86 (47.2)	24.25 (616.0)	15 (7)
J	250	36.02 (914.9)	12.23 (310.6)	7.20 (182.9)	30.00 (762.0)	1.88 (47.8)	35.70 (906.8)	32 (15)
K ⑦	400	40.13 (1019.3)	12.38 (314.5)	10.94 (277.9)	34.00 (863.6)	2.94 (74.7)	39.81 (1011.2)	53 (24)

⑥ Maximum wire size: 4/0.
⑦ Maximum wire size: 500 kcmil.

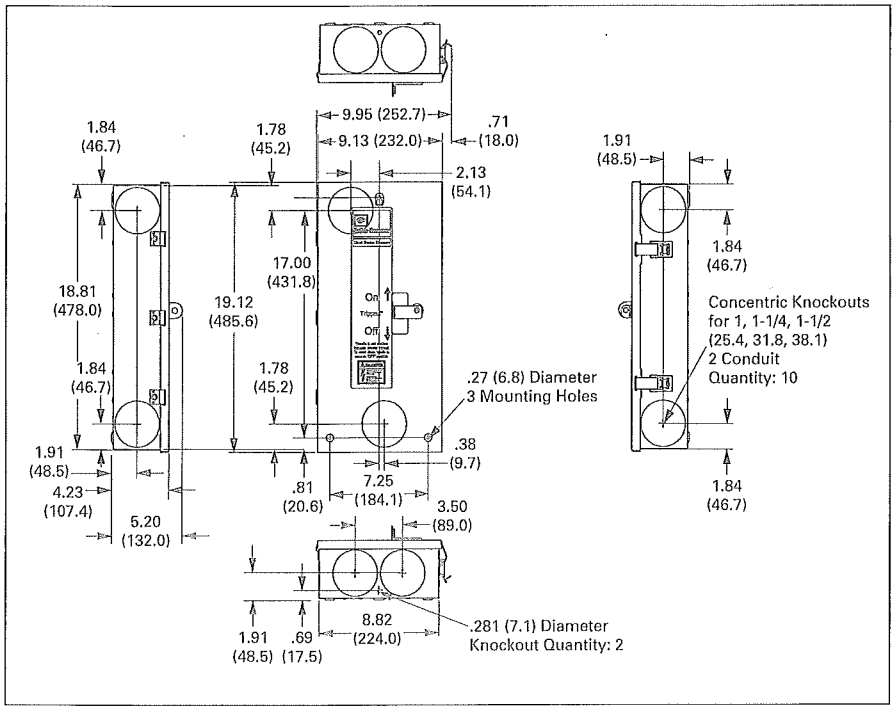


Figure 1. NEMA 1 Surface Mounted SFDN100 Series "B"

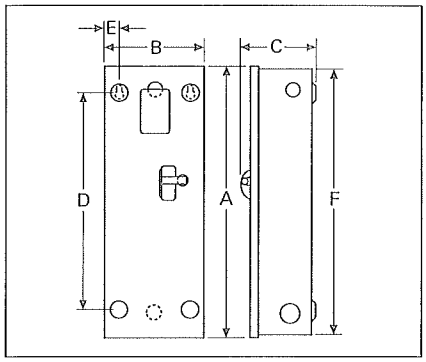


Figure 2. NEMA 1 Surface Mounted

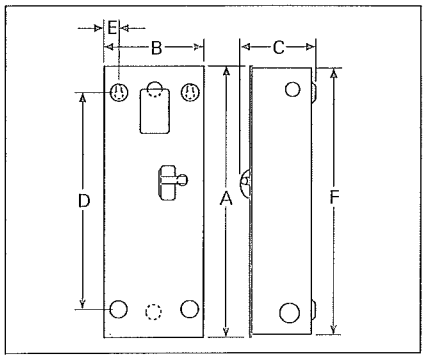
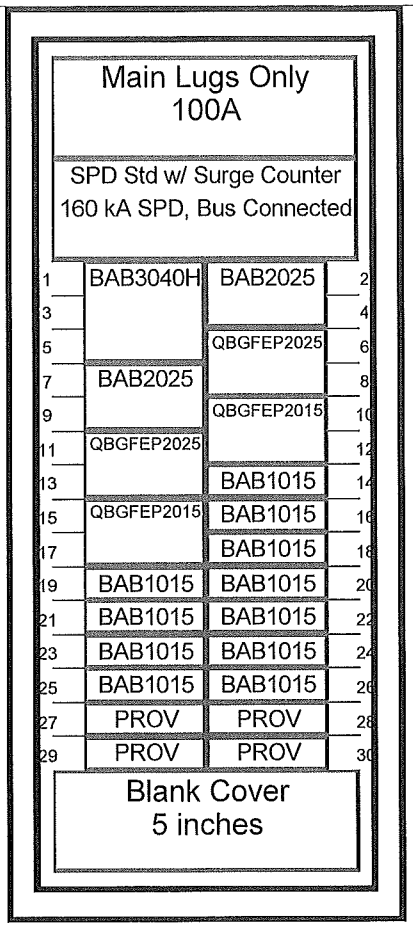


Figure 3. NEMA 1 Flush Mounted

Industrial Circuit Breakers

Circuit Breaker Type	Cont. Amp. Rating @ 40°C	No. Poles	Volts AC	Volts DC	Type of Trip ①	CSA/UL Listed Interrupting Ratings rms Symmetrical Amperes (kA)											
						AC Ratings Volts									DC ②		
						120	120/240	240	277	347	480Y/277	480	600Y/347	600	125	250	125/250
G-Frame																	
GHC	15 – 100	1	277	125	N.I.T.	65	—	—	14	—	—	—	—	—	14	—	—
GHC	15 – 100	2, 3	480Y/277	125/250	N.I.T.	—	—	65	—	—	14	—	—	—	—	—	14
GCH④	15 – 100	1	347	125	N.I.T.	65	—	—	14	10	—	—	—	—	14	—	—
GCH④	15 – 100	2, 3	600Y/347	125/250	N.I.T.	—	—	65	—	—	14	—	10	—	—	—	14
GD	15 – 50	2	480	125/250	N.I.T.	—	—	65	—	—	—	14	—	—	—	—	10
GD	15 – 100	3	480	250	N.I.T.	—	—	65	—	—	—	22	—	—	—	10	—
F-Frame																	
ED	100 – 225	2, 3	240	125	N.I.T.	—	—	65	—	—	—	—	—	—	10	—	—
EDH	100 – 225	2, 3	240	125	N.I.T.	—	—	100	—	—	—	—	—	—	10	—	—
EDC	100 – 225	2, 3	240	125	N.I.T.	—	—	200	—	—	—	—	—	—	10	—	—
EHD	15 – 100	1	277	125	N.I.T.	—	—	—	14	—	—	—	—	—	10	—	—
EHD	15 – 100	2, 3	480	250	N.I.T.	—	—	18	—	—	—	14	—	—	—	10	—
FDB	15 – 150	1	347	125	N.I.T.	—	—	—	—	14	—	—	—	—	10	—	—
FDB	15 – 225	2, 3	600	250	N.I.T.	—	—	18	—	—	—	14	—	14	—	10	—
FD	15 – 150	1	347	125	N.I.T.	—	—	—	25	18	—	—	—	—	10	—	—
FD	15 – 225	2, 3	600	250	N.I.T.	—	—	65	—	—	—	25	—	18	—	10	—
HFD③	15 – 30	1	347	125	N.I.T.	—	—	—	65	25	—	—	—	—	10	—	—
HFD	15 – 225	2,3	600	250	N.I.T.	—	—	100	—	—	—	65	—	25	—	22	—
FDC③	15 – 30	1	347	125	N.I.T.	—	—	—	—	30	—	—	—	—	10	—	—
FDC	15 – 225	2, 3	600	250	N.I.T.	—	—	200	—	—	—	100	—	35	—	22	—
J-Frame																	
JD	70 – 250	2, 3	600	250	I.T.	—	—	65	—			35		18	—	10	—
HJD	70 – 250	2, 3	600	250	I.T.	—	—	100	—			65		25	—	22	—
JDC	70 – 250	2, 3	600	250	I.T.	—	—	200	—			100		35	—	22	—
K-Frame																	
DK	250 – 400	2, 3	240	250	I.T.	—	—	65	—			—		—	—	10	—
KD	100 – 400	2, 3	600	250	I.T.	—	—	65	—			35		25	—	10	—
CKD	100 – 400	2, 3	600	250	I.T.	—	—	65	—			35		25	—	10	—
HKD	100 – 400	2, 3	600	250	I.T.	—	—	100	—			65		35	—	22	—
CHKD	100 – 400	2, 3	600	250	I.T.	—	—	100	—			65		35	—	22	—
KDC	100 – 400	2, 3	600	250	I.T.	—	—	200	—			100		50	—	22	—
LG-Frame																	
LGE	250 – 600	3, 4	600	250	I.T.	—	—	65	—			35		18	—	22	—
LGS	250 – 600	3, 4	600	250	I.T.	—	—	85	—			50		25	—	22	—
LGH	250 – 600	3, 4	600	250	I.T.	—	—	100	—			65		35	—	42	—
L-Frame																	
LD	300 – 600	2, 3	600	250	I.T.	—	—	65	—			35		25	—	22	—
HLD	300 – 600	2, 3	600	250	I.T.	—	—	100	—			65		35	—	25	—
MDL-Frame																	
MDL	300 – 800	2, 3	600	250	I.T.	—	—	65	—			50		25	—	22	—
HMDL	300 – 800	2, 3	600	250	I.T.	—	—	100	—			65		35	—	25	—
N-Frame																	
ND (800A Frame)	400 – 800	3	600	—	N.I.T.	—	—	65	—			50		25	—	—	—
ND (1200A Frame)	600 – 1200	3	600	—	N.I.T.	—	—	65	—			50		25	—	—	—
CND (800A Frame)	400 – 800	3	600	—	N.I.T.	—	—	65	—			50		25	—	—	—
HND (800A Frame)	400 – 800	3	600	—	N.I.T.	—	—	100	—			65		35	—	—	—
HND (1200A Frame)	600 – 1200	3	600	—	N.I.T.	—	—	100	—			65		35	—	—	—
CHND (800A Frame)	400 – 800	3	600	—	N.I.T.	—	—	100	—			65		35	—	—	—

① N.I.T. is non-interchangeable trip unit and I.T. is interchangeable trip unit.
② Two-pole circuit breaker, or two poles of three-pole circuit breaker at 250V DC.
③ Interrupting rating @ 347V AC are listed with CSA only. Not UL listed.
④ CSA listed only, Not UL listed.



General Information **(Section 1 of 1)**

Service Voltage:	208Y/120V 3Ph 4W	**Enclosure:**	Type 1
Bus Rating & Type:	100A Silver Plated Copper	**Neutral Rating:**	100A
Ground Bar:	Std. Bolted Aluminum, Al or Cu cable		
S.C. Rating:	10k A.I.C.Fully Rated		
Main Device Type:	Main Lugs Only - Top Cable Entry		
Main Terminals:	Mechanical - (1) #14-1/0 (Cu/Al)		
Neutral Terminals:	Mechanical - (1) #14-1/0 (Cu/Al)		
Box Catalog No.:	EZB2042RC		
Trim:	EZ Trim, Door in Door, Concealed Hardware (EZT2042S)		
	Surface Mounted		
Box Dimensions:	42." [1066.8mm]H x 20" [508.0mm]W x 5.75" [146.0mm]D		
Min. Gutter Size:	Top = 5.5" [139.7mm] Bottom = 5.5" [139.7mm] Left = 6.0" [152.4mm] Right = 6.0" [152.4mm]		

Panel ID Nameplate:
Type: No Nameplate

CSA Approved (LL47169) *****Non-Interchangeable Main Device*****

Trim Lock:Standard Lock & Key (Keyed WEM2)
Circuit Directory:Plastic Sleeve with Card
Entry Plate:No Plate

APPROVED

By Jesse Mailloux - Ryfan Industrial Electric at 8:14 am, Oct 21, 2010

Device Modifications:

Ref #	Description

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

Reviewed only as to general conformity with the design concept. The Engineer does not warrant or represent that the information contained on this drawing is either accurate or complete. Sole responsibility for correct design, details and dimensions shall remain with the contractor submitting the drawing. The review of this shop drawing shall not, in any way, relieve the contractor from complying with all requirements of the contract documents.

Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 24/11/2010

WILLIAMS ENGINEERING CANADA

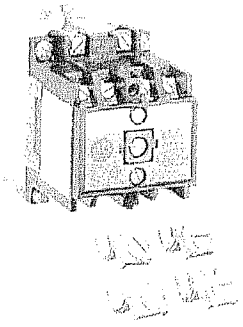
Notes:

Branch Devices

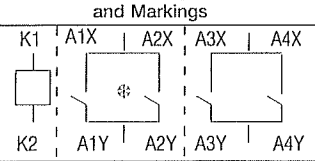
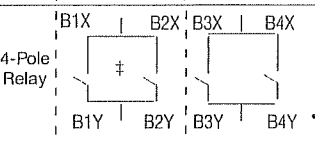
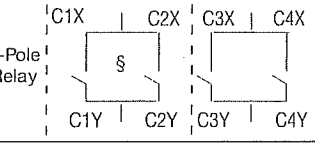
Qty	Poles	Trip	Frame	Amps	KAIC
11	1	15	BAB	100	10
2	2	25	BAB	100	10
1	3	40	BAB	100	10
2	2	15	QBGFEP	100	10
2	2	25	QBGFEP	100	10
4	1		PROV		

PREPARED BY: Macdonald, Don J	DATE: 10/19/10	Eaton Corporation	
APPROVED BY:	DATE: 10/19/10	JOB NAME: Kugluktuk Intake and Pumphouse	DESIGNATION: PH-opt.
VERSION: 7.2		TYPE: PRL1a	DRAWING TYPE: Customer Approval
NEG-ALT NUMBER: EN510818F002-0001	REVISION:	DWG SIZE: A	G.O.:
ITEM:	SHEET: 1 OF 1		

Electrically Held Relays
Bulletin 700-PH 35A Tandem Contact Cartridges*
AC-Operated Relays



Cat. No. 700-PH200

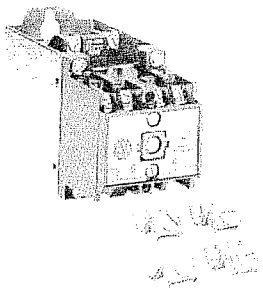
Contacts N.O.	Contacts N.C.	Contact Arrangement and Markings	Open Type Relay Rail Mount Cat. No.	Type 1➢ General Purpose Cat. No.
1	—		700-PH100⊗	700-PH101⊗
2	—		700-PH200⊗	700-PH201⊗
3	—		700-PH300⊗	700-PH301⊗
4	—		700-PH400⊗	700-PH401⊗
5	—		700-PH500⊗	700-PH501⊗
6	—		700-PH600⊗	700-PH601⊗

⊗AC Voltage Suffix Code

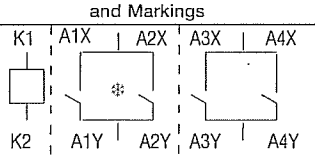
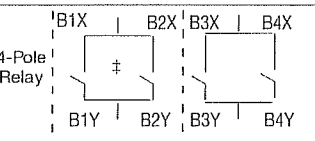
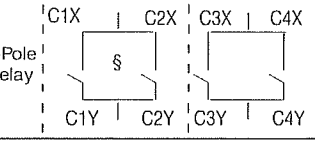
The Cat. No. as listed is incomplete. Select a voltage suffix code from the table below to complete the Cat. No. Example: **Cat. No. 700-PH100⊗** becomes **Cat. No. 700-PH100A48**. For other coil voltages, consult your local Rockwell Automation sales office or Allen-Bradley distributor.

Hz	24	48	110	110-115	115-120	120	127	200-208	220-230	230-240	277	347	380	415	440-480	460-480	500	575-600
50	B24	B48	A1⌘	B11✢	—	—	B27	—	B22	B2	—	—	B3	B41	B44	—	B50	—
60	A24	A48	—	—	A1⌘	B11✢	—	A20	A22	A2	A27	A35	—	—	—	A4	—	A6

DC-Operated Relays



Cat. No. 700DC-PH200

Contacts N.O.	Contacts N.C.	Contact Arrangement and Markings	Open Type Relay Rail Mount Cat. No.	Open Type DIN Rail Mount Cat. No.	Type 1➢ General Purpose Cat. No.
1	—		700DC-PH100⊗	700DC-PH100D⊗	700DC-PH101⊗
2	—		700DC-PH200⊗	700DC-PH200D⊗	700DC-PH201⊗
3	—		700DC-PH300⊗	700DC-PH300D⊗	700DC-PH301⊗
4	—		700DC-PH400⊗	700DC-PH400D⊗	700DC-PH401⊗
5	—		700DC-PH500⊗	700DC-PH500D⊗	700DC-PH501⊗
6	—		700DC-PH600⊗	700DC-PH600D⊗	—

⊗DC Voltage Suffix Code

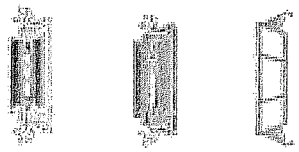
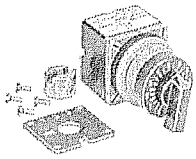
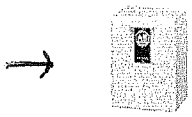
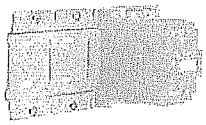
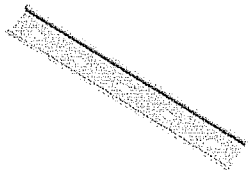
The Cat. No. as listed is incomplete. Select a voltage suffix code from the table below to complete the Cat. No. Example: **Cat. No. 700DC-PH200⊗** becomes **Cat. No. 700DC-PH200Z12**. For other coil voltages, consult your local Rockwell Automation sales office or Allen-Bradley distributor.

6	12	18	24	32	48	64	72	90	115-125	230-250	500-550	575-600
Z06	Z12	Z18	Z24	Z32	Z48	Z64	Z72	Z90	Z1	Z2	Z5	Z6

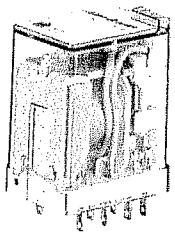
⌘ Optimized for 115...120V, 60 Hz. Operates satisfactorily at 110V, 50 Hz.
✢ Optimized for 110...115V, 50 Hz. Operates satisfactorily at 120V, 60 Hz.
* **Normally closed contacts**: The normally open contacts can easily be changed to normally closed in the field. Relays can be supplied with N.C. contacts.
❄ Location of contacts in 1-pole relays.
‡ Location of contacts in 3-pole relays: 2-pole relay plus the contact indicated.
§ Location of contacts in 5-pole relays: 4-pole relay plus the contact indicated.
➢ For Type 4/4X Enclosure replace 1 with 4, for Type 7 & 9 Enclosure replace 1 with 7 (Example, 700-PH401⊗ becomes 700-PH404).

Sealed Switch Timing Relays

Accessories

	Description	Cartridge Type	Color	Cat. No.
 *Cat. No. 700-CRT5* *Cat. No. 700-CRT6* *Cat. No. 700-CR9*	**Contact Cartridges** – These cartridges are used to add contacts to timing relays having unused slots. The N.O., N.C., and Dummy cartridges are interchangeable and can be used in timed or instantaneous contact slots. Dummy cartridges should be placed in unused cartridge slots to guard against entrance of foreign material.	N.O.	Gray	**700-CRT5**
		N.C.	Orange	**700-CRT6**
		Dummy Cartridge	Black	700-CR9
 *Cat. No. 800MR-N37*	**External Potentiometer** – The potentiometer units listed are recommended for timers with remote potentiometer provision. Refer to catalog section on Bulletin 800T or 800M for general construction features. **Connection Cable** – Use shielded twisted pair cable, maximum of 50 feet. Recommended cable (or equivalent): UL style 2517, having two #18 stranded conductors with aluminum mylar foil shield and #20 drain wire. Rated 150 °C, FR-1, 300 volts.	Oiltight∗		**800T-U90**
		Small Oiltight – Round❄‡		**800MR-N37**
		Small Oiltight – Square❄§		**800MS-N37**
	ATTENTION – If the recommended potentiometer and cable are not used, be certain that the potentiometer and cable wiring is insulated from ground and circuit common for 300V RMS or greater.			
	**Type 1 Enclosure** – Use for all Bulletin 700-P, -PH, and -PK relays except 10- and 12-pole DC relays or 5- and 6-pole DC Bulletin 700-PH relays.			700-N31
	**Relay Rail** Simplifies panel layout. These indexed strips are easily cut to the required length and bolted, riveted, or spot-welded in place. Relays are installed adjacent to one another on the mounting strip with the captive mounting screws provided. Rows of relays on Relay Rail form their own wiring trough. Can be used with the following relays: 700P, 700-PK, 700PH, 700S-P, 700N, 700-R, 700-RTC	Relays per Strip	Pkg. Quantity	
		4	5	**700-MP4**
		8	5	**700-MP8**
		12	5	**700-MP12**
		16	5	**700-MP16**
 *Cat. No. 199-DR1*	**DIN (#3) Symmetrical Rail** 35x7.5x1 m		10	**199-DR1**
	**DIN Rail Adapter** Can be used with the following relays: 700P, 700-PK, 700-PH, 700S-P, 700-N, 700-R, 700-RTC		1	**700-DRA**

∗ Legend plate, Cat. No. 800T-X609, must be specified when ordering.
❄ Add suitable 400 KΩ potentiometer.
‡ Does not include legend plate.
§ Does not include legend plate. Contact your local Rockwell Automation sales office or Allen-Bradley distributor.



Bulletin 700-HC

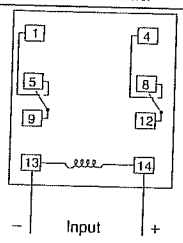
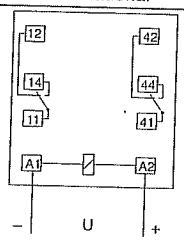
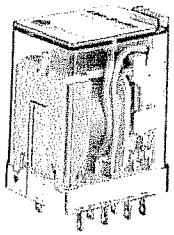
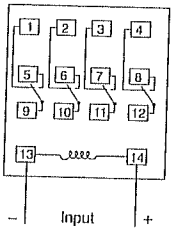
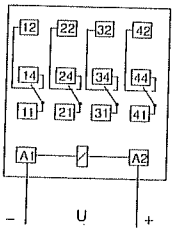
- 7 or 10 A contact ratings
- 2PDT or 4PDT
- Standard ON/OFF flag indicator
- Blade-style terminals
- Choice of standard silver nickel contacts, or silver nickel with gold-plated contacts for low-energy applications
- Options: LED, push-to-test with manual override option
- Tungsten UL Approvals
  4-Pole: 5A @ 24V DC
  2-Pole: 10A @ 24V DC

Table of Contents

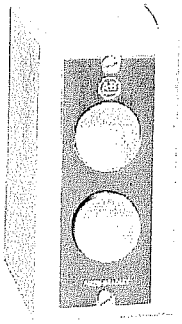
Standards Compliance and Certifications

See Specification table in this section, page 9-38.

Bulletin 700-HC Miniature Square Base with Blade Terminals

	Description	Contact Rating	Wiring Diagrams U.S./Canada	Wiring Diagrams International	Coil Voltage	Cat. No. * ❊
	2PDT 2-Pole 2 Form C Contacts: 10 A = AgNi Contacts	10 A C300 R300 Low energy rating; (10V, 10 mA)	 *700-HN128*	 *700-HN103* *700-HN104*	12V DC	700-HC22Z12
					24V DC	700-HC22Z24
					24V AC	700-HC22A24
					120V AC	700-HC22A1
					240V AC	700-HC22A2
	4PDT 4-Pole 4 Form C Contacts: 7A = AgNiAu Gold Plated Contacts	7 A Low energy rating; (10V, 1 mA)			6V AC	700-HC14A06
					12V AC	700-HC14A12
					24V AC	700-HC14A24
					120V AC	700-HC14A1
					240V AC	700-HC14A2
					6V DC	700-HC14Z06
					12V DC	700-HC14Z12
					24V DC	700-HC14Z24
					48V DC	700-HC14Z48
					110V DC	700-HC14Z1
	4PDT 4-Pole 4 Form C Contacts: 7A = AgNi Silver Contacts	7 A C300 R300 Low energy rating; (10V, 10 mA)	*700-HN128*	*700-HN103* *700-HN104*	6V AC	700-HC24A06
					12V AC	700-HC24A12
					24V AC	700-HC24A24
					120V AC	700-HC24A1 ←
					240V AC	700-HC24A2
					6V DC	700-HC24Z06
					12V DC	700-HC24Z12
					24V DC	700-HC24Z24
					48V DC	700-HC24Z48
					110V DC	700-HC24Z1

* LED Option: Add suffix **(-4)** to the selected Bulletin 700-HC Relay Cat. No. except for the 240V AC units, add **(-4L)**.
❊ Push-to-Test and LED Option: Add suffix **(-3-4)** to the selected Bulletin 700-HC Relay Cat. No., except for the 240V AC units, add **(-3-4L)**.



Bulletin 800S — Standard Duty Stations

Features — Bulletin 800S standard duty push button stations are used in control circuits. They offer compact size and dependable peformance.

NEMA Type 1 general purpose stations have been designed for greater operating flexibility and ease of wiring. The cover of the station contains the entire contact mechanism. Wiring terminals are located in the base. Spring type, silver plated contacts connect the two assemblies. This unique construction will speed up installation and maintenance. Operating buttons can be rotated 90 degrees to make them suitable for horizontal mounting. This change can be made in the field.

NEMA Type 4 — Enclosures are die cast aluminum. Standard stations are supplied with a 3/4 inch pipe tap at the bottom.

Table of Contents

Pilot Lights

- Push button stations with pilot lights can operate on either 120V or 240V by changing connections. A red pilot lens is supplied.

Selector Switches

- All two-position Bulletin 800S standard duty selector switch stations can be changed to three-position in the field, and the three-position selector switches can be changed to two-position. Instructions for changing are included with each station.
- In addition to the standard marking, all selector switches are supplied with adhesive backed metal legend plates, marked as follows: OFF-ON, FOR-REV, HAND-AUTO, OPEN-CLOSE, HIGH-LOW, SUMMER-WINTER, SUMMER-OFF-WINTER, HIGH-OFF-LOW, OPEN-OFF-CLOSE, FOR-OFF-REV, HAND-OFF-AUTO.

Complete Assembled Stations

Flush Mount Units fit a standard GEM or Handy Type Wall Box. Contact Symbol 3
Cat. No. 800S-2AS

Type 1 Flush Mount Unit* — Wall Box not included			
		Grey Painted Flush Plate	Stainless Steel Flush Plate
Legend Marking	Contact Symbol	Cat. No.	Cat. No.
START STOP	3	**800S-2AS**	800S-2ASQ

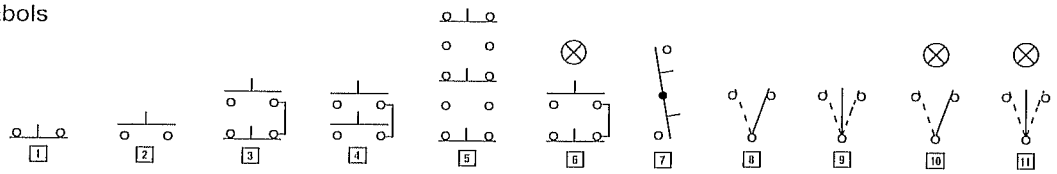
* Not rated for DC operation.

Cat. No. 800S-2SAP

Cat. No. 800S-2SCM

Momentary Contact Buttons and Pilot Light — 120V or 240V, Type 1.			Maintained Contact Buttons — Type 1		
Legend Marking	Contact Symbol	Cat. No.	Legend Marking	Contact Symbol	Cat. No.
No Legend START STOP	6	**800S-2SAP**	No Legend ON OFF	7	**800S-2SCM**
			No Legend START STOP	7	**800S-2SBM**

Contact Symbols

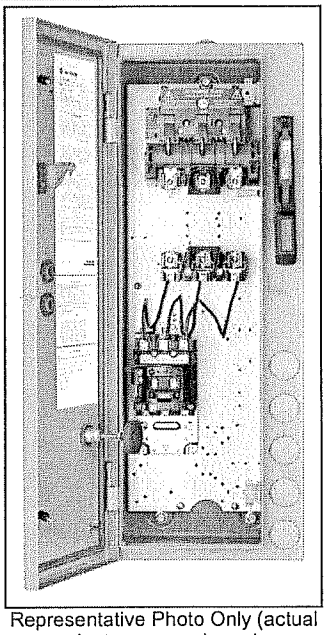


Rockwell Automation

APPROVED

By Jesse Mailloux - Ryfan Industrial Electric at 10:07 am, Nov 15, 2010

Configuration Results



Representative Photo Only (actual product may vary based on configuration selections)

Product: 512-CDCD-EC2D

Description: NEMA Combination Starter, Disconnect Type, NEMA 2, 600/110/120 VAC - 50/60Hz (CD), Type 3R/4/12 - Enclosure Code "D"

Selected Components

Selected Components

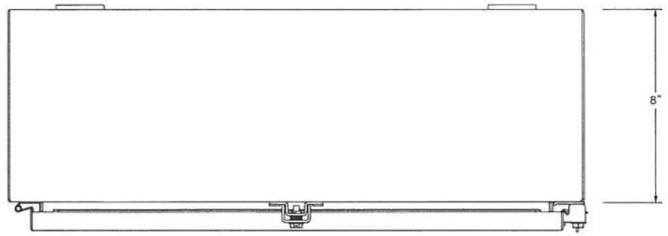
Catalog Number	Qty	Product Description	Unit Price (US$)	Supplementary Documents
512-CDCD-EC2D	1	NEMA Combination Starter, Disconnect Type, NEMA 2, 600/110/120 VAC - 50/60Hz (CD), Type 3R/4/12 - Enclosure Code "D"	$ 2,718.00	• Product Details and Certifications • Repair Parts List • Renewal Parts for Overload Relay Reset Button • Dimension Sheet • Repair Parts for Enclosure • Repair Parts for 25Hz Coil • Repair Parts for Control Circuit Terminal
		Estimated List Price *(Contact local RA Distributor for pricing)*	**$ 2,718.00**	

Modify Cancel

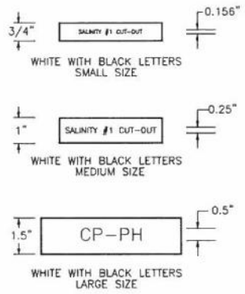
APPROVED

By Jesse Mailloux - Ryfan Industrial Electric at 10:15 am, Mar 09, 2011

DRAWING NO. 10-1908-1 REV. A



TOP VIEW



TYPICAL ENGRAVINGS

ITEM	QTY.	DESCRIPTION
1	1	HOFFMAN ENCLOSURE # 1418N4J8
2	2	ALLEN-BRADLEY PUSH BUTTON #800H-AR1D1 (GREEN)
3	2	ALLEN-BRADLEY PUSH BUTTON #800H-AR6D2 (RED)
4	2	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10G (GREEN)
5	3	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10R (RED)
6	1	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10A (YELLOW)
7	2	ALLEN-BRADLEY 2 POS. SELECTOR SWITCH #800H-HR2A
8	8	ALLEN-BRADLEY RELAY #700-HC24A1
9	8	ALLEN-BRADLEY RELAY BASE #700-HN128
10	12	ALLEN-BRADLEY LEGEND PLATE #800H-W100
11	2	ENM HOUR METER RESETABLE #T348N62D
12	LOT	WIREWAY 2" W X 2" H C/W COVER (62X62)
13	14	ENGRAVING - SMALL AND MEDIUM SIZE
14	3	ENGRAVING - LARGE SIZE
15	28	WEIDMUELLER WDU4 TERMINAL #102010
16	1	WEIDMUELLER WAP END PLATE #105000
17	2	WEIDMUELLER WEW35 END CLAMP #106120
18	56	WEIDMUELLER WS12/6 TERMINAL MARKER #16099
19	LOT	WEIDMUELLER BRIDGE #175827
20	LOT	WEIDMUELLER TS35 RAIL #38340
21	1	IISCO GROUND BAR #N820A108T
22	1	HOFFMAN HANDLE, KEY LOCKING # C-WKL
23	1	CSA

BILL OF MATERIAL

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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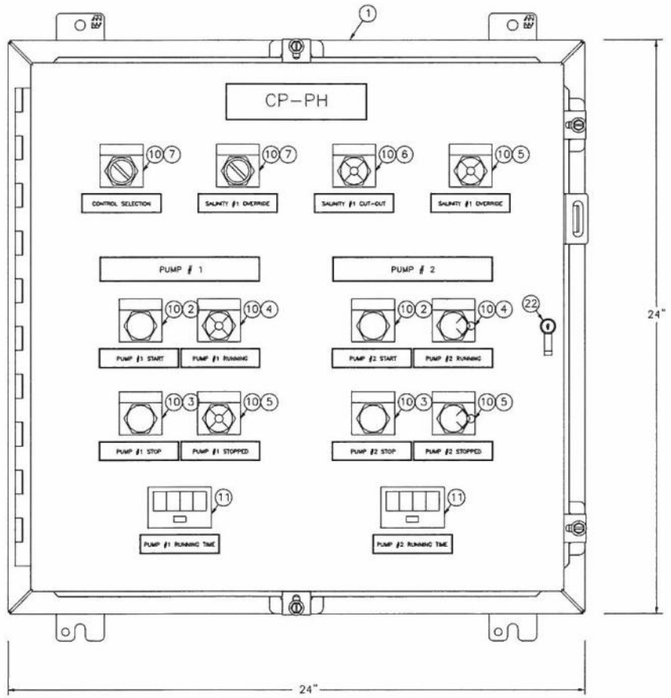
Per,

WILLIAMS ENGINEERING CANADA INC.

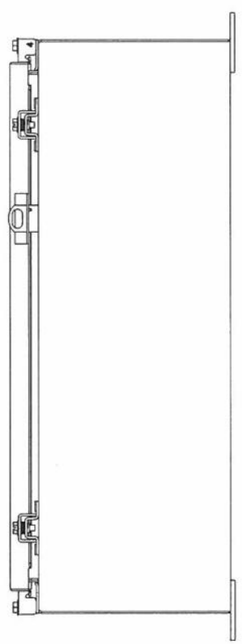
By: Jaehoon Lee, Williams Engineerir..

Date: 03/15/2011

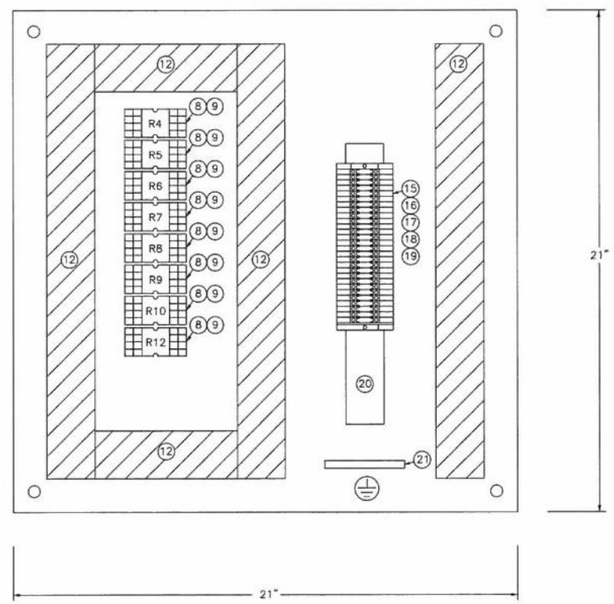
WILLIAMS ENGINEERING CANADA



FRONT VIEW



SIDE VIEW



INTERIOR BACK PLATE

SCALE INCHES 0 1 2 3 4 5

REV	ISSUE DATE Y	M	D	DESCRIPTION	DWN	CHK	ENG	APP	APP
A	11	01	31	SHOP DRAWING REVIEW	PCM				

G.T.K. ELECTRIC CONTROLS LTD.
Design & Manufacture of Electrical and Process Control Systems

DRAWING TITLE:
KUGLUKTUK, NU
WATER SUPPLY IMPROVEMENTS
PHASE 1
NEW INTAKE AND PUMPHOUSE ELECTRICAL PANELS
CP-PH PANEL LAYOUT AND BILL OF MATERIAL
SHEET 1 OF 5

DRAWING NO.	SHT. No.	REV
10-1908-1	1	A

PLOT SCALE X

8 7 6 5 4 3 2 1

DRAWING NO. 10-1908-2 | REV. A

CP-PH

LOCAL - REMOTE — L-SS1 — CONTROL SELECTION

OFF - ON — L-SS2 — SALINITY #1 OVERRIDE

ON (Y) — L-IL5 — SALINITY #1 CUT-OUT

ON (R) — L-IL6 — SALINITY #1 OVERRIDE

PUMP # 1

START (G) — L-PB1 — PUMP #1 START

RUNNING (G) — L-IL1 — PUMP #1 RUNNING

STOP (R) — L-PB2 — PUMP #1 STOP

STOPPED (R) — L-IL2 — PUMP #1 STOPPED

PUMP #1 RUNNING TIME

PUMP # 2

START (G) — L-PB3 — PUMP #2 START

RUNNING (G) — L-IL3 — PUMP #2 RUNNING

STOP (R) — L-PB4 — PUMP #2 STOP

STOPPED (R) — L-IL4 — PUMP #2 STOPPED

PUMP #2 RUNNING TIME

DOOR LAYOUT

N.T.S.

001	○	001
001	○	001
001	○	001
001	○	001
N	○	N
N	○	N
N	○	N
N	○	N
7	○	7
10	○	10
11	○	11
15	○	15
18	○	18
19	○	19
23	○	23
24	○	24
25	○	25
26	○	26
27	○	27
28	○	28
29	○	29
30	○	30
31	○	31
	○	SPARE
	○	SPARE
	○	SPARE
	○	SPARE
	○	SPARE

TERMINAL LAYOUT

N.T.S.

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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Per,
WILLIAMS ENGINEERING CANADA INC.
By: Jaehoon Lee, Williams Engineerin
Date: 03/15/2011

WILLIAMS ENGINEERING CANADA

REV.	ISSUE Y	M	D	DESCRIPTION	DWN	CHK	ENG	APP	APP
A	11	01	31	SHOP DRAWING REVIEW	PCM				

G.T.K. ELECTRIC CONTROLS LTD.
Design & Manufacture of Electrical and Process Control Systems

DRAWING TITLE:
KUGLUTUK, NU
WATER SUPPLY IMPROVEMENTS
PHASE 1
CP-PH DOOR LAYOUT AND TERMINAL BLOCK LAYOUT
PHASE 1
SHEET 2 OF 5

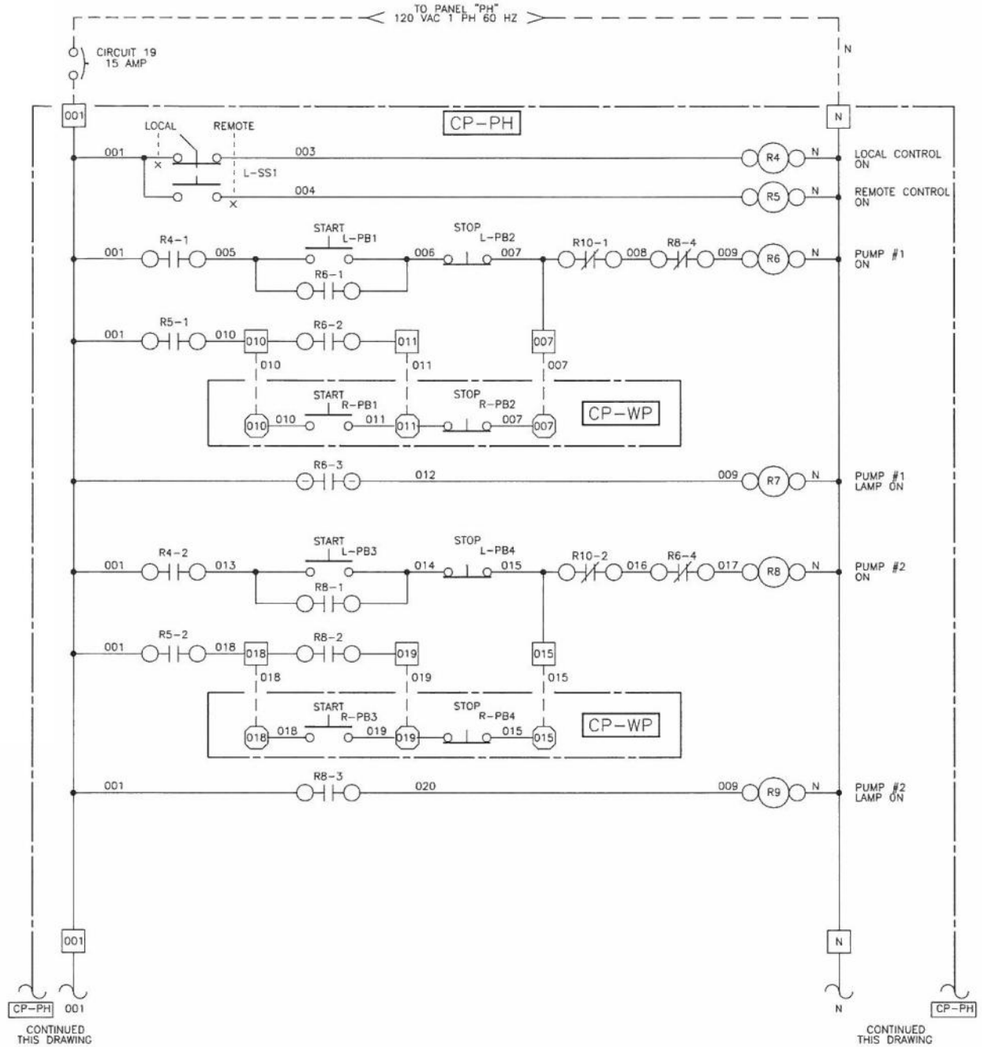
DRAWING NO.	SHT No.	REV.
10-1908-2	2	A

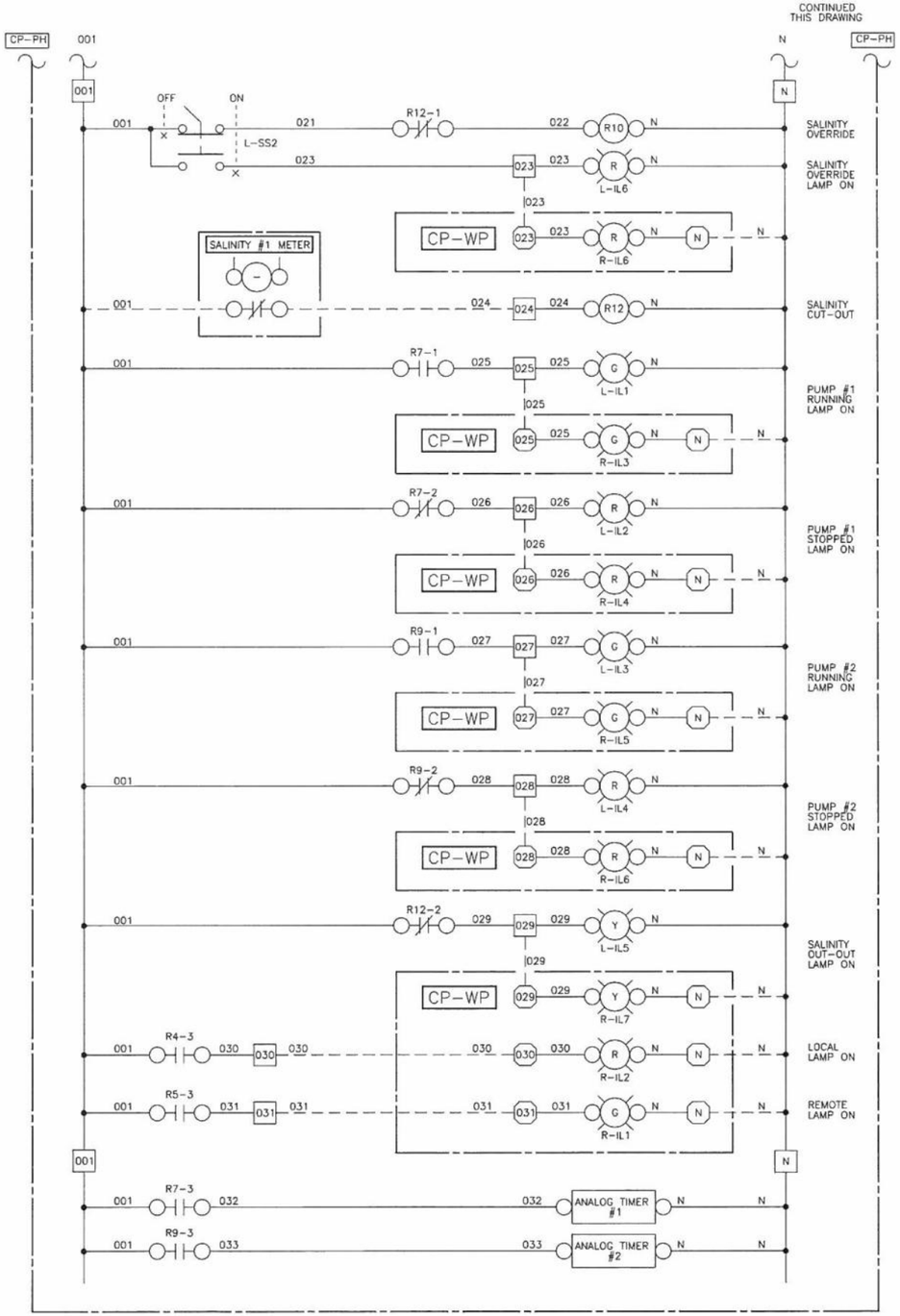
PLOT SCALE X

8 7 6 5 4 3 2 1

REV A

DRAWING NO. 10-1908-3





LEGEND

015 – TERMINAL IN LOCAL PANEL CP-PH

015 – TERMINAL IN LOCAL PANEL CP-WP

REV.	ISSUE DATE (Y M D)	DESCRIPTION	DWN	CHK	ENG	APP	APP
A	11 01 31	SHOP DRAWING REVIEW	PCM				

G.T.K. ELECTRIC CONTROLS LTD.
Design & Manufacture of Electrical and Process Control Systems

DRAWING TITLE:
KUGLUKTUK, NU
WATER SUPPLY IMPROVEMENTS
PHASE 1
NEW INTAKE AND PUMPHOUSE ELECTRICAL PANELS
CP-PH AND CP-WP ELECTRICAL SCHEMATIC
SHEET 3 OF 5

DRAWING NO.	SHT. No.	REV.
10-1908-3	3	A

PLOT SCALE X

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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Per,

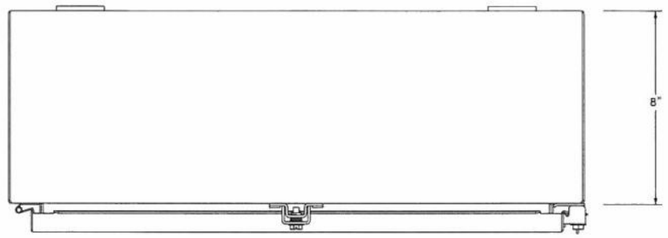
WILLIAMS ENGINEERING CANADA INC.

By: Jaehoon Lee, Williams Engineerir..

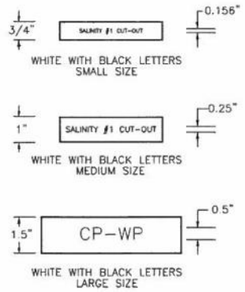
Date: 03/15/2011

WILLIAMS ENGINEERING CANADA

DRAWING NO. 10-1908-4 REV A



TOP VIEW



TYPICAL ENGRAVINGS

ITEM	QTY.	DESCRIPTION
1	1	HOFFMAN ENCLOSURE # 141BN4JB
2	2	ALLEN-BRADLEY PUSH BUTTON #800H-AR1D1 (GREEN)
3	2	ALLEN-BRADLEY PUSH BUTTON #800H-AR6D2 (RED)
4	3	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10G (GREEN)
5	4	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10R (RED)
6	1	ALLEN-BRADLEY PILOT LIGHT #800H-ARH10A (YELLOW)
7	–	–
8	–	–
9	–	–
10	12	ALLEN-BRADLEY LEGEND PLATE #800H-W100
11	–	–
12	LOT	WIREWAY 2" W X 2" H C/W COVER (62X62)
13	12	ENGRAVING - SMALL AND MEDIUM SIZE
14	3	ENGRAVING - LARGE SIZE
15	23	WEIDMUELLER WDU4 TERMINAL #102010
16	1	WEIDMUELLER WAP END PLATE #105000
17	2	WEIDMUELLER WEW35 END CLAMP #106120
18	46	WEIDMUELLER WS12/6 TERMINAL MARKER #16099
19	LOT	WEIDMUELLER BRIDGE #175827
20	LOT	WEIDMUELLER TS35 RAIL #38340
21	1	IISCO GROUND BAR #N820A10BT
22	1	HOFFMAN HANDLE, KEY LOCKING # C-WKL
22	1	CSA

BILL OF MATERIAL

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
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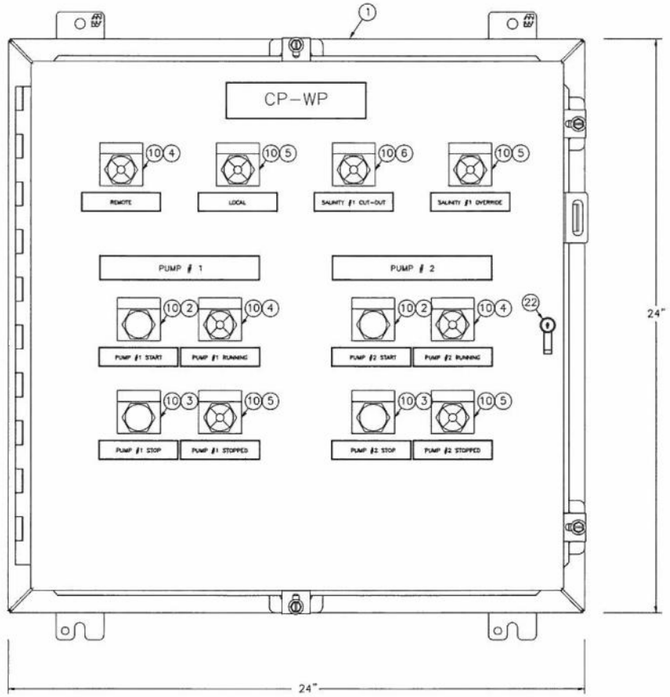
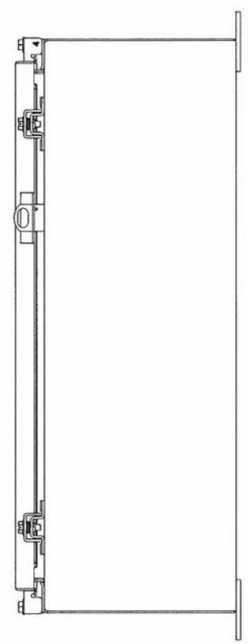
WILLIAMS ENGINEERING CANADA INC.
By: Jaehoon Lee, Williams Engineering
Date: 03/15/2011

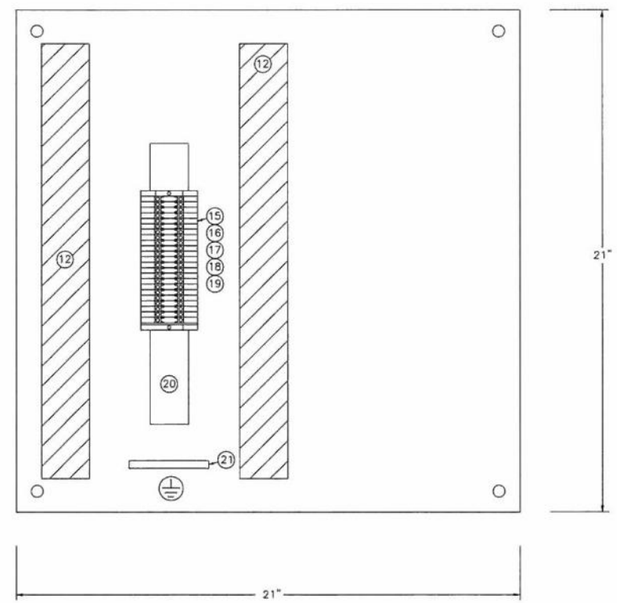
WILLIAMS ENGINEERING CANADA



FRONT VIEW



SIDE VIEW



INTERIOR BACK PLATE

SCALE INCHES 0 1 2 3 4 5

REV.	ISSUE DATE Y	M	D	DESCRIPTION	DWN	CHK	ENG	APP	APP
A	11	01	31	SHOP DRAWING REVIEW	PCM				

G.T.K. ELECTRIC CONTROLS LTD.
Design & Manufacture of Electrical and Process Control Systems

DRAWING TITLE
KUGLUKTUK, NU
WATER SUPPLY IMPROVEMENTS
PHASE 1
NEW INTAKE AND PUMPHOUSE ELECTRICAL PANELS
CP-WP PANEL LAYOUT AND BILL OF MATERIAL
SHEET 4 OF 5

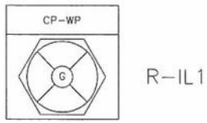
DRAWING NO.	SHT. No.	REV
10-1908-4	4	A

PLOT SCALE X

8 7 6 5 4 3 2 1

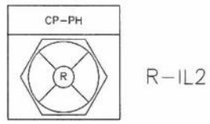
DRAWING NO. 10-1908-5 REV. A

CP-WP



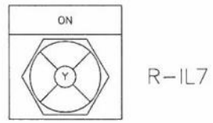
R-IL1

REMOTE



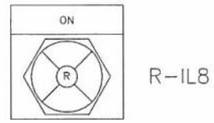
R-IL2

LOCAL



R-IL7

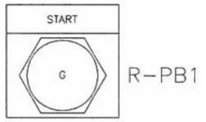
SALINITY #1 CUT-OUT



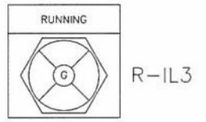
R-IL8

SALINITY #1 OVERRIDE

PUMP # 1

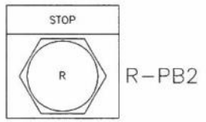


R-PB1

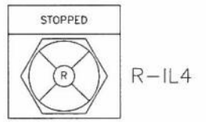


R-IL3

PUMP #1 START | PUMP #1 RUNNING



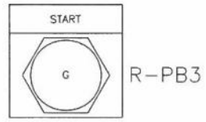
R-PB2



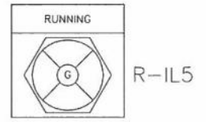
R-IL4

PUMP #1 STOP | PUMP #1 STOPPED

PUMP # 2

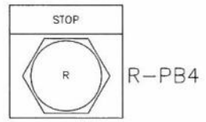


R-PB3

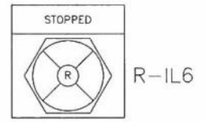


R-IL5

PUMP #2 START | PUMP #2 RUNNING



R-PB4



R-IL6

PUMP #2 STOP | PUMP #2 STOPPED

Reviewed (X)
Reviewed as Modified ( )
Revise ( )
Revise and Re-Submit ( )
Not Reviewed ( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

WILLIAMS ENGINEERING CANADA

By: Jaehoon Lee, Williams Engineeri.

Date: 03/15/2011

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TERMINAL LAYOUT

N.T.S.

REV.	ISSUE	DATE	DESCRIPTION	DWN	CHK	ENG	APP	APP
A	Y	11 01 31	SHOP DRAWING REVIEW	PCM				

G.T.K. ELECTRIC CONTROLS LTD.
Design & Manufacture of Electrical and Process Control Systems

DRAWING TITLE:
KUGLUTUK, NU
WATER SUPPLY IMPROVEMENTS
PHASE 1
CP-WP DOOR LAYOUT AND TERMINAL BLOCK LAYOUT
PHASE 1
SHEET 5 OF 5

DRAWING NO.	SHT. No.	REV
10-1908-5	5	A

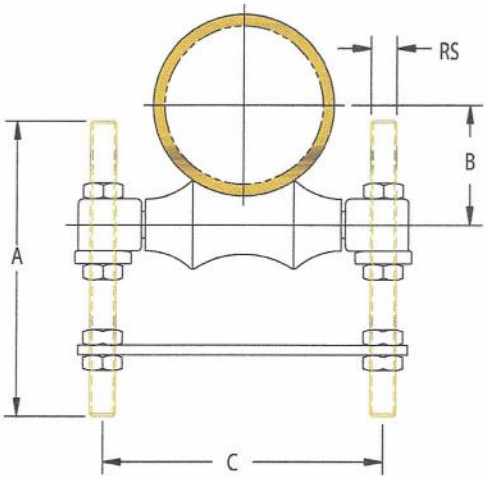
PLOT SCALE: X

8 7 6 5 4 3 2 1

PIPE ROLLER 620

Adjustable Pipe Roll Support

- Size Range: 2-1/2" thru 30"
- Surface Finish: Black
- Support pipe from a substructure or structural member where longitudinal movement may occur due to expansion or contraction and where vertical adjustment of up to 6" may be necessary
- Conforms with Federal Specification WW-H-171 (Type 42), Manufacturers Standardization Society ANSI/MSS-SP-58 (Type 41); install in accordance with ANSI/MSS-SP-69



NOTE: Roll and sockets are cast iron and axle is carbon steel, available with Electro-zinc plated finish by special order

Part Number	Pipe Size	RS	A	B	C	Max. Rec. Load (lbs)
6200250PL	2-1/2"	1/2"	12"	1-7/8"	4-7/8"	660
6200300PL	3"	1/2"	12"	2-1/4"	5-5/8"	700
6200350PL	3-1/2"	1/2"	12"	2-5/8"	6-1/8"	750
6200400PL	4"	5/8"	12"	2-7/8"	6-11/16"	750
6200500PL	5"	5/8"	12"	3-1/2"	7-15/16"	750
6200600PL	6"	3/4"	12"	4"	9-9/16"	1070
6200800PL	8"	7/8"	12"	5-1/4"	12"	1350
6201000PL	10"	7/8"	12"	6-5/16"	14"	1730
6201200PL	12"	7/8"	12"	7-7/16"	15-3/4"	2400
6201400PL	14"	1"	12"	8-3/8"	17-5/8"	3130
6201600PL	16"	1"	18"	9-7/16"	19-5/16"	3970
6201800PL	18"	1"	18"	10-7/16"	21-5/8"	4200
6202000PL	20"	1-1/4"	18"	11-1/2"	24-1/8"	4550
6202400PL	24"	1-1/2"	24"	13-15/16"	28-3/8"	6060
6203000PL	30"	1-1/2"	24"	17-1/4"	35-3/8"	7290

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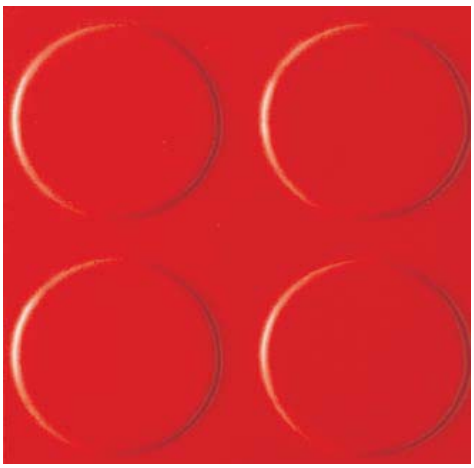
Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir

Date: 22/10/2010

WILLIAMS ENGINEERING CANADA



BR

(STUDDED RUBBER TILES)

ACTiVA™ Rubber Flooring

Technical Data Sheet

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

By: Kevin Rattray EIT, Williams Engir.

Date: 08/04/2011

WILLIAMS ENGINEERING CANADA

Product Specifications

Feature	Standard	Results	Notes
Safety			
Halogen Free		Yes	
Asbestos Free		Yes	
This product does not contain PVC, cadmium, formaldehyde, chlorine, fluorine or bromine, which could be highly toxic and corrosive in case of fire.			
Fire and Smoke Behaviour			
Critical Heat Flux Critical Radiant Flux	ASISO 9239.1-2003	≥ 11 kw/m^2	
Smoke Value	ASISO9239.1-2003	16 min	
Toxicity of Smoke	Boeing Safety Standard BSS 7239	ppm level (Complies)	
Mechanical Features			
Hardness	ASTM D-2240	≥ 85 Shore A	
Dimensional Stability	DIN 51962	< 0.3 % No variation	
Indentation	ASTM F-36	≤ 0.20 mm	
Abrasion Resistance	DIN 53516	≤ 160 mm^3	
Elongation	ASTM D412	~150 %	
Tensile Strength	ASTM D-412	≥ 800 psi	
Slip Resistance	ASTM D-2047-82	≥0.60	Complies with ADA
Resistance to Elements Over Time			
Colour Fastness	DIN 53389	5 - 7	
Water Retention	ASTM D471	≤ 1 %	
Chemical Resistance	DIN 51958	Good	See Chart
Cigarette Burn Resistance	DIN 51961	Yes	Visual Judgment
Acoustical Features			
Acoustical Insulation	DIN 52210	~ 10 dB	Noise abetment
Electrical Features			
Insulation	DIN 53596	≥ 10^{10} ohm	Insulating
Static Generation	DIN 54345	<2 kV	Antistatic
Composition			
ACTiVA Rubber flooring products are made of 100% synthetic rubber (SBR - Styrene Butadiene Rubber), the finest quality minerals, organic stabilsing agents, vulcanising agents, antioxidants and quality pigments. They DO NOT CONTAIN re-ground rubber, coarse mineral aggregates, fillers, sand or any material known to pose a health hazard in any of the phases of the manufacturing and use cycle.			

Product Description

The original PIRELLI design and the worldwide best seller.

Homogeneous Rubber Flooring tile made of 100% synthetic rubber.

Features

- Easy Maintenance
- Slip Resistant
- Sound Absorbent
- High Abrasion Resistance
- Highly Resilient

Environmental & Safety

Product FREE from:
Halogens, Antimony, Arsenic, Barium, Lead, Cadmium, Chromium, PVC, Volatile elements, DOP's, Formaldehyde, Asbestos and Heavy metals.

Manufactured in compliance with ISO 14001

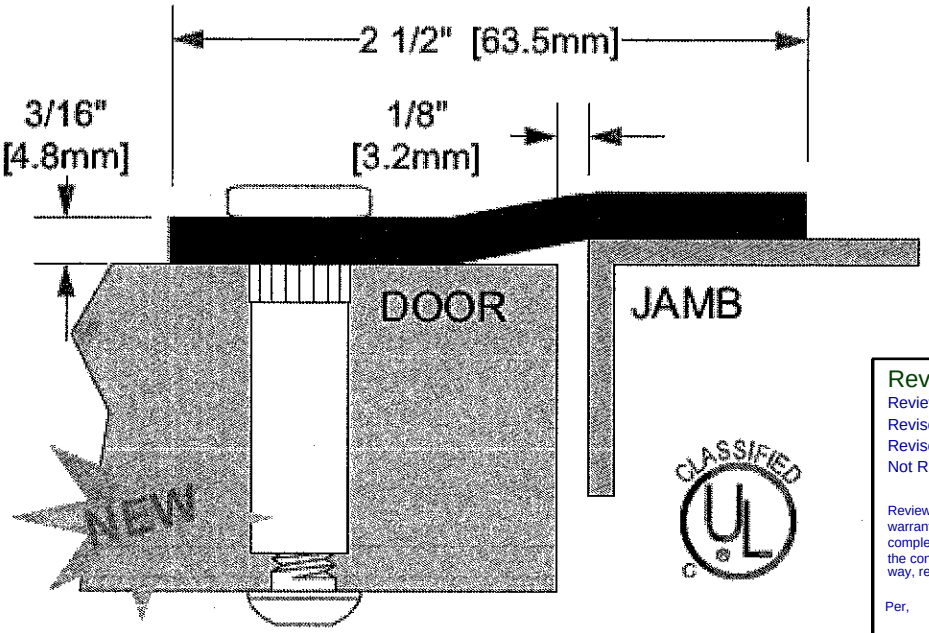
Information

- Tile Size : 50 x 50 cm
- Thickness : 3.0mm
- Limited Wear Warranty: 10 Years
- Colour s: 24 Standard
  Custom Colours are available upon request
- Recommended Adhesives:
  Two-part PU
  **Please consult our office for detail.*

PRF (NZ) Pty Ltd.
6 Findlay Street
Ellerslie, Auckland
P: (09) 579 2890 F:(09) 579 2892
www.rubberflooring.co.nz

W7

Product Details PDF



SECURITY ASTRAGAL

PRIMED C.R. STEEL c/w SECURITY SLEEVE

Reviewed	(X)
Reviewed as Modified	( )
Revise	( )
Revise and Re-Submit	( )
Not Reviewed	( )

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Per,

WILLIAMS ENGINEERING CANADA INC.

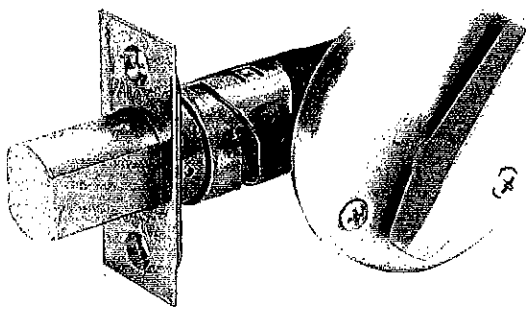
By: Kevin Rattray EIT, Williams Engir

Date: 04/05/2011

WILLIAMS ENGINEERING CANADA

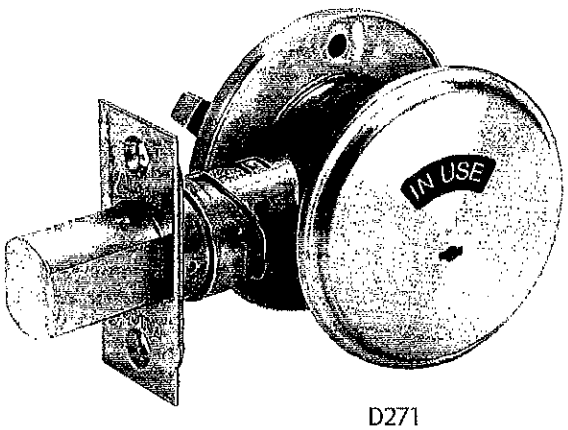
DOORTECH'S ARE WELDED TO THE DOOR RATHER THAN BOLTED.

Deadbolt thrown or retracted by turn unit only. No outside trim. Bolt automatically deadlocks when fully thrown.
ANSI/BHMA E2192



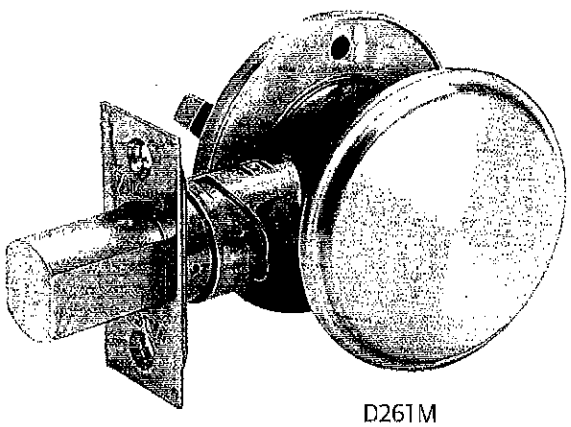
D261

Deadbolt thrown or retracted by turn unit only. Occupancy indicator on outside (reads either "in use" or "vacant" with color coding). Bolt automatically deadlocks when fully thrown. Emergency key supplied.



D271

Deadbolt thrown or retracted by turn unit only. Outside blank rose. Bolt automatically deadlocks when fully thrown.
ANSI/BHMA E01112



D261M

SCHLAGE®

P513-610

Single Cylinder Deadbolt
B660/760/860
B661/761/861

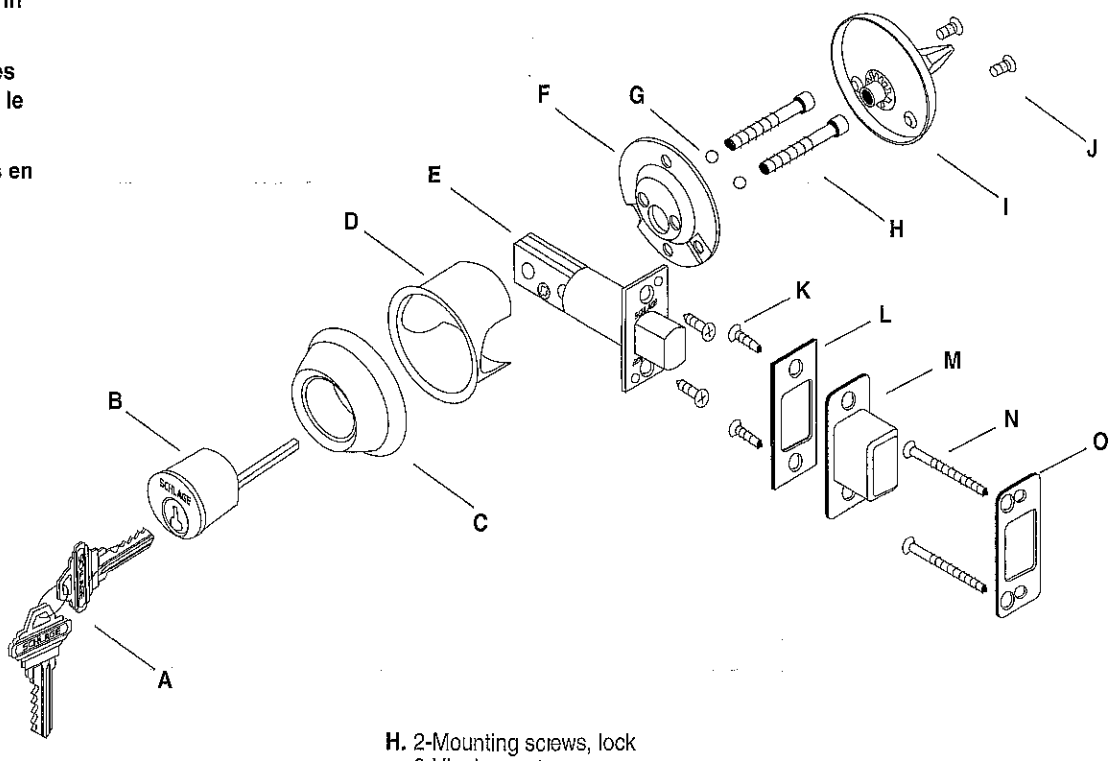
B-Series

Installation Instructions

Parts contained in package

Pièces détachées contenues dans le paquet

Piezas incluidas en el paquete



A. 2-Keys
2-Clés
2- Llaves

B. 1-Cylinder
1-Cylindre
1-Cilindro

C. 1-Trim ring
1-Anneau de garniture
1-Aro de guarnición

D. 1-Metal shield
1-Gaine de sécurité
1- Rodela metálica

E. 1-Deadbolt
1-Pêne dormant
1-Cerrojo de seguridad

F. 1-Mounting plate
1-Plaque support
1-Placa de montaje

G. 2-Hardened steel balls
2-Billes en acier trempé
2-Bolas de acero templado

H. 2-Mounting screws, lock
2-Vis de montage pour verrou
2-Tornillos de montaje para la cerradura

I. 1-Thumbturn (B660) or
1-Rose (B661)
1-Le tourniquet (B660) ou
1-Rosette (B661)
1-Perno mariposa (B660) ó
1-Roseta (B661)

J. 2-Mounting screws, rose
2-Vis de montage pour rosette
2-Tornillos de montaje para la roseta

K. 4-Screws, bolt and strike
4-Vis, pêne et gâche
4-Tornillos, pasador y recibidor

L. 1-Strike
1-Gâche (affleurante)
1-Placa fija

M. 1-Strike box
1-Boîtier de gâche
1-Recibidor

N. 2-3" (76mm) mounting screws
2-Vis de montage (76 mm)
2-Tornillos de montaje de 76 mm

O. 1-Wood frame reinforcer
1-Plaque de renfort pour cadre en bois
1-Reforzador para marco de madera

1

Mark door with template

a. Place template on door (high edge of beveled (slanted) door). Mark for two holes.

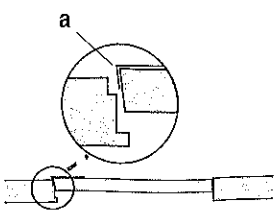
b. Heightline.

c. Center of door thickness.

Tracez le gabarit sur la porte

a. Placez le gabarit sur la porte (du côté de l'arête supérieure sur une porte à chanfrein). Tracez deux trous.

b. Ligne de hauteur.



3

Install deadbolt

a. Bolt must be retracted. If necessary, use screwdriver to turn cam and retract bolt.

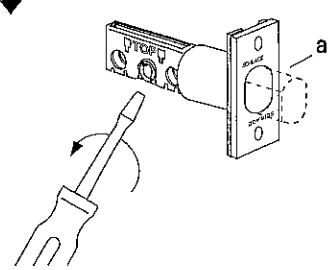
b. Trace around faceplate.

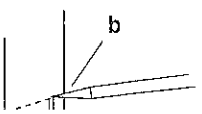
c. Chisel out wood for flat fit against door.

d. Fasten with screws.

Installez le pêne dormant

a. Rétractez le pêne. Si nécessaire, faites tourner la came à l'aide d'un tournevis pour rétracter le pêne.

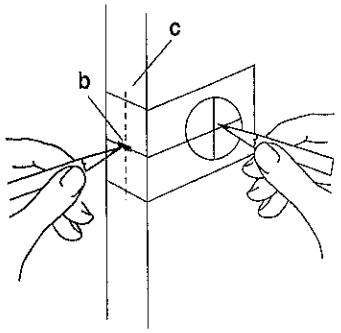




porte.

Marque la puerta con la plantilla

a. Coloque la plantilla sobre la puerta (sobre el borde alto de la puerta biselada o inclinada). Marque los puntos para dos agujeros.
b. La línea de altura.
c. El centro del espesor de la puerta.



2

Drill (2) holes

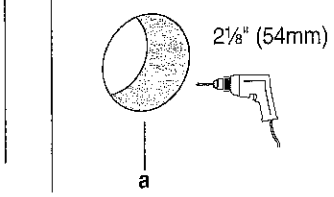
a. Drill a 2⅛" (54mm) hole through door face (from both sides to avoid damaging wood). **Note:** Do not use metal shield in existing 1½" (38mm) hole installations.
b. Drill a 1" (25mm) hole in door edge or 1⅛" (27mm) for circular bolt. Drill ⅜" (10mm) deeper as shown.

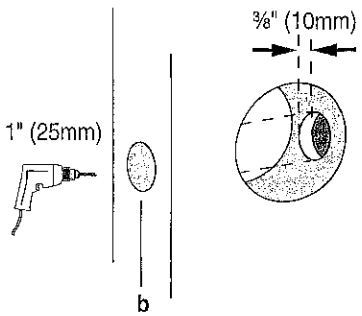
Percez les (2) trous

a. Forez un trou de 54 mm à travers la porte (percez des deux côtés pour ne pas endommager la porte). **Remarque:** Pour un trou de 38 mm existant, n'utilisez pas la gaine de sécurité fournie.
b. Forez un trou de 25 mm dans l'épaisseur de la porte ou de 27 mm pour un verrou circulaire. Forez 10 mm plus profond comme indiqué sur le schéma.

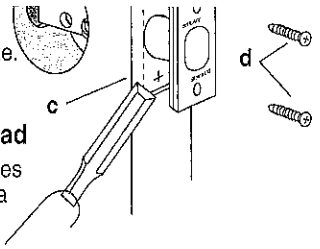
Taladre (2) agujeros

a. Taladre un agujero de 54 mm en el frente de la puerta (taladre desde ambos lados para evitar que se estropee la madera). **Nota:** Si utiliza un agujero previamente taladrado de 38 mm, no haga uso de la rodela metálica incluida.
b. Taladre un agujero de 25 mm en el borde de la puerta o 27 mm para el pasador circular. Taladre 10 mm más de profundidad, según se ve en la ilustración.





c. Buriner le bois afin de permettre l'encastrement de la têtière affleurante.
d. Vissez les deux vis.



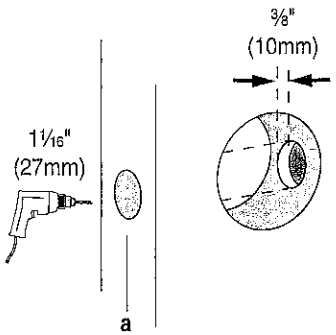
Instalación del cerrojo de seguridad

a. El pasador debe estar descorrido. Si es necesario, utilice un desarmador para girar la leva y descorrer el pasador.
b. Trace el contorno de la placa.
c. Cincele el área marcada para que la placa se asiente al ras de la puerta.
d. Asegure la placa con tornillos.

Install circular drive-in deadbolt

(optional as ordered)

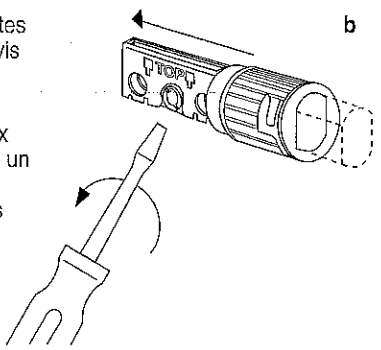
a. Drill a 1⅛" (27mm) hole in door edge. Drill ⅜" (10mm) deeper as shown.
b. Bolt must be retracted. If necessary, use screwdriver to turn cam and retract bolt.
c. Insert bolt as far as it will go (bolt sides must be vertical). Place wood block against retracted bolt and gently tap until flat against door edge.



Installez le pêne dormant circulaire

(optionnel en fonction de la commande)

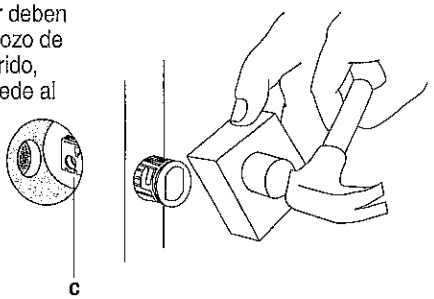
a. Forez un trou de 27 mm dans l'épaisseur de la porte. Forez 10 mm plus profond comme indiqué sur le schéma.
b. Rétractez le pêne. Si nécessaire, faites tourner la came à l'aide d'un tournevis pour rétracter le pêne.
c. Insérez le pêne dans le trou aussi profondément que possible (les deux côtés doivent être verticaux). Placez un bloc de bois sur le pêne en position rétractée et donnez des petits coups de marteau afin d'encastrer le pêne.



Instale el cerrojo circular de seguridad

(según el pedido del cliente)

a. Taladre un agujero de 27 mm en el borde de la puerta. Taladre 10 mm más de profundidad, según se ve en la ilustración.
b. El pasador debe estar descorrido. Si es necesario, utilice un desarmador para girar la leva y descorrer el pasador.
c. Inserte el pasador lo más que se pueda. (Ambos lados del pasador deben mantenerse verticales.) Con un trozo de madera contra el pasador descorrido, martillee levemente hasta que quede al ras con el borde de la puerta.



4

Prepare door jamb

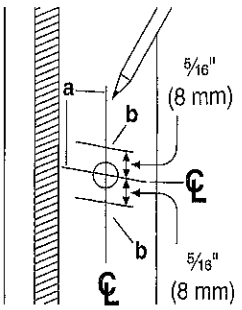
a. Locate exact centerline of bolt and mark centerline on jamb.

b. Mark drill points 5/16" (8 mm) above and below centerline.

c. Drill two overlapping 1" (25 mm) holes 1⅛" (29 mm) deep. Clean out hole for bolt.

d. Place strike box in hole. Place strike over strike box and use it as pattern for cutout.

e. Chisel ¼" (6mm) deep.



Préparez le jambage de la porte

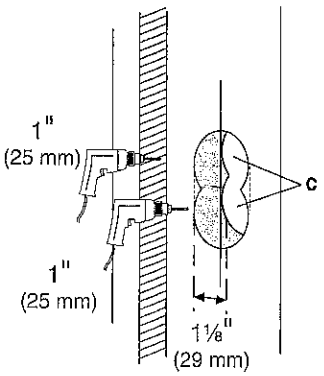
a. Trouvez la ligne verticale du pêne en marquant l'emplacement où le pêne vient frapper contre le jambage.

b. Tracez les points de forage 8 mm au-dessus et au-dessous de la ligne centrale (horizontale).

c. Percez deux trous de 25 mm de diamètre se chevauchant verticalement et de 29 mm de profondeur. Nettoyez le trou pour que le pêne puisse s'y loger facilement.

d. Insérez le boîtier de gâche dans le trou. Placez temporairement la gâche sur le boîtier et tracez le contour de la gâche pour buriner le jambage avant d'encastrer la gâche affleurante.

e. Burinez à une profondeur de 6 mm.



Prepare la jamba de la puerta

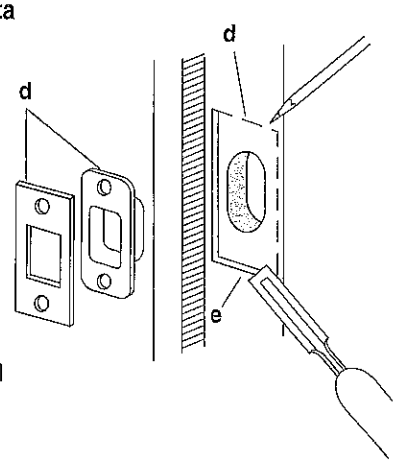
a. Ubique la línea central del pasador y marque la línea central en la jamba de la puerta.

b. Marque los puntos para taladrar 8 mm arriba y abajo de la línea central.

c. Taladre dos agujeros superpuestos de 25 mm a una profundidad de 29 mm. Limpie el agujero para colocar el pasador.

d. Coloque el recibidor dentro del agujero. Coloque la placa fija sobre el recibidor y utilícela como molde para marcar donde va a cincelar.

e. Cincele a una profundidad de 6 mm.



6

Install lock

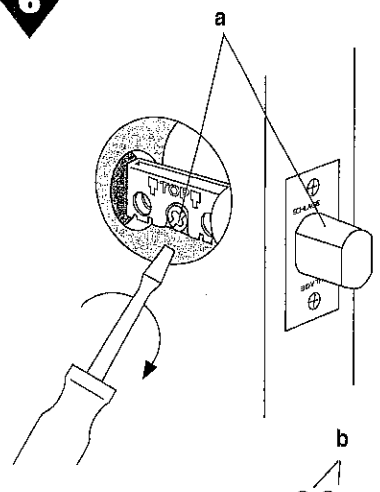
a. First extend bolt.

b. Place steel balls in screw holes as shown.

c. Place metal shield in hole. **Note:** Do not use metal shield in existing 1½" (38mm) hole installations.

d. Place cylinder and ring onto door with cylinder bar through slot in deadbolt cam.

e. Place inside mounting plate in position, insert mounting screws.



Installez le verrou

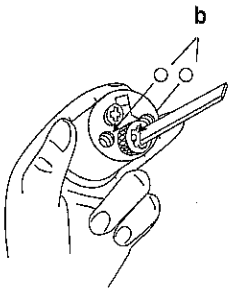
a. Mettez le pêne en position verrouillée.

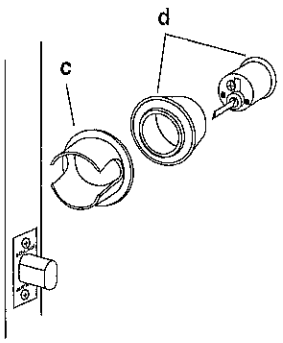
b. Insérez les billes en acier dans les trous des vis comme indiqué sur le schéma.

c. Placez la gaine de sécurité dans le trou. **Remarque:** S'il existe déjà un trou de 38 mm, ne pas utiliser la gaine de sécurité fournie.

d. Placez le cylindre et l'anneau de fourniture sur la porte, la barre du cylindre passant par la fente de la came du pêne dormant.

e. Mettez la plaque support intérieure en place et vissez les vis de montage.





Instale la cerradura

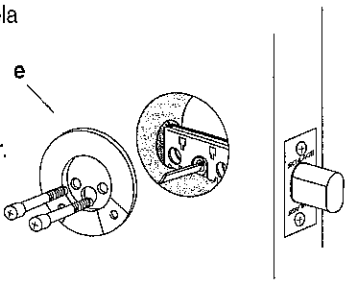
a. Primero descorra el pasador.

b. Coloque los balines en los agujeros de los tornillos según la ilustración.

c. Coloque la rodela metálica en el agujero. **Nota:** Si utiliza un agujero previamente taladrado de 38 mm, no haga uso de la rodela metálica incluida.

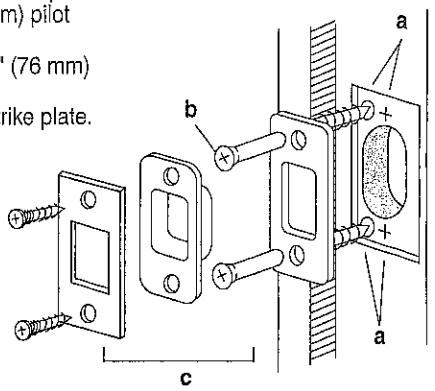
d. Coloque el cilindro y el aro de guarnición uniéndolos a la puerta con la barra del cilindro insertada en la ranura de la leva del pasador.

e. Coloque dentro de la placa de montaje en su posición y apriete los tornillos de montaje.



Install strike assembly

a. Place reinforcer in cutout with screw holes toward door stop. Mark and drill 3/16" (5 mm) pilot holes.
b. Install reinforcer with 3" (76 mm) wood screws.
c. Install strike box and strike plate.



Installez les pièces de la gâche

a. Placez la plaque de renfort dans la partie creusée, les trous de vis orientés vers le chambranle de la porte. Tracez et forez des trous pilotes de 5 mm.
b. Installez la plaque de renfort avec des vis à bois de 76 mm.
c. Mettez le boîtier de la gâche et la gâche affleurante en place.

Instale el conjunto de piezas del recibidor

a. Coloque el reforzador en el área cincelada con los agujeros de los tornillos hacia el tope de la puerta. Marque y taladre los agujeros piloto de 5 mm.
b. Instale el reforzador con tornillos para madera de 76 mm.
c. Instale el recibidor y la placa fija.

Install thumbturn

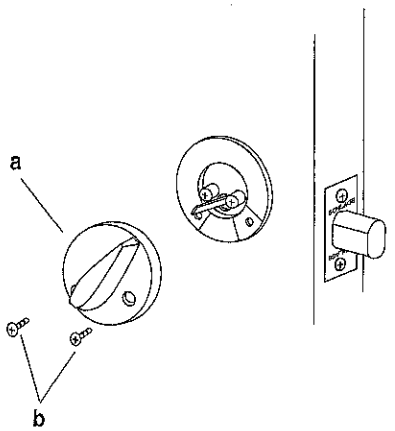
a. Engage thumbturn with cylinder bar as shown.
b. Fasten mounting plate with screws. Test operation of lock with keys and thumbturn.

Installez le tourniquet

a. Insérez le tourniquet sur la barre du cylindre comme indiqué sur le schéma.
b. Fixez la rosette à l'aide des vis. Vérifiez le bon fonctionnement de la serrure à l'aide de la clé et du verrou poucier.

Instale del perno mariposa

a. Enganche el perno mariposa con la barra del cilindro según se ve en la ilustración.
b. Apriete la roseta con tornillos. Ensaye el funcionamiento de la cerradura con las llaves y el perno mariposa.



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FALCON®

Instrucciones de instalación

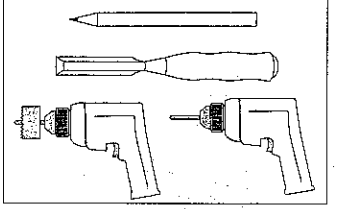
Installation Instructions
W-Series with Levers

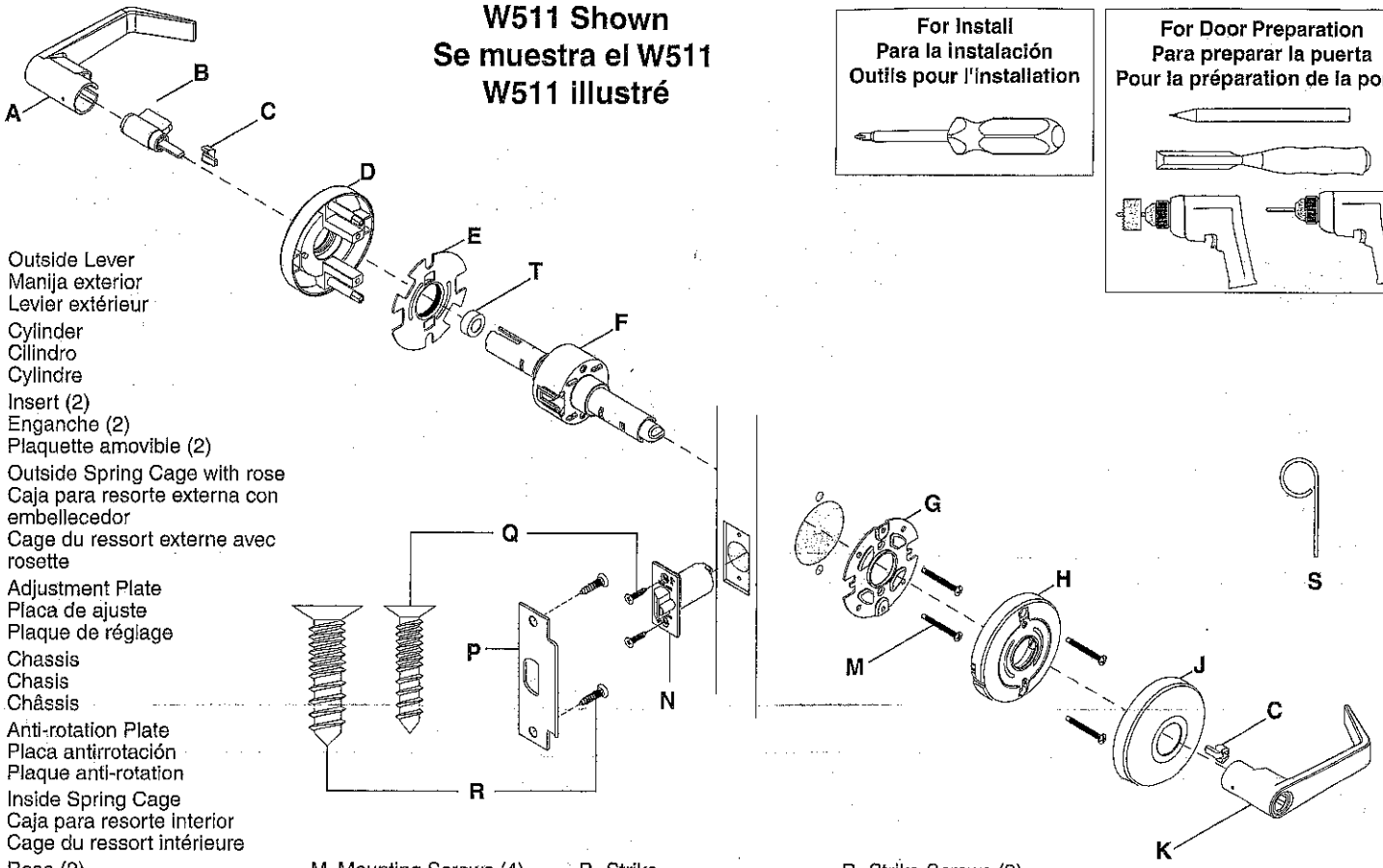
Notice d'installation

W511 Shown
Se muestra el W511
W511 illustré

For Install
Para la instalación
Outils pour l'installation

For Door Preparation
Para preparar la puerta
Pour la préparation de la porte





A. Outside Lever
Manija exterior
Levier extérieur

B. Cylinder
Cilindro
Cylindre

C. Insert (2)
Enganche (2)
Plaquette amovible (2)

D. Outside Spring Cage with rose
Caja para resorte externa con embellecedor
Cage du ressort externe avec rosette

E. Adjustment Plate
Placa de ajuste
Plaque de réglage

F. Chassis
Chasis
Châssis

G. Anti-rotation Plate
Placa antirrotación
Plaque anti-rotation

H. Inside Spring Cage
Caja para resorte interior
Cage du ressort intérieure

J. Rose (2)
Embellecedor (2)
Rosette (2)

K. Inside Lever
Manija interior
Levier intérieur

M. Mounting Screws (4)
Tornillos de montaje (4)
Vis de montage (4)

N. Latch
Pestillo
Verrou

P. Strike
Placa hembra
Gâche

Q. Latch Screws (2)
Tornillos del pestillo (2)
Vis du verrou (2)

R. Strike Screws (2)
Tornillos de la placa hembra (2)
Vis de la gâche (2)

S. Pin Wrench
Llave para pasador
Clé à ergot

T. Cup
Taza
Tasse

Instale la cerradura — Install Lock — Installer le serrure

1 Use Template to Check Door Holes

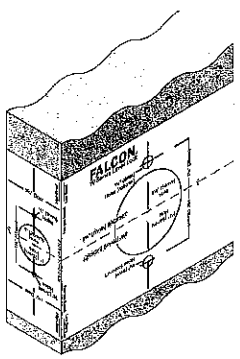
Note: If door holes do not match template, see DOOR PREP section

Use la plantilla para verificar los agujeros de la puerta

Nota: Si los agujeros de la puerta no coinciden con la plantilla, consulte la sección PREP DE LA PUERTA

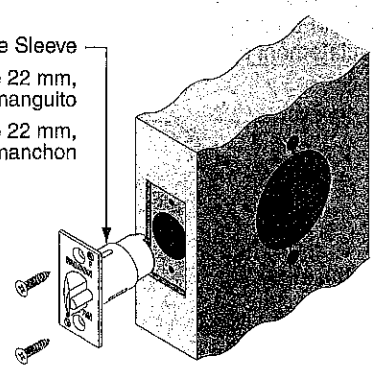
Utiliser le gabarit pour vérifier les trous de porte

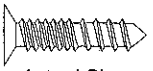
Note: Si les trous de porte ne correspondent pas au gabarit, voir la section PRÉPARATION DE LA PORTE



2 Install Latch
Instale el pestillo
Installer le verrou

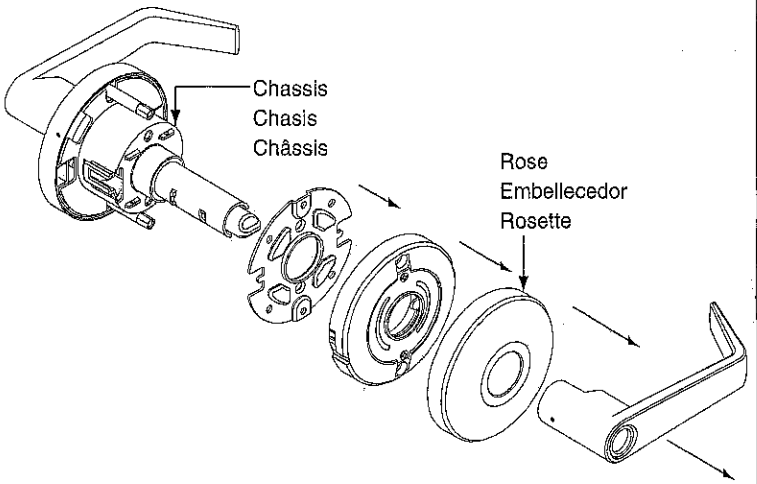
For 7/8" (22 mm) Hole, Remove Sleeve
Para un agujero de 22 mm, retire el manguito
Pour un trou de 22 mm, retirer le manchon





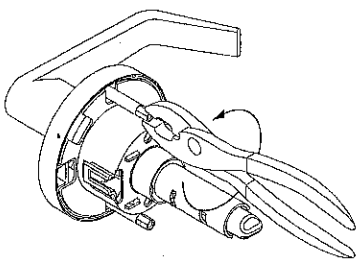
Actual Size
Tamaño real
Taille réelle

3 Remove Assembly from Box
Retire el conjunto desde la caja
Retirer l'ensemble de la boîte

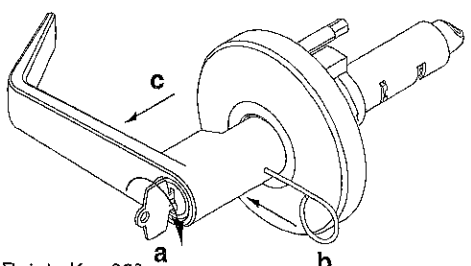


4 If Needed, Mounting Posts Can Be Removed
Si necesario, los postes de montaje pueden retirarse
Si nécessaire, les poteaux de montage peuvent être retirés

For maximum performance, use mounting posts
Para obtener un resultado óptimo, utilice postes de montaje
Pour de meilleurs résultats, utiliser les poteaux de montage



5 If Needed, Remove Outside Lever
Si necesario, retire la manija exterior
Si nécessaire, retirer le levier extérieur



Rotate Key 90°
Girar la llave 90°
Tourner la clé à 90°

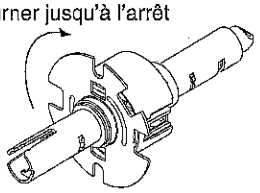
6 If Needed, Adjust Chassis
Chassis is factory set for 1¾" (44 mm) door

Si necesario, ajuste el chasis
El chasis está fijado en fábrica para una puerta de 44 mm

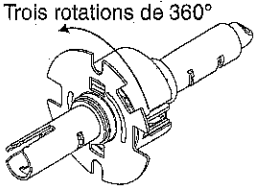
Si nécessaire, régler le châssis
Le châssis est réglé en usine pour une porte de 44 mm

For 1⅜" (35 mm) thick door
Para una puerta de 35 mm de espesor
Pour une porte de 35 mm d'épaisseur

a
Rotate until stops
Gire hasta que se detenga
Tourner jusqu'à l'arrêt



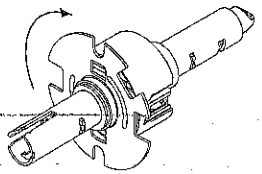
b
Three 360° rotations
Tres giros de 360°
Trois rotations de 360°



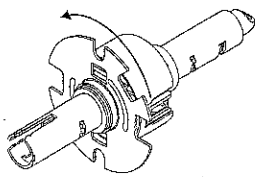
OR O OU

For 1¾" (44 mm) thick door
Para una puerta de 44 mm de espesor
Pour une porte de 44 mm d'épaisseur

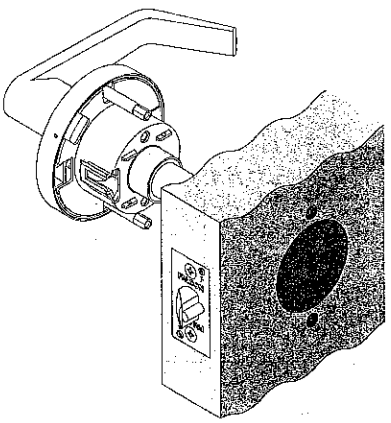
a
Rotate until stops
Gire hasta que se detenga
Tourner jusqu'à l'arrêt

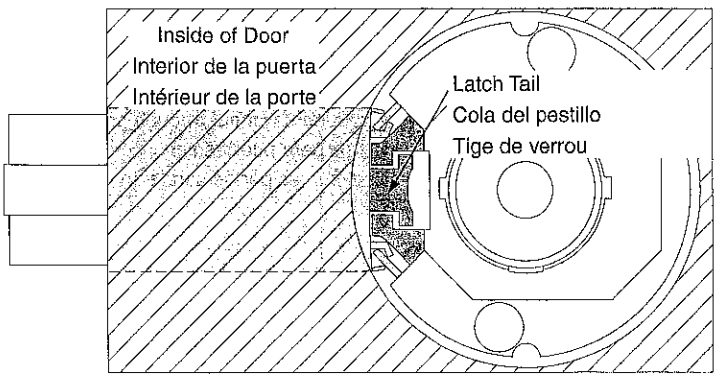


b
Nine 360° rotations
Nueve giros de 360°
Neuf rotations de 360°



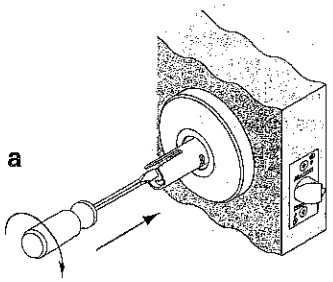
7 Install Outside Chassis Assembly
Instale el conjunto del chasis exterior
Installer le châssis extérieur



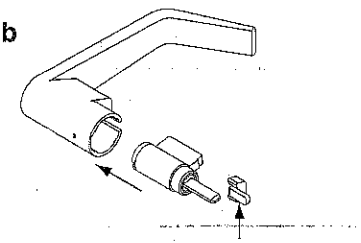


8 If Needed, Install Cylinder and Outside Lever
Si necesario, instale el cilindro y la manija exterior
Si nécessaire, installer le cylindre et le levier extérieur

For W561 Only
Para W561 solamente
Pour W561 seulement

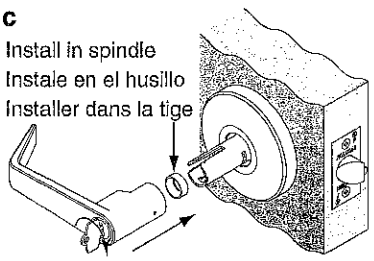


Rotate cam until it stops
Gire la leva hasta que se detenga
Tourner la came jusqu'à l'arrêt



Must be installed
Se debe instalar
Doit être installé

c
Install in spindle
Instale en el husillo
Installer dans la tige

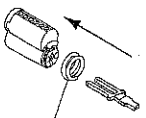


Rotate key 90°
Gire la llave 90°
Tourner la clé à 90°

OR O OU

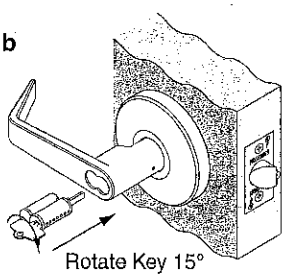
SFIC

a



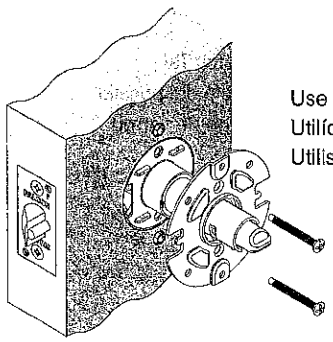
For 6-Pin Cylinder Only
Solamente para el cilindro de 6 pasadores
Pour cylindre à six goupilles seulement

b



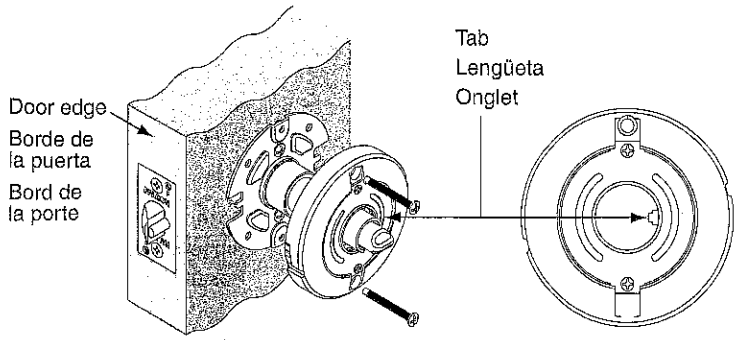
Rotate Key 15°
Gire la llave 15°
Tourner la clé à 15°

9 Install Anti-Rotation Plate
Instale la placa antirrotación
Installer la plaque anti-rotation

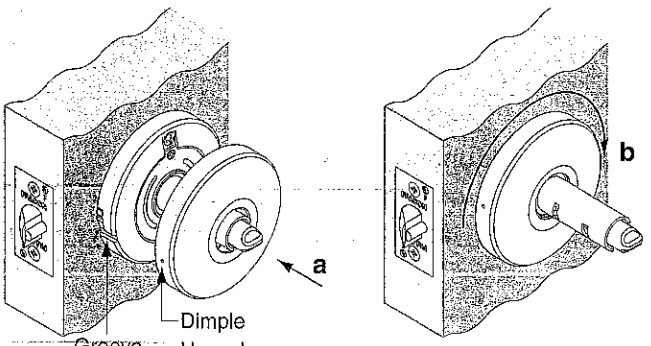


Use for doors without through holes
Utilícese para puertas sin orificios pasantes
Utiliser sur les portes sans trous traversants

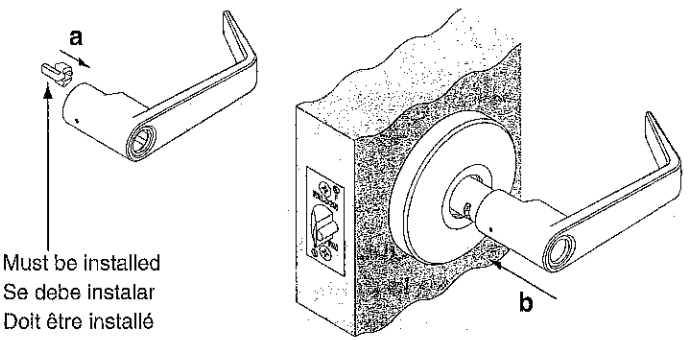
10 Install Inside Spring Cage
Instale caja para resorte interior
Installer la cage du ressort intérieur



11 Install Inside Rose
Instale el embellecedor interior
Installer la rosette intérieur

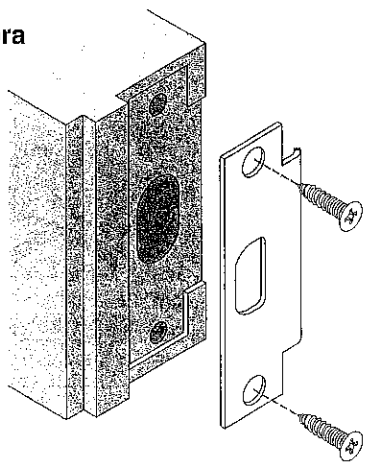


12 Install Inside Lever
Instale la manija interior
Installer le levier intérieur

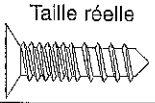


Must be installed
Se debe instalar
Doit être installé

13 Install Strike
Instale la placa hembra
Installer la gâche

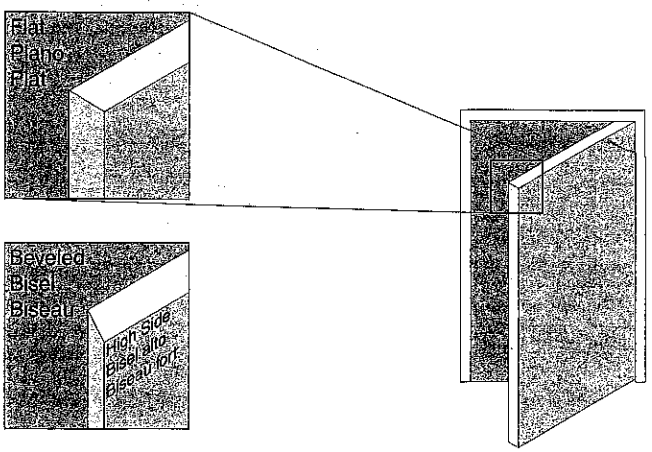


Actual Size
Tamaño real
Taille réelle

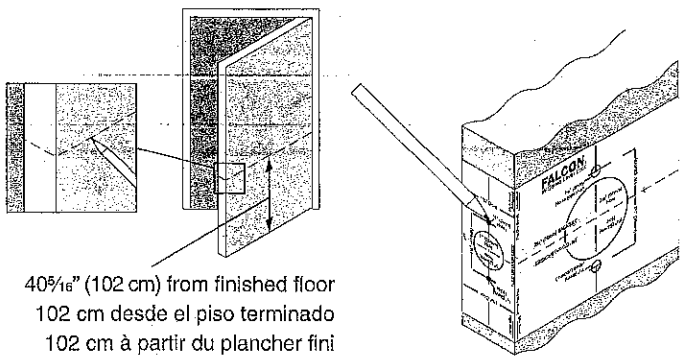


Preparación de la puerta | Door Preparation | Préparation de la porte

A Determine Bevel
Determine el bisel
Définir le biseau



B Mark Centerline and Points for Drilling
Marque la línea central y los puntos para taladrar
Marquer la ligne centrale et les points pour forer

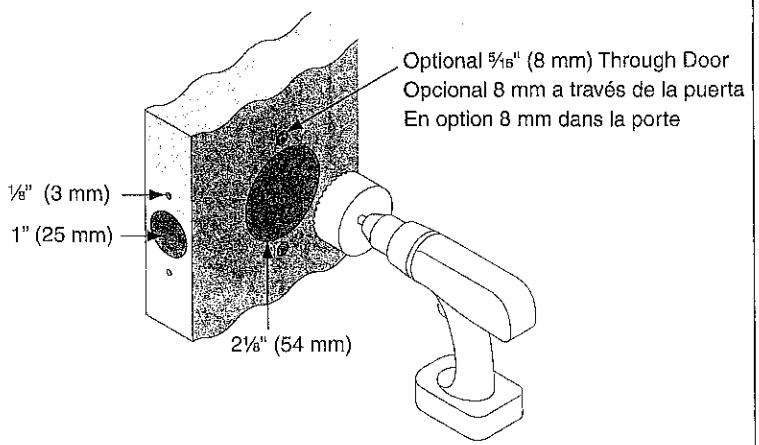


40 5/16" (102 cm) from finished floor
102 cm desde el piso terminado
102 cm à partir du plancher fini

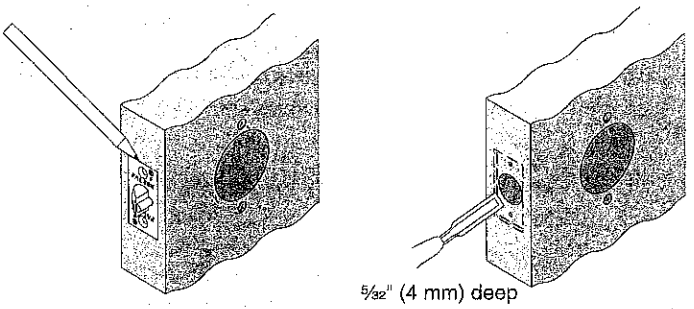
C Drill Holes
NOTE: Drill from both sides to avoid splintering

Taladre los agujeros
NOTA: Taladre desde ambos lados para evitar la formación de astillas

Forer les trous
Note: Forer à partir des deux côtés pour éviter l'éclatement du bois



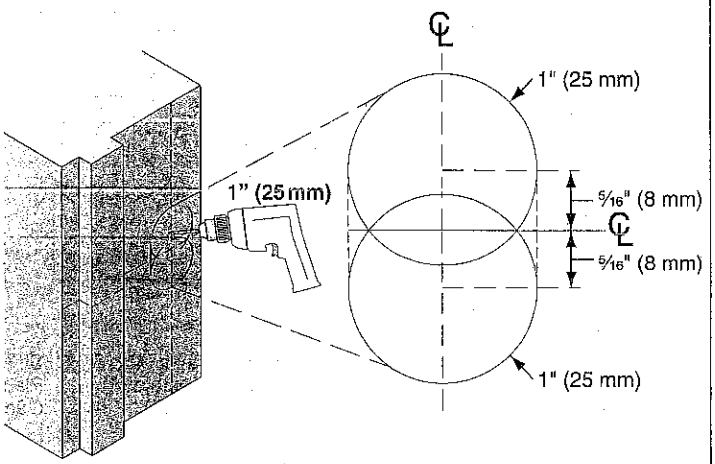
D Mortise Cutout for Latch
Mortaje para el pestillo
Mortaiser pour le verrou



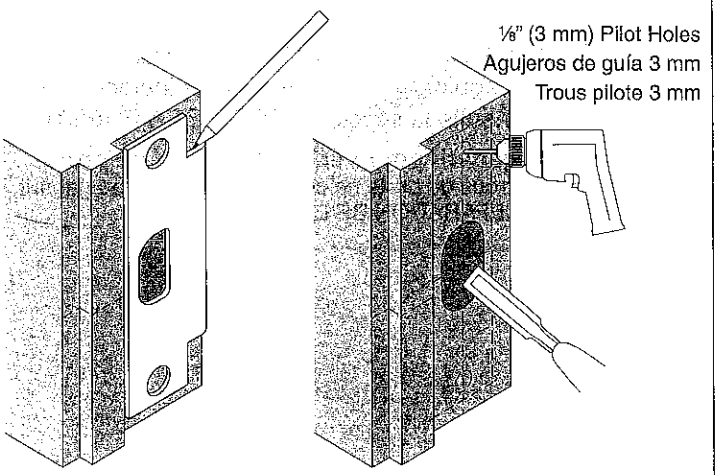
Faceplate
Placa delantera
Têtière

5/32" (4 mm) deep
4 mm de profundidad
4 mm de profondeur

E Drill Holes for Strike
Taladre los agujeros para la placa hembra
Forer les trous pour la gâche



F Mortise for Strike
Mortaje para la placa hembra
Mortaiser pour la gâche



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03

MACCAFERRI

PRODUCT INSTALLATION GU

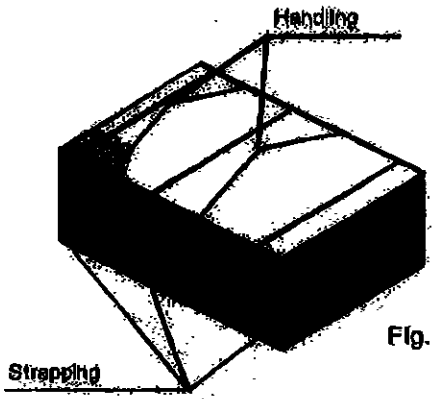

Fig. 1

Maccaferri gabions are delivered to the job site in bundles. They are compressed and strapped in the factory for easier shipping and handling.

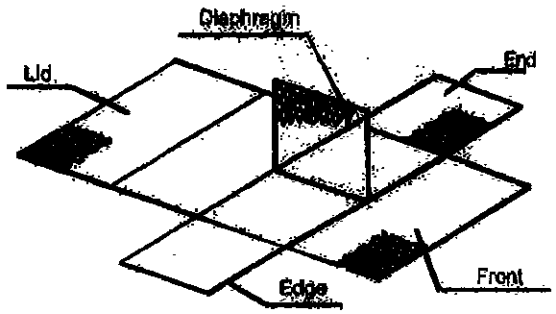

Fig. 2

1. Open and unfold the gabions one by one on a flat, hard surface. Eliminate all folds due to the packaging.

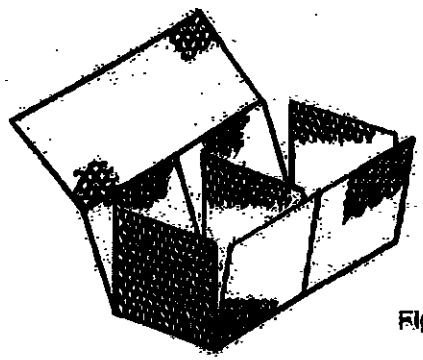

Fig. 3

2. Pull up the sides and the diaphragms to form an open box. Be sure the top of face and side panels are at the same level.

3. Fold by hand the end of the reinforcing wire of the main unit and the diaphragms allowing the gabion to stand by itself.

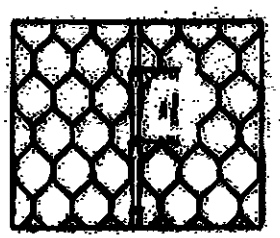

Fig. 4

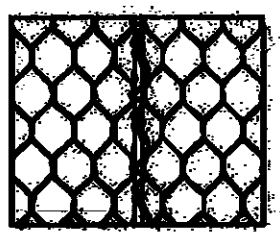

Fig. 5

Fig. 6

The fasteners have a diameter of 50 mm open and 20 mm closed.

4. Edges are joined together, using the appropriate lacing techniques.

MANUAL: continuous wire looped tightly around every other mesh opening, alternating single and double loops (Fig. 5). Galvanized lacing wire is used for galvanized gabions and PVC coated lacing wire is used for PVC coated gabions.

MECHANICAL: using a pneumatic or hand power tool and "C" shaped fasteners (galvanized fasteners for galvanized gabions and stainless steel fasteners for PVC gabions). For continuity and strength, the recommended spacing is every mesh opening, and not to exceed 150mm (Fig. 4).

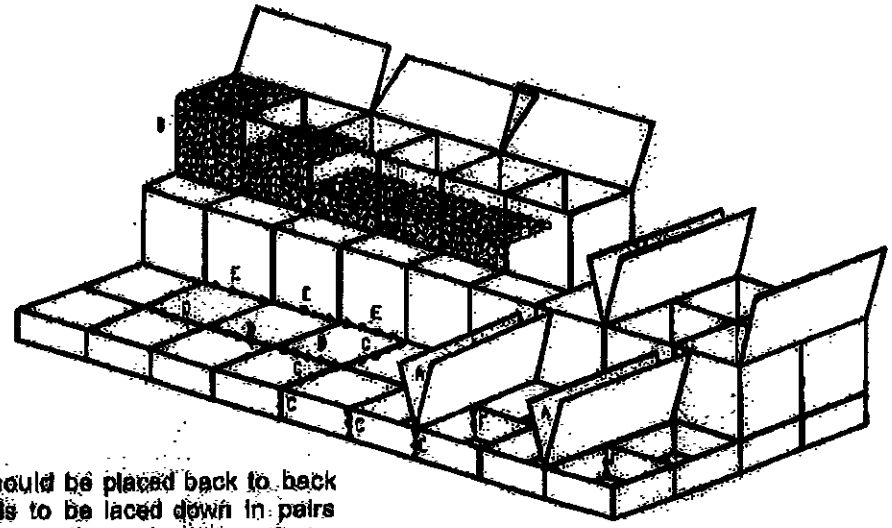

Fig. 7

A – Units should be placed back to back to enable lids to be laced down in pairs and also to facilitate dumping of the stone.
B – Unit after fill-up
C – Lacing together of the units.
D – Lacing the lids to the diaphragms.
E – Lacing the upper gabion to the lower gabion.
F – Lacing the diaphragms together.

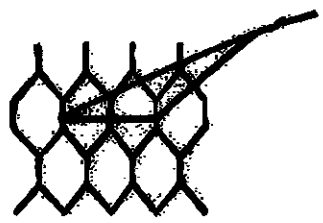

Fig. 10

The connecting wire must grip at least two mesh openings.

5. Installing a few gabions empty at the proper location, we place them side by side and back to back. Lace them together tightly at the contact edges. The rows above and below should be laced together at the edges. It is suggested to stretch the gabions in the row, prior to filling.

6. Fill the gabions while stretched during the entire operation.

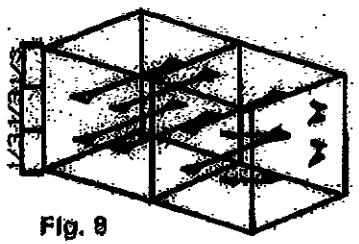

Fig. 8

Fig. 9

At the extremities, extra connecting wire should be installed at 45 degrees to the adjacent faces.

7. The connecting wires are placed at the 1/3 and 2/3 levels for the gabions 1.00m high and half-height for the gabions 0.50m high.

8. Lace the lids two by two, attaching the edges to the gabion's selvedge wire. A crow bar or a steel bar can be used to facilitate lid closure.

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TECHNICAL DATA SHEET

Rev: 02 Issue Date 09.07.2008

SI

GABIONS
GALVANIZED

Gabions are baskets made of 8x10 double twisted steel woven wire mesh, as per ASTM A975-97 (Figs. 1, 2). Gabions are filled with stones at the project site to form flexible, permeable, monolithic structures such as retaining walls, channel linings, and weirs for erosion control projects.
The steel wire used in the manufacture of the gabion is heavily zinc coated soft temper steel. The standard specifications of mesh-wire are shown in Table 2.
The gabion is divided into cells by means of diaphragms positioned at approximately 1 m centers (Fig.1). In order to reinforce the structure, all mesh panel edges are selvedged with a wire having a greater diameter (Table 3). Dimensions and sizes of galvanized gabions are shown in Table 1.

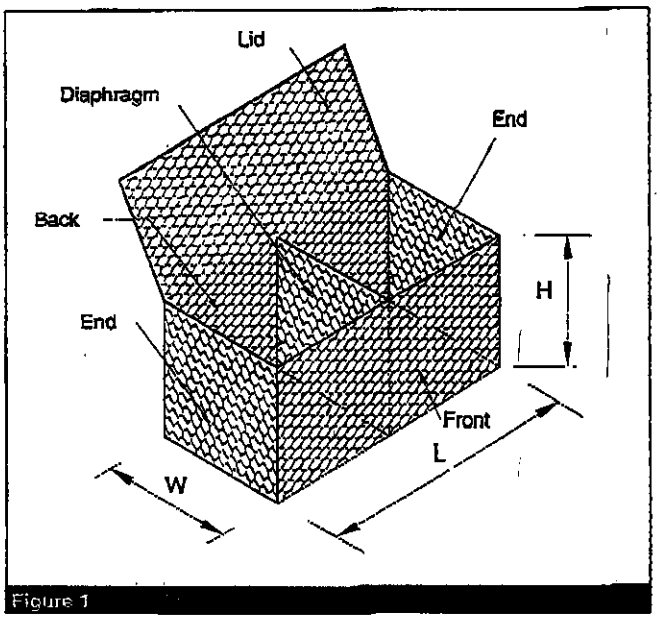


Figure 1

Wire

All tests on wire must be performed prior to manufacturing the mesh. All wire should comply with ASTM A975-97, style 3 coating and galvanized. Wire used for the manufacture of Gabions and the lacing wire, shall have a maximum tensile strength of 515 MPa as per ASTM A641-03, soft temper steel.

Woven Wire Mesh Type 8x10

The mesh and wire characteristics shall be in accordance with ASTM A975-97 Table 1, Mesh type 8x10. The nominal mesh opening D = 83 mm as per Fig. 2.

The minimum mesh properties for strength and flexibility should be in accordance with the following:

- *Mesh Tensile Strength* shall be 51.1 kN/m minimum when tested in accordance with ASTM A975 section 13.1.1
- *Punch Test* resistance shall be a minimum of 26.7 kN when tested in compliance with ASTM A975 section 13.1.4 .
- *Connection to Selvedges* should be 17.5 kN/m when tested in accordance with ASTM A975.

The tolerance on the opening of mesh 'D' being the distance between the axis of two consecutive twists, is according to ASTM A975-97

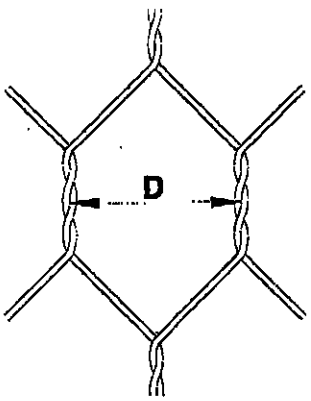


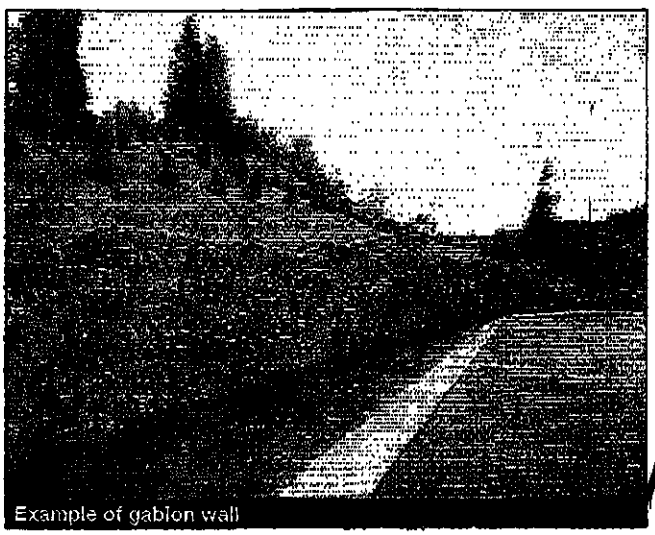
Figure 2

Lacing Operations

Lacing operations are made by using lacing wire specified in Table 3 and described in Fig. 3. Galvanized steel ring fasteners can be used instead of lacing wire (Fig. 4 and Fig. 5).

Galvanized steel rings for galvanized gabions shall be in accordance with ASTM A975 section 6.3.

Spacing of the rings shall be in accordance with ASTM A975 Table 2, Panel to Panel connection, Pull-Apart Resistance. In any case, ring fasteners spacing shall not exceed 150 mm (Fig. 3).


Example of gabion wall

1. Table of sizes for gabions

L=Length m (ft)	W=Width m (ft)	H=Height m (ft)	# of cells
2	1	1	2
3	1	1	3
4	1	1	4
2	1	0.5	2
3	1	0.5	3
4	1	0.5	4
2	1	0.3	2
3	1	0.3	3
4	1	0.3	4

All sizes and dimensions are nominal.
Tolerances of ± 5% of the width, height, and length of the gabions shall be permitted.

Assembly and installation

Lacing operations can be made by using lacing wire or stainless steel fasteners. With stainless steel fasteners, the ring can be placed using automatic or manual tools (Fig. 5.). The maximum spacing of the fasteners is determine by ASTM A975 Table 2, Pull Apart Resistance test. For full details please see the Gabion Product Installation Guide.

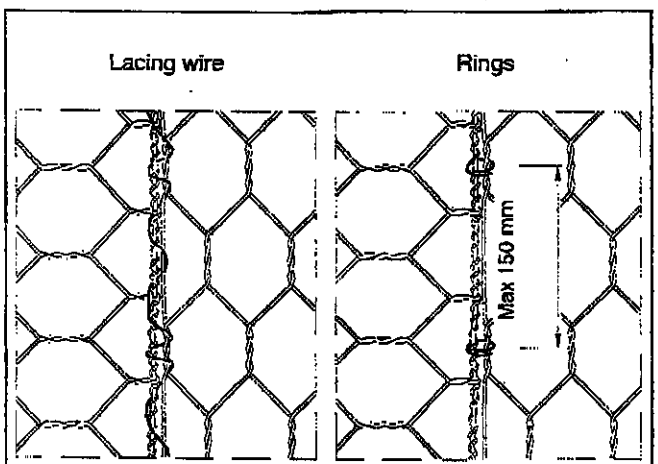


Figure 3

2. Standard Mesh-Wire

Type	D mm	Tolerance	Wire Diam.
8x10/ ZN	83	±10%	3.05

3. Standard wire diameters

		Lacing Wire	Mesh Wire	Selvedge Wire
Mesh Diameter	ø mm	2.20	3.05	3.90
Wire Tolerance	(±) ø mm	0.10	0.10	0.10
Minimum Quantity/Zinc	g/m²	214	259	275

Quantity Request
When requesting a quotation, please specify:

- No. of units,
- size of units (length x width x height, see Fig.1),
- type of mesh,
- type of coating.

EXAMPLE: No. 100 gabions 2x1x1m - Mesh type 8x10 - Wire diam. 3.05 mm - galvanized.

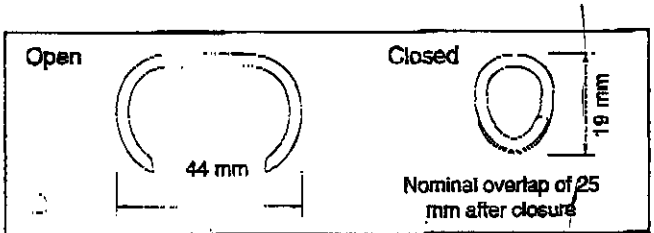
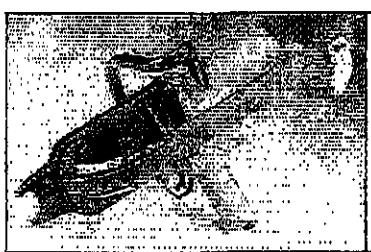


Figure 4



A Pneumatic Spenax tool

Figure 5

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