PROCESS VALVES

1. GENERAL

1.1 Description

.1 This Section specifies the supply, installation and testing of process valves used for isolation, throttling, and bypass.

1.2 Definitions

.1 Valve Identification: Valves are identified in the drawings by valve symbols. Refer to the Drawings for lists of valve symbols and labels.

.2 Detailed Valve Specification Sheets:

.1 Detailed valve specification sheets are provided in Section 15105 for each type of valve which is:

1 Identified in the drawings with a valve symbol and/or,

2 Described in Part 2 of this specification section.

.2 Where there is a conflict between valves described in this Section and other valves described in Division 15 and Division 17, conform to the most stringent requirements.

.3 Instrument Data Sheets for Modulating Control Valves

.1 Division 17 specifies and takes responsibility for the supply and installation of electric control valves, complete with valve body, actuator, position indicator, and other ancillaries. Valve bodies for these products will comply with the requirements as specified this Section.

.4 Abbreviations used in Detailed Valve Specification Sheets:

BV - Ball Valve
BF - Butterfly Valve
CV - Check Valve
FCV - Flow Control Valve
GL - Globe Valve
PRV - Pressure Relief Valve

1.3 Submittals for Review

.1 Shop Drawings: Submit the following information in accordance with Division 01:

.1 Catalog cuts and/or shop drawings for each type of valve indicating the valve number, materials of construction, dimensions, head loss characteristics through the valve, operating torque and valve end configuration.

.2 An amended Detailed Valve Specification Sheet for all valves. Indicate with check marks where the valve supplied meets the requirements specified and with written amendments where the product differs from the specification.

.3 Operating and Maintenance data for incorporation in operation and maintenance manual, as specified in Division 01. Include complete description of operation together with detailed drawings, a complete list of replacement and repair parts, and parts manufacturer's identifying numbers.

1.4 Shipment, Protection and Storage

.1 Deliver valves to Work Site in accordance with manufacturer's specifications, and using loading methods which do not damage casings or coatings.

.2 Valves will be clearly tagged, stating size, type, coatings and mating parts.

.3 Store on-site until ready for incorporation in the work using methods recommended by the manufacturer to prevent damage, undue stresses, or weathering.

2. PRODUCTS

2.1 General

.1 Provide valves of the same type, size range and service from a single manufacturer.

.2 Provide new, unused valves for the work.

.3 Valve materials to be free from defects or flaws, with true alignment and bores.

.4 Unless otherwise indicated on the Process and Instrumentation drawings or specified in Division 17, valves shall be the same size as the pipe run in which they are to be installed.

.5 Clearly mark valve bodies in raised lettering to indicate the valve type, rating, and where applicable, the direction of flow. Conform to MSS SP25.

.6 Provide padlockable lockout feature on all sizes of the following valve types:

.1 Automated Control Valves (electric); FCV only. Refer to the Section 15105 for abbreviation definitions.

.2 Manual Isolation and Shut-off Valves; BF, BV, and GV only. Refer to Section 15105 for abbreviation definitions.

.7 Specific requirements for the materials, ratings and service conditions for each valve are listed in Section 15105.

.8 Valves to open counter-clockwise.

2.2 Drawings

.1 The process and instrumentation drawings (P&ID's) indicate major process valves required for the process to operate as intended.

.2 The detailed process drawings and process standard drawings indicate the valves on the process schematics plus other valves required for isolation.

.3 Provide drain, air vent, and flushing connections in accordance with Section 15056.

2.3 Valve Ends

.1 In pipe runs less than 75mm diameter provide valves with female threaded ends, unless indicated otherwise. Threads to conform to ANSI B1.20.1.

.2 Valves in pipe runs equal to or greater than 75mm diameter to be flanged unless indicated otherwise.

.3 For cast iron body valves, drill flanges to Class 125 pattern conforming to ANSI B16.1. For steel body valves, flanges to be Class 150 pattern or Class 300 pattern conforming to ANSI B16.5 or as noted in Section 15105.

.4 Do not use grooved joint valve ends.

.5 Use flanged joints for buried and exterior valves. The flanges are to be compatible with the pipe and jointing technique used.

.6 Use flanged joints for buried butterfly valves.

.7 Lug style wafer body valves shall have tapped holes, suitable for the bolt spacing of the pipe flanges placed on either side.

.8 Wafer body valves shall not be used.

.9 Use wafer body butterfly valves only for control applications, and only if other valve(s) are provided for blocking and isolation. Use lug style or flanged wafer body butterfly valves if the function is blocking and isolation, including control valves where separate block and isolation valves are not provided.

.10 For gate valves, end flanges shall be integral with the gate valve body and be faced and drilled in accordance with ANSI B16.1, Class 125 flanges.

2.4 Manual Operators

.1 Provide valves with manual operators unless specifically indicated otherwise on the process schematic drawings, Detailed Valve Specification sheets, or the Instrumentation Specification sheets.

.2 For hand wheels, clearly show the direction of opening in raised lettering and symbols.

.3 Hand wheel diameter to conform to the following:

Nominal Valve Diameter (mm)	Minimum Hand Wheel Diameter (mm)
12	50
20	50
25	60
38	75
50	85
65	105
75	200
100	250
150	300
200	350
250	400
300	450
350	450
400	550
450	600
500	600
600	600

.4 The maximum rim pull on a hand wheel not to exceed 300 N when one side of the valve is at test pressure and the other side is at atmospheric pressure. Where a shaft mounted hand wheel would require greater than this force to operate, provide a gear operator. Unless different operators are scheduled or shown in the drawings, conform to the following minimum requirements:

1 Globe Valves: less than 200 mm, hand wheel; equal to or greater than 200 mm. gear operator.

.5 Lever operators to conform to the following dimensions:

Nominal Valve Diameter (mm)	Minimum Length of Lever (mm)
6	80
12	80
20	100
38	150
50	150
65	150
75	175
100	225
150	250
200	300
250	450
300	450

.6 Quarter turn lever operators to be perpendicular to the pipe run when the valve is closed.

.7 Lever operators on ball valves to be two position. Provide butterfly valves with 10 position latching levers except where used to balance air flows. Where used to balance air flows provide infinite position, screw down levers.

.8 The maximum pull at the end of the lever arm not to exceed 300 N when one side of the valve is at test pressure and one side is at atmospheric pressure. Where greater than this force would be required to operate the valve with a lever, provide a gear operator. Unless different operators are scheduled or shown in the drawings, conform to the following minimum requirements:

.1 Ball Valves: less than 150 mm, lever operator; greater than or equal to 150 mm, gear operator.

.2 Butterfly Valves: less than 250 mm, lever operator; greater than or equal to 250 mm, gear operator.

.9 Gear operator to be worm gear type, equipped with a hand wheel and a visual indicator of the valve position. Equip operators with adjustable mechanical stop-limiting devices to prevent overtravel of the disc/ball in the open and closed positions and which are self-locking and designed to hold the valve in any intermediate position between full open and full closed. Gear operators shall be grease lubricated. Where gear operators are intended for direct bury or submergence, seal units with long life lubricant.

.10 For manual valves on lines 75 mm and greater, mounted over 2.0 m above the operating floor, provide chain wheel gear operators. Design the operator so that a force of 150 N is sufficient to open the valve when one side of the valve is at test pressure and the other side is at atmospheric pressure. The chain pulley to mesh positively with the chain. Extend the chain from the valve operator to operating height 1.2 m above the floor or as directed by the Owner or Engineer. The exact dimensions shall be field determined. Provide approved chain hooks where required to prevent chain from hanging within traffic paths.

2.5 Valve Stem Extensions

.1 Provide valve stem extensions where additional clearance is required for pipe insulation, where valve operation without the extension is difficult, and in wetwell.

.2 Where angle valve stem extensions are employed, they shall be angle geared. Universal joint types are not permitted.

2.6 Protective Coatings

.1 Unless otherwise specified, provide valves coated in accordance with Division 09.

2.7 Spare Parts

.1 Provide one spare valve including the appropriate operator for each valve type and size.

.2 Provide a list of all spare parts which would be expected to be required under normal conditions for a period of five years. At the Engineer's request, provide a price for these parts.

3. EXECUTION

3.1 Preparation

.1 The valve and piping arrangement indicated in the drawings is based on typical dimensions for valves of the specified type. Make the necessary modifications in the piping to allow for discrepancies between the valve dimensions shown and those supplied for the work.

.2 Prior to the installation of the valves, field measure and check all equipment locations, pipe alignments, and structural installation. Ensure that the valve location and orientation provides suitable access to manual operators and that sufficient space and accessibility is available for electric actuators.

.3 Where conflicts are identified, inform the Engineer and initiate the necessary piping modifications at no cost to the Owner.

3.2 Valve Installation

.1 Install valves in conjunction with the piping described in Sections 15050 and with control valves and their appurtenances described in Division 17.

.2 In horizontal pipe runs other than in locations where space does not permit, mount all valves except for butterfly valves with the actuator at the top. In no case install a valve with the operator shaft pointing down.

.3 Mount butterfly valves with the shaft in a horizontal orientation.

.4 When joining valves to pipe or fittings, do not over torque bolts to correct for misalignment.

.5 Permanently support valves to reduce transmission of loads to adjacent pipework and/or equipment.

.6 Generally pipe supports and hangers are not shown unless for indication purposes only.

.7 Install valves which are bubble tight in one direction to seal in a direction opposite to normal flow unless otherwise noted or directed by the Engineer.

.8 Unless otherwise specified, install single seated ball valves with the seat downstream. Install at tank connections with seat away from tank. Install on pump discharge and suction lines with seat adjacent to the pump.

.9 Install all valves in accordance with the manufacturer's recommendations.

3.3 Valve Testing

.1 Operate valves under simulated and/or real process conditions to ensure they operate as intended.

.2 Pressure test the valves in conjunction with the pipes in which the valves are installed as specified in Section 15050.

END OF SECTION

DETAILED PROCESS VALVE SPECIFICATION SHEETS

1. GENERAL

1.1 Description

.1 The following pages provide a summary of the valve body materials, valve performances and reference specifications for use in the Work and should be read in conjunction with Sections 15050, 15055 and 15100. Furnish all valves in accordance with the requirements of this section and those requirements of Sections 15050, 15055, and 15100. Where there is a conflict, conform to the most stringent requirements.

.2 The table in 1.2.1 below provides a list of the valve abbreviations and the corresponding full valve type names referenced in the following Detailed Valve Specification Sheets. Provide the valve type as indicated in the drawings by the valve symbol shown. See the valve tables within the detailed pipe specification sheets (Section 15055) for guidance to specific valve types suitable for a given commodity and line size. See the Detailed Valve Specification Sheets for information on the valves.

.3 Valves identified in the drawings with an equipment identification symbol or instrument identification symbol are specified in Section 15100 and Division 17, respectively. Detailed Valve Specification Sheets referenced by other sections are independent of the table below.

.4 Named Acceptable Products are shown to define basic materials and performance criteria required for each valve type. Modify valves as specified to meet the service requirements of the system and detailed specifications.

1.2 Definitions

.1 Abbreviations used in Detailed Valve Specification Sheets:

BF	- Butterfly Valve
BV	- Ball Valve
CV	- Check Valve
GL	- Globe Valve
PRV	- Pressure Relief / Sustaining Valve

2. PRODUCTS

.1 Detailed Valve Specification Sheets follow.

3. EXECUTION – NOT USED

DETAILED PROCESS VALVE SPECIFICATION SHEETS

BV01

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	OPERATING LIMITS		DESIGN LIMITS	
			PRESSURE (kPag)	TEMP. (°C)	PRESSURE (kPag)	TEMP. (°C)
Ball Valve	**BV01**	Liquid/Air	1000	0.5-120	1500	120

TYPICAL SERVICE
On/Off valve for Liquid / Air.

VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIAL	Reference Document	Note 2
Body	Bronze or Forged Brass	Size Range	10 mm to 65 mm
Ball	Bronze or Chrome plated brass - floating	Rating	Class 125
Seats	PTFE	Body/Valve Ends	Female Threaded (Note 3)
Shaft	Bronze or Stainless Steel (Note 1)	Pattern	Compact, Regular Port
		Operator	Lever
		Lining	
		Coating	

NOTES

1. Blowout-proof stem.
2. Gas service valves to comply with CGA requirements
3. Provide threaded end cap and chain when used for drain service.

ACCEPTABLE PRODUCTS			
Newman Hattersley Fig. 1969	Crane CSC9202	Nibco 560/580	Watts B6100/B6000

DETAILED PROCESS VALVE SPECIFICATION SHEETS

BF

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	OPERATING LIMITS		DESIGN LIMITS	
			PRESSURE (kPag)	TEMP. (°C)	PRESSURE (kPag)	TEMP. (°C)
Butterfly Valve	**BF**	Liquid	1000	0.5 to 70	1500	70

TYPICAL SERVICE
On/Off Valve for Liquid Service.

VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIAL	Reference Document	
Body	Cast Iron	Size Range	50 mm to 300 mm
Disc	Ductile Iron	Rating	Class 125
Seats	Buna-N	Body/Valve Ends	Lug
Shaft	Stainless Steel (316)	Type of Disc	
		Operator	
		Actuator	
		Lining	
		Coating	

NOTES

ACCEPTABLE PRODUCTS			
Keystone F1020 / F1000	Bray Series 31	DeZurik Fig. 632	Centreline Series 200

DETAILED PROCESS VALVE SPECIFICATION SHEETS

CV02

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	OPERATING LIMITS		DESIGN LIMITS	
			PRESSURE (kPag)	TEMP. (°C)	PRESSURE (kPag)	TEMP. (°C)
Check Valve	**CV02**	Liquid	1000	0.5 to 70	1500	70

TYPICAL SERVICE
Check valve for treated water.

VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIAL	Reference Document	Body Material: ASTM A126 Gr. B
Body	Cast Iron	Size Range	50 - 300 mm
Disc	Bronze	Rating	Class 125
Seats	Bronze	Valve Ends	Flanged
Spring	Stainless Steel	Type of Disc	Silent Check

NOTES

ACCEPTABLE PRODUCTS			
Crane Uni-Chek 11	APCO Series 600		

DETAILED PROCESS VALVE SPECIFICATION SHEETS

GL

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	OPERATING LIMITS		DESIGN LIMITS	
			PRESSURE (kPag)	TEMP. (°C)	PRESSURE (kPag)	TEMP. (°C)
Globe Valve	**GL01**	Liquid	1000	0.5 to 70	1500	70

TYPICAL SERVICE
On/Off valve for Water.

VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIAL	Reference Document	MSS SP-085
Body	Cast Iron	Size Range	32 mm - 150 mm
Disc	294-s renewable composition	Rating	Class 150
Seats	Bronze	Valve Ends	Flanged
		Type of Stem	Rising Stem
		Operator	OS&Y
		Actuator	
		Lining	
		Coating	

NOTES

ACCEPTABLE PRODUCTS		
Jenkins Fig. 142	Newman Hattersley 731	

DETAILED PROCESS VALVE SPECIFICATION SHEETS

ARV

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	OPERATING LIMITS		DESIGN LIMITS	
			PRESSURE (kPag)	TEMP. (°C)	PRESSURE (kPag)	TEMP. (°C)
Air Valve	ARV	Liquid	850	4 to 70	1000	70

TYPICAL SERVICE
Air and Vacuum valve.

VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIAL	Reference Document	Body Material: ASTM A-536
Body	Cast Iron	Size Range	25mm
Seat	Buna-N	Rating	Class 150
Float	Stainless Steel	Valve Ends	Threaded
		Operator	Float
		Pressure Set Point	
		Lining	
		Coating	

NOTES

ACCEPTABLE PRODUCTS	
APCO Valve	ARI

DETAILED PROCESS VALVE SPECIFICATION SHEETS

PRV

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	OPERATING LIMITS		DESIGN LIMITS	
			PRESSURE (kPag)	TEMP. (°C)	PRESSURE (kPag)	TEMP. (°C)
Pressure Relief Valve	PRV, PCV	Liquid	1000	0.5 to 70	1500	70

TYPICAL SERVICE
Hydraulically operated valve for pressure relief.

VALVE MATERIALS		VALVE DESCRIPTION	
ITEM	MATERIAL	Reference Document	Body Material: ASTM A-536
Body	Ductile Iron	Size Range	40 mm – 250 mm
Disc	Buna-N or EPDM	Rating	Class 150
Trim	Bronze	Valve Ends	Flanged
		Operator	Pilot Controlled
		Pressure Set Point	(Note 1)
		Lining	
		Coating	

NOTES

1. PCV – 306 (Fire Pump): 150 psi
   PCV – 307 (Booster Pumps): 150 psi

ACCEPTABLE PRODUCTS	
Cla-Val Model 50-01	Singer Valve

END OF SECTION

PIPE AND PIPE FITTINGS

1. GENERAL

1.1 Description

.1 This section describes the pipe materials, fittings, appurtenances, installation and testing of the plumbing and HVAC systems.

1.2 Quality Assurance

.1 Welding materials, fabrication standards and labour qualifications must conform to ANSI/ASME B31.1, ANSI B16.25, ASME Section IX, and the Provincial Board of Labour Regulations latest current editions.

.2 Use welders fully qualified and licensed by Provincial Authorities.

.3 Oil Piping: CSA Standard B139, Installation Code for Oil Burning Equipment (latest edition).

.4 Domestic Water, Drainage and Vent Piping: current Provincial and Municipal Codes.

.5 All below grade steel piping shall be yellow jacketed with taped and sealed joints.

.6 Non-specified pipe joining and pipe fitting methods such as T-drill and press fit are not permitted in any piping system covered under Division 15.

.7 Conflicts:

.1 Review the Drawings prior to installation of piping, conduit services, and fixtures by this or any other division. Identify any conflicts and cooperate with the Engineer to determine the adjustments necessary to resolve these conflicts.

.2 Confirm the routing of each section of pipework with other services prior to commencement of installation. Advise the Engineer of any conflicts with existing services or services yet to be installed. Where necessary, amend the routing of pipework to avoid conflict and confirm with the Engineer.

2. PRODUCTS

2.1 Pipe

	Service	Material
.1	Sanitary drainage, and vent, inside building, above ground	`DWV' copper, ASTM B306 Cast iron, CSA B70, PVC SDR-35 for sizes to 300 mm
.2	Sanitary vent, outside building	Cast iron, CSA B70
.3	Domestic water, above ground (inside building)	Type `L' hard copper
.4	Glycol heating to 120°C	Steel, Sch.40, ASTM A53, Grade B heating to 120°C
.5	Oil (above ground)	Steel, Sch.40, ASTM A120
.6	Diesel engine exhaust Grade B	Steel, Sch.40, ASTM A53 UL Listed Insulated Position Pressure Piping System
.7	Equipment drains and overflows	Sch.40, galvanised steel, ASTM A120 Type `L' hard copper ASTM B88M

2.2 Fittings and Joints

	Service	Material	Joint
.1	Sanitary drainage and vent inside building, above ground	Cast iron	Gasket clamp
		Wrought or Cast copper	Lead-free Solder
.2	Domestic water, above ground	Wrought copper, bronze	Lead free solder, brazed for pipes over 50 mm
		Cast bronze	Screwed
.3	Glycol heating to 120°C	Banded malleable iron, 1033 kPa, up to 50 mm	Screwed
		Steel, same schedule as pipe, for sizes 50 mm and larger	Welded
		Wrought copper,	95-5 solder, brazed bronze, for pipes over 50 mm
		Cast brass	Screwed
		Cast bronze	Flare tube

	Service	Material	Joint
.4	Oil (above ground)	Malleable iron, banded, 1033 kPa	Screwed
		Forged steel	Screwed
		Forged steel, socket weld	Welded
		Steel, same schedule as pipe	Welded
		Cast bronze	Flared tube
.5	Diesel engine exhaust Grade B	Steel, same schedule as pipe, all sizes	Welded
.6	Equipment drains and overflows	Galvanised banded malleable iron	Screwed
		Wrought copper, bronze	50-50 solder
		Cast brass	Screwed

.7 Use factory fabricated butt welded fittings for welded steel pipes.

.8 Use long radius elbows for steel and cast iron water piping, including grooved mechanical fittings.

.9 Where not shown or otherwise specified, use solvent weld joints for PVC piping. Minimize number of threaded joints on all PVC piping.

2.3 Unions, Flanges and Couplings

.1 Size 50 mm and under: 1033 kPa malleable iron, bronze to iron ground joint unions for threaded ferrous piping, air tested for gas service, all bronze for copper piping.

.2 Sizes 65 mm and over: 1033 kPa forged steel welding neck flanges for ferrous piping, 1033 kPa bronze slip-on flanges for copper piping. Gaskets shall be 1.5 mm thick performed synthetic rubber bonded asbestos. Gaskets for gas service shall be synthetic rubber.

.3 Flange bolting: For systems up to 120°C, use carbon steel stud bolts, semi-flushed and heavy hex nuts, ASTM A307-GrB. For systems up to 215°C, use alloy steel bolts ASTM A193-GrB7, and semi-finished heavy hex nuts ASTM A194-Gr2H.

.4 Where permitted by the Engineer, use grooved mechanical couplings to engage and lock grooved or shouldered pipe ends and to allow for some angular deflection, contraction and expansion. Couplings consist of malleable iron housing-clamps, C-shaped composition sealing gasket EPDM Grade 'E' and steel bolts. Use galvanised couplings for galvanised pipe. Victaulic brand or Grinnel Gruv-Lok only.

3. EXECUTION

3.1 Preparation

.1 Ream pipes and tubes. Clean off scale and dirt, inside and outside, before assembly. Remove welding slag or other foreign material from piping.

3.2 Pipe Handling

.1 Inspect each pipe and fitting prior to installation. Do not install damaged pipe or pipe with damaged protective coatings.

.2 Remove all foreign matter from inside of pipe prior to installation.

.3 Repair pipe with damaged protective coatings with material similar to the original in accordance with the manufacturer's directions and to the satisfaction of the Engineer.

.4 Use proper implements, tools, and facilities for the proper protection of the pipe. Exercise care in the installation so as to avoid damage to pipe or coatings.

3.3 Connection

.1 Screw joint steel piping up to and including 40 mm Weld piping 65 mm and larger, including branch connections. Screw or weld 50 mm piping for liquid systems.

.2 Make screwed joints with full cut standard taper pipe threads with approved non-toxic joint compound applied to male threads only.

.3 Make joints for plain end pipe with gasket and clamp type mechanical fastener.

.4 Use grooved mechanical couplings and mechanical fasteners, only where permitted by the Consultant.

.5 Use galvanised couplings with galvanised pipe.

.6 Make connections to equipment, specialty components, and branch mains with unions or flanges.

.7 Provide dielectric type connections wherever joining dissimilar metals in open systems. Brass adapters and valves are acceptable.

.8 Use insulating plastic spacers for copper pipe installation in metal studs

3.4 Route and Grades

.1 Route piping in orderly manner and maintain proper grades. Install to conserve headroom and interfere as little as possible with use of space. Run exposed piping parallel to walls. Group piping wherever practical at common elevations. Install concealed pipes close to the building structure to keep furring to a minimum.

.2 Slope water piping 0.2% and provide hose bibb drains at low points.

.3 Equip low points with 20 mm drain valves and hose nipples.

.4 Provide air collection chambers with manual air vent at all high points of system. Collection chambers to be 25 mm dia. or line size whichever is greater and 150 mm high minimum. Square tees may only be used to assist with complete venting and draining.

.5 Make reductions in water pipes with eccentric reducing fittings installed to provide drainage and venting. Top flat for water.

.6 Grade horizontal drainage and vent piping 2% minimum, unless noted otherwise.

.7 Pipe the discharge from all relief valves, safety valves, vents, drains, water columns and overflows to the nearest building drain. Pipe to glycol recovery tanks for a glycol based system.

3.5 Installation

.1 Install piping to allow for expansion and contraction without unduly stressing pipe or equipment connected.

.2 Provide clearance for proper installation of insulation and for access to valves, air vents, drains and unions.

3.6 Welded Pipe Branch Connections

.1 Make branch connections according to the following schedule.

Legend:

T: Forges tee or reducing tee

S: Socolet

W: Weldolet

HEADER	BRANCH									
	15	T								
	20	T	T							
	25	T	T	T						
	30	T	T	T	T					
	40	T	T	T	T	T				
	50	S	S	S	T	T	T			
	65	S	S	S	S	T	T	T		
	75	S	S	S	S	S	T	T	T	
	100	S	S	S	S	S	T	T	T	T
		15	*20*	*25*	*30*	*40*	*50*	*65*	*75*	*100*

END OF SECTION

VALVES AND STRAINERS

1. GENERAL

1.1 Scope

.1 Gate valves.

.2 Globe or angle valves.

.3 Ball valves.

.4 Check valves.

.5 Plug cocks.

.6 Eccentric plug valves.

.7 Butterfly valves.

.8 Drain valves.

.9 Hose bibbs.

.10 Strainers.

.11 Pressure Reducing Valves.

1.2 Manufacturer

.1 Provide valves of the same type by the same manufacturer throughout.

.2 Provide valves with manufacturer's name and pressure rating clearly marked on outside of body.

1.3 Shop Drawings

.1 Submit copies of valves "ordering schedule" for review before ordering valves.

.2 Submit detailed shop drawings clearly indicating make, model, size, pressure rating, materials of construction and intended service products.

1.4 Cold Water System

.1 Ball Valves up to 50 mm: Brass body, chrome plated brass ball, threaded or solder ends, TFE seat and packing. 4134 kPa non-shock WOG rating. Threaded, Red-White Fig. 5044A. Solder joint, Red-White Fig. 5049A.

.2 Globe Valves up to 50 mm: Bronze body, screw over bonnet, threaded ends rating 1035 kPa steam, solder ends rating 2070 kPa water. Threaded, Red-White Fig. 221. Solder ends, Red-white Fig. 222.

Globe Valves 65 mm and over: Cast iron body, flanged ends, O.S. and Y, renewable bronze seat ring, renewable composition disc. Rating 860 kPa steam. 1380 kPa. Red-White Fig. 400.

.3 Butterfly Valves: Cast iron wafer full-lug body, 300 Series stainless steel shaft, bronze disc, replaceable EPDM seat, lever lock handle operator with multiple position lock plate for valve sizes to 100 mm, heavy duty gear handwheel operator with position indicator for valve sizes 150 mm and over. Minimum rating 1200 kPa, 121°C. Keystone F1000, F1020.

.4 Gate Valves up to 50 mm: Bronze body, inside screw, travelling stem, solid wedge, screw-in bonnet, threaded ends rating 860 kPa steam, solder ends rating 1380 kPa water. Threaded, Red-White Fig. 293. Solder ends, Red-White Fig. 299.

Gate Valves 65 mm and over: Cast iron body, bronze trim, O.S. and Y, rising stem, solid wedge, flanged ends, rating 860 kPa steam. Red-White Fig. 421.

.5 Swing Check Valves up to 50 mm: Bronze body, screw-in cap, replaceable disc, 860 kPa steam rating. Threaded, Red-White Fig. 236. Solder ends, Red-White Fig. 237.

Swing Check Valves 65 mm 2½ in. and over: Cast iron body, regrind-renew swing check, bolted cover, flanged ends, bronze disc and seat ring, rating 860 kPa steam. Red-White Fig. 435.

.6 Silent Check Valves for Pump Discharge

Up to 50 mm: Bronze body, SS stem, 316 SS spring, Teflon disc and seat ring, 430 SS seat screw, threaded ends. 1380 kPa water. Val Matic VM-S1400.

65 mm and over: Wafer style, cast iron body, 316 SS seat, plug, spring and bushing. ANSI Class 125. Val Matic, Series 1400.

1.5 Domestic Hot Water System

.1 Valves to be used in the hot water section of the system shall be exactly as specified in the cold water section with one exception, that all composition disc valves shall be fitted with discs suitable for hot water.

1.6 Domestic Water System Hose Bibbs

.1 Bronze body globe valve, renewable composition disc, threaded inlet, "garden hose" thread outlet, rating 2070 kPa water.

Bronze or red brass, replaceable hexagonal disc, hose thread spout.

1.7 Glycol heating system

.1 Ball Valves up to 50 mm: Brass body, chrome plated brass ball, threaded or solder ends, TFE seat and packing. 4134 kPa non-shock WOG rating. Threaded, Red-White Fig. 5044A. Solder joint, Red-White Fig. 5049A.

.2 Globe Valves up to 50 mm: Bronze body, screw over bonnet, threaded ends rating 1035 kPa steam, solder ends rating 2070 kPa water. Threaded, Red-White Fig. 221. Solder ends, Red-white Fig. 222.

.3 Globe Valves 65 mm and over: Cast iron body, flanged ends, O.S. and Y, renewable bronze seat ring, renewable composition disc. Rating 860 kPa steam. 1380 kPa water. Red-White Fig. 400.

.4 Butterfly Valves: Cast iron wafer full-lug body, 300 Series stainless steel shaft, bronze disc, replaceable EPDM seat, lever lock handle operator with multiple position lock plate for valve sizes to 100 mm, heavy duty gear handwheel operator with position indicator for valve sizes 150 mm and over. Minimum rating 1200 kPa, 121°C. Keystone F1000, F1020.

.5 Gate Valves up to 50 mm: Bronze body, inside screw, travelling stem, solid wedge, screw-in bonnet, threaded ends rating 860 kPa steam, solder ends rating 1380 kPa water. Threaded, Red-White Fig. 293. Solder ends, Red-White Fig. 299.

Gate Valves 65 mm and over: Cast iron body, bronze trim, O.S. and Y, rising stem, solid wedge, flanged ends, rating 860 kPa steam. Red-White Fig. 421.

.6 Swing Check Valves up to 50 mm: Bronze body, screw-in cap, replaceable disc, 860 kPa steam rating. Threaded, Red-White Fig. 236. Solder ends, Red-White Fig. 237.

Swing Check Valves 65 mm and over: Cast iron body, regrind-renew swing check, bolted cover, flanged ends, bronze disc and seat ring, rating 860 kPa steam. Red-White Fig. 435.

.7 Silent Check Valves for Pump Discharge:

Up to 50 mm: Bronze body, SS stem, 316 SS spring, Teflon disc and seat ring, 430 SS seat screw, threaded ends. 1380 kPa water. Val Matic VM-S1400.

65 mm and over: Wafer style, cast iron body, 316 SS seat, plug, spring and bushing. ANSI Class 125. Val Matic, Series 1400.

.8 Eccentric Plug Valves: Cast iron body with resilient faced cast iron plug, bolted bonnet, stainless steel bearings, nickel seat. Multiple packing ring, stem seal and resilient plug facing materials suitable for hot water/glycol service to 121°C. Valve ends threaded up to 50 mm, flanged 65 mm and over. Lever operator with adjustable open position memory stop up to 100 mm valves, heavy duty gear reducer handwheel operator with adjustable open position memory stop for valves 150 mm and over. Rating 1210 kPa water at 121°C. DeZurik Series 100.

.9 Terminal Heat Transfer Unit Valves up to 30 mm: Heavy pattern brass body radiator valve, wheel handle, rising stem, inside screw, renewable composition swivel disc, straight or angle globe, threaded or union ends, positive back seating. Dahl Series 11040.

Terminal Heat Transfer Unit Valves 40 mm and over: Bronze gate valves, threaded ends up to 50 mm, cast iron gate valves, flanged ends, valve sizes 65 mm and over. Red-White Fig. 421.

.10 Terminal Heat Transfer Unit Balancing Valves up to 30 mm: Removable cap key, screw set memory bonnet for balancing, brass body, rising stem, inside screw, renewable composition swivel disc, straight or angle globe, threaded or union ends, positive back seating. Dahl Series 13000-M.

Terminal Heat Transfer Unit Balancing Valves 40 mm and over: Eccentric plug valve, as described above.

.11 Drain Valves up to 50 mm: Brass 2 piece body ball valve, blowout proof stem, Teflon seats, forged brass chrome palted ball, hose end connection with cap and chain by male IP, 4200 kPa water, oil, gas rating, Red-White Fig. 5046.

Terminal unit brass T-body drain valve, wheel handle, ground body-bonnet joint, renewable disc, brass chain, forged brass gasketted cap. Working pressure 1725 kPa at 121°C. Dahl 21.616.

.12 Circuit Balancing Valves: Suitable for throttling. All metal parts non-ferrous, die cast non-porous copper alloy. Flow measuring accuracy ±2%. Positive shut-off, drain connection with cap. Memory balancing feature. Fittings for connection of portable differential pressure meter. Bell & Gosset circuit setter.

1.8 Fuel Oil System

.1 Gate Valves up to 50 mm: Bronze body, inside screw, travelling stem, solid wedge, screw-in bonnet, threaded ends rating 860 kPa steam. Red-White Fig. 293.

.2 Check Valves up to 50 mm: Bronze body and disc, regrinding swing check, screw-in cap, threaded ends, rating 860 kPa steam. Red-White Fig. 236.

1.9 Valve Operators

.1 Provide suitable hand wheels for gate, globe or angle, radiation and drain valves and inside hose bibbs.

.2 Provide one plug cock wrench. Provide each plug cock sized 65 mm and larger with a wrench, with set screw.

1.10 Strainers

.1 Size 50 mm and under: Screwed brass or iron body, Y pattern with 0.75 mm stainless steel perforated screen.

.2 Size 65 mm to 100 mm: Flanged iron body, Y pattern with 1 mm stainless steel perforated screen.

.3 Size 125 mm and larger: Flanged iron body, Y pattern with 3 mm stainless steel perforated screen.

.4 Screen free area shall be minimum three times area of inlet pipe.

2. EXECUTION

2.1 Installation and Application

.1 Install valves with stem upright or horizontal, not inverted.

.2 Provide threaded lug type butterfly valves for equipment isolation service. Provide wafer or threaded lug type valves for zone shut-off service.

.3 Where permitted by codes, butterfly valves may be used in fire protection systems.

.4 Use eccentric plug valves in water systems for throttling/balancing service.

.5 Use memory radiator balancing valves in water and glycol systems terminal heat transfer unit balancing service. For radiant panels provide "circuit setter" valves on return line for each central zone; and a ball valve for shut off service.

.6 Provide drain valves at main shut-off valves, low points of piping and apparatus and terminal units.

.7 Size drain lines and drain valves equal to size of apparatus drain connection.

.8 For pipe sizes 20 mm and over, minimum drain size to be 20 mm

.9 Provide hose thread connection with cap and chain for 20 mm drain valves located in ceiling and public areas.

.10 Provide male NPT nipples with threaded pipe cap for drain sizes over 20 mm where not piped directly to floor drains.

.11 Provide valved drain and hose connections off the bottom of all strainers.

END OF SECTION