Protective & Marine Coatings

NSF Certified to NSF/ANSI 61

DURA-PLATE® UHS

WITH OPTI-CHECK OAP TECHNOLOGY

PART A	B62-210	SERIES
PART A	B62W211	WHITE OAP (NSF)
PART B	B62V210	STANDARD HARDENER (NSF)
PART B	B62V211	LOW TEMP HARDENER (NSF)

Revised: December 3, 2014

PRODUCT INFORMATION

TRM.35

PRODUCT DESCRIPTION

DURA-PLATE UHS is an ultra high solids epoxy amine engineered specifically for immersion service in ballast tanks, oil tanks, and refined fuel storage tanks. The high build, edge-retentive properties of Dura-Plate UHS provide superior protection compared to conventional epoxies.

- Airless Spray
- One coat protection
- Low VOC
- Low odor
- High flash point, >200°F (93°C)
- Can be used with 1½ oz. fiberglass mat
- Low Temperature Hardener for applications down to 40°F (4.5°C).
- NSF approved to Standard 61 for potable water (tanks of 1000 gallons or greater and pipes of 30" diameter or greater.)

RECOMMENDED USES

For use over prepared steel or concrete surfaces in industrial and marine exposures such as:

- Meets MIL-PRF-23236, Type VII, Class 5, 7, 9 and 11, Grade C (standard hardener only)
- Ballast tank interiors, Oil storage tank interiors, Refined fuel storage tank and potable water tanks interiors and pipe.
- NSF approved for one coat application up to 50.0 mils (1250 microns) dft if required
- Water and waste treatment plants
- Buried Pipe Applications
- Primary and secondary containment areas
- Where edge protection film build properties are required
- Suitable for use with cathodic protection systems
- White B62W211 Contains OAP fluorescent pigment (NSF Approved)
- Suitable for use in the Mining & Minerals Industry

PRODUCT CHARACTERISTICS

Finish	Gloss
Color:	White OAP (NSF), White (NSF), Light Gray (NSF), Light Green (NSF), Black, Haze Gray
Volume Solids:	98% ± 2%, mixed
Weight Solids:	98% ± 2%, mixed
VOC (EPA Method 24):	
(with B62-V210 Hardeners)	<100 g/L; 0.83 lb/gal, mixed
(with B62V211 Hardener)	<100 g/L; 0.84 lb/gal, mixed
Mix Ratio:	4:1 by volume

Recommended Spreading Rate per coat*:

	1 coat system Min.		1 coat system Max.		2 coat system Min.		2 coat system Max.	
Wet mils (microns)	**18.0**	450	**22.0**	550	**10.0**	250	**12.0**	300
Dry mils (microns)	**18.0**	450	**22.0**	550	**10.0**	250	**12.0**	300
Total mils (microns)	**18.0**	450	**22.0**	550	**20.0**	500	**24.0**	600
~Coverage sq ft/gal (m^2/L)	**72**	1.76	**90**	2.2	**130**	3.18	**160**	3.9
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil/25 micron dft	**1568** (38.4)							

* See NSF Systems on next page.

NOTE: Brush or roll application recommended for stripe coating and repair only. Standard hardener preferred for brush & roll due to pot life.

Drying Schedule @ 10.0-22.0 mils wet (250-550 microns):

With B62-V210	@ 55°F/13°C *50% RH*	@ 77°F/25°C	@ 100°F/38°C
To touch:	12 hours	5 hours	3 hours
To handle:	48 hours	14 hours	8 hours
To recoat:			
minimum:	48 hours	14 hours	8 hours
maximum:	21 days	14 days	14 days
Cure to service:	10 days	4 days	24 hours
Heat Cure:	8 hours @ ambient, then 16 hrs @ 140°F (60°C)*		

*Not NSF Approved. See Tips Section.

Pot Life*:	30-45 minutes	30-45 minutes	20-30 minutes
*Dependent upon temperature and mass			
Sweat-in-time:	15 minutes	None	None

PRODUCT CHARACTERISTICS (CONT'D)

With B62V211	@ 40°F/4.5°C	@ 55°F/13°C *50% RH*	@ 77°F/25°C
To touch:	24 hours	5 hours	3 hours
To handle:	48 hours	24 hours	8 hours
To recoat:			
minimum:	48 hours	24 hours	8 hours
maximum:	30 days	21 days	14 days
Cure to service:	7 days	5 days	3 days
Heat Cure:	8 hours @ ambient, then 16 hrs @ 140°F (60°C)*		

Material should be at least 50°F (10°C) for optimal performance.

If maximum recoat time is exceeded, abrade surface before recoating.

Drying time is temperature, humidity, and film thickness dependent.

Sterilize and rinse per AWWA C652.

*Not NSF Approved. See Tips Section.

Pot Life*:	20 minutes	20 minutes	10 minutes
*Dependent upon temperature and mass			
Sweat-in-Time:	5 minutes	None	None

Shelf Life:	36 months Store indoors at 40°F (4.5°C) to 100°F (38°C).
Flash Point:	>200°F (93°C), PMCC, mixed
Reduction:	Not recommended
Clean Up:	MEK, R6K10 or R7K104 Reducer

PERFORMANCE CHARACTERISTICS

Substrate*: Steel

Surface Preparation*: SSPC-SP10/NACE 2

System Tested*:

1 ct. Dura-Plate UHS @ 18.0 mils (450 microns) dft with B62GV210 Hardener

*unless otherwise noted below

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load	20.8 mg loss
Adhesion	ASTM D4541; ASTM D3359	800 psi, minimum (ASTM D4541); 5A (ASTM D3359)
Corrosion Weathering	ASTM D5894, 6 cycles, 2016 hours	Rating 10 per ASTM D610 for rusting and Rating 10 per ASTM D714 for blistering
Direct Impact Resistance	ASTM D2794; ASTM G14	30 in. lb. (ASTM D2794); 168 in. lb. (ASTM G14)
Dry Heat Resistance	ASTM D2485	250°F (121°C)
Flexibility	ASTM D522, 180° bend, 1/2" mandrel	Passes, 9.7% elongation
Immersion (Galvapac/1 ct Dura Plate UHS)	5 year potable water	Rating 10 per ASTM D610 for rusting and Rating 10 per ASTM D714 for blistering
Pencil Hardness	ASTM D3363	3H

IMMERSION (Ambient temperature):

- Ballast Tank mix ..... Recommended
- Crude oil ..... Recommended
- Diesel fuel ..... Recommended
- Ethanol or Gasohol ..... Recommended
- Fresh water/Potable Water ..... Recommended
- Fuel oil ..... Recommended
- Methanol or methanol blends ..... Not Recommended
- MTBE, TAME, ETBE ..... Recommended
- Refined petroleum products ..... Recommended
- Sea water ..... Recommended
- Hi-Aromatic Gasolines ..... Recommended

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Revised: December 3, 2014

PRODUCT INFORMATION

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RECOMMENDED SYSTEMS

		Dry Film Thickness / ct. Mils	(Microns)
Steel, NSF Systems:			
1 ct.	Dura-Plate UHS Primer	4.0-8.0*	(100-200)
1 ct.	Dura-Plate UHS	10.0-12.0*	(250-300)
or			
1 ct.	Dura-Plate UHS	16.0-50.0	(400-1250)
or			
2 cts.	Dura-Plate UHS	8.0-25.0	(200-625)
or			
3 cts.	Dura-Plate UHS	8.0-16.0	(200-400)
Steel, OAP Fluorescent Pigment System			
1 ct.	Dura-Plate UHS (B62W211)	12.0-14.0	(300-350)
Steel:			
1 ct.	Dura-Plate UHS Primer	4.0-8.0**	(100-200)
1 ct.	Dura-Plate UHS	10.0-12.0	(250-300)
or			
2 cts.	Dura-Plate UHS	6.0-7.0	(150-175)
or			
1 ct.	Dura-Plate UHS	18.0-22.0	(450-550)
or			
2 cts.	Dura-Plate UHS	10.0-12.0	(250-300)
Steel, with hold primer:			
1 ct.	Macropoxy 5500 Primer (as required for blast hold primer)	1.0-1.5**	(25-40)
2 cts.	Dura-Plate UHS	10.0-12.0	(250-300)
Steel, Laminate System:			
1 ct.	Copoxy Shop Primer (as required for blast hold primer)	1.0-1.5	(25-40)
or			
1 ct.	Dura-Plate UHS Primer	4.0-8.0**	(100-200)
1 ct.	Steel-Seam FT910 as required for filling pits, and transitioning sharp edges, weld seams, etc.		
1 ct.	Dura-Plate UHS Clear Laminate Resin with 1½ oz. glass mat	40.0-45.0	(1000-1125)
1 ct.	Dura-Plate UHS as required to seal fiberglass mat	10.0-12.0	(250-300)
Concrete/Masonry:			
1 ct.	Corobond 100 Epoxy Primer/Sealer	4.0-6.0	(100-150)
	(or 1 ct Dura- Plate UHS Primer (as required for NSF)	4.0-8.0**	(100-200)
1 ct.	Dura-Plate UHS (as required for NSF)	10.0-12.0	(250-300)

* If primer is used, 10 mils (250 microns) dft maximum for primer and 14 mils (350 microns) dft maximum for topcoat.

** When using the B62L210 Primer containing the OAP fluorescent pigment, make sure a non-containing OAP fluorescent pigment Topcoat is used.

Refer to Application Bulletin for treatment of pitted tank bottoms.

The systems listed above are representative of the product's use, other systems may be appropriate.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

Iron & Steel:
- Atmospheric: SSPC-SP6/NACE 3, 2 mil (50 micron) profile or SSPC-SP12/NACE No. 5, WJ-3/NV-2
- Immersion: SSPC-SP10/NACE2, 2-3 mil (50-75 micron)profile or SSPC- SP12/NACE No. 5, WJ-2/NV-2

Concrete & Masonry:
- Atmospheric: SSPC-SP13/NACE 6, or ICRI No. 310.2R CSP 2-3
- Immersion: SSPC-SP13/NACE 6-4.3.1 or 4.3.2, or ICRI No. 310.2R CSP 2-3

Surface Preparation Standards

Condition of Surface		ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

TINTING

Do not tint Part A.

Clear Hardeners B62V210 and B62V211 may be tinted with up to 1½ oz. per gallon with Maxitoner Colorant, Phthalo Green or Black (both NSF approved) **ONLY**.

APPLICATION CONDITIONS

Temperature (air, surface):
- B62-V210 Hardeners: 50°F (10°C) minimum, 110°F (43°C) maximum
- B62V211 Hardener: 40°F (4.5°C) minimum, 77°F (25°C) maximum

At least 5°F (2.8°C) above dew point

Material should be 70°F (21°C) to 85°F (29°C) or optimal performance.

Relative humidity: 85% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:
- Part A: 4 gallon (15.1L) container
- Part B: 1 gallon (3.78L) container

Weight: 10.52 ± 0.2 lb/gal ; 1.26 Kg/L, mixed

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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PART A	B62-210	SERIES
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PART B	B62V211	LOW TEMP HARDENER (NSF)

Revised: December 3, 2014

APPLICATION BULLETIN

TRM.35

SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel (atmospheric service)
Minimum surface preparation is Commercial Blast Cleaning per SSPC-SP6/NACE 3 or SSPC-SP12/NACE No. 5. For surfaces prepared by SSPC SP6/NACE 3, first remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. For better performance, use Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2-3 mils / 50-75 microns). For surfaces prepared by SSPC-SP12/NACE No. 5, all surfaces shall be cleaned in accordance with WJ-3/NV2. Pre-existing profile should be approximately 2 mils (50 microns). Prime any bare steel the same day as it is cleaned or before flash rusting occurs.

Iron & Steel (immersion service)
Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2, or SSPC-SP12/NACE No. 5. For SSPC-SP10/NACE 2 blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2-3 mils / 50-75 microns). For SSPC-SP12/NACE No.5, all surfaces to be coated shall be cleaned in accordance with WJ-2/NV2 standards. Pre-existing profile should be approximately 2 mils (50 microns). Remove all weld spatter. Prime any bare steel the same day as it is cleaned or before flash rusting occurs.

Concrete and Masonry
For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2R, CSP 2-3. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910. Primer required.

Follow the standard methods listed below when applicable:
ASTM D4258 Standard Practice for Cleaning Concrete.
ASTM D4259 Standard Practice for Abrading Concrete.
ASTM D4260 Standard Practice for Etching Concrete.
ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.
SSPC-SP 13/Nace 6 Surface Preparation of Concrete.
ICRI No. 310.2R Concrete Surface Preparation.

Concrete, Immersion Service:
For surface preparation, refer to SSPC-SP13/NACE 6, Section 4.3.1 or 1.3.2 or ICRI No. 310.2R, CSP 2-3.

Surface Preparation Standards

Condition of Surface		ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

APPLICATION CONDITIONS

Temperature (air, surface):

B62-V210 Hardeners	50°F (10°C) minimum, 110°F (43°C) maximum
B62V211 Hardener	40°F (4.5°C) minimum, 77°F (25°C) maximum
	At least 5°F (2.8°C) above dew point

Material should be 70°F (21°C) to 85°F (29°C) or optimal performance.

Relative humidity: 85% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reduction .....Not recommended

Clean Up .....MEK, R6K10 or R7K104 Reducer

Airless Spray
Unit.....74:1 Pump, minimum
Pressure.....6000 psi minimum
Hose.....3/8" ID
Tip .....019" - .021"
Filter.....30 mesh

In order to avoid blockage of spray equipment and hose, flush equipment with MEK, R6K10 or R7K104 Reducer at least once every 30 minutes when using the B62V210 Hardener and after each kit when using the Low Temperature Hardener, and before periods of extended downtime.

Plural Component Equipment .....Acceptable

Brush .....For stripe coating and repair only
Brush.....Nylon/Polyester or Natural Bristle

Roller .....For stripe coating and repair only
Cover .....3/8" woven with solvent resistant core

If specific application equipment is not listed above, equivalent equipment may be substituted.

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Protective & Marine Coatings

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WITH OPTI-CHECK OAP TECHNOLOGY

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PART A	B62W211	WHITE OAP (NSF)
PART B	B62V210	STANDARD HARDENER (NSF)
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Revised: December 3, 2014

APPLICATION BULLETIN

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APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mixing Instructions: Mix contents of each component thoroughly using low speed power agitation. Make certain no pigment remains on the bottom or the sides of the can. Then combine four parts by volume of Part A with one part by volume of Part B. Thoroughly agitate the mixture with power agitation.

To ensure that no unmixed material remains on the sides or bottom of the cans after mixing, visually observe the container by pouring the material into a separate container.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat*:

	1 coat system Min.		1 coat system Max.		2 coat system Min.		2 coat system Max.	
Wet mils (microns)	**18.0**	450	**22.0**	550	**10.0**	250	**12.0**	300
Dry mils (microns)	**18.0**	450	**22.0**	550	**10.0**	250	**12.0**	300
Total mils (microns)	**18.0**	450	**22.0**	550	**20.0**	500	**24.0**	600
~Coverage sq ft/gal (m^2/L)	**72**	1.76	**90**	2.2	**130**	3.18	**160**	3.9
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil/25 micron dft	**1568** (38.4)							

* See NSF Systems on next page.

NOTE: Brush or roll application recommended for stripe coating and repair only. Standard hardener preferred for brush & roll due to pot life.

Drying Schedule @ 10.0-22.0 mils wet (250-550 microns):

With B62-V210	@ 55°F/13°C *50% RH*	@ 77°F/25°C	@ 100°F/38°C
To touch:	12 hours	5 hours	3 hours
To handle:	48 hours	14 hours	8 hours
To recoat:			
minimum:	48 hours	14 hours	8 hours
maximum:	21 days	14 days	14 days
Cure to service:	10 days	4 days	24 hours
Heat Cure:	8 hours @ ambient, then 16 hrs @ 140°F (60°C)*		

*Not NSF Approved. See Tips Section.

Pot Life*:	30-45 minutes	30-45 minutes	20-30 minutes

*Dependent upon temperature and mass

Sweat-in-time:	15 minutes	None	None

With B62V211	@ 40°F/4.5°C	@ 55°F/13°C *50% RH*	@ 77°F/25°C
To touch:	24 hours	5 hours	3 hours
To handle:	48 hours	24 hours	8 hours
To recoat:			
minimum:	48 hours	24 hours	8 hours
maximum:	30 days	21 days	14 days
Cure to service:	7 days	5 days	3 days
Heat Cure:	8 hours @ ambient, then 16 hrs @ 140°F (60°C)*		

Material should be at least 50°F (10°C) for optimal performance.

If maximum recoat time is exceeded, abrade surface before recoating.

Drying time is temperature, humidity, and film thickness dependent.

Sterilize and rinse per AWWA C652.

*Not NSF Approved. See Tips Section.

Pot Life*:	20 minutes	20 minutes	10 minutes

*Dependent upon temperature and mass

Sweat-in-Time:	5 minutes	None	None

Note: Recommended application procedure direct to steel: Apply a 5.0-6.0 mil (125-150 micron) coat to the substrate. Allow material to "wet" the surface. Then apply additional material, to bring total film thickness to the recommended range.

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with MEK, R6K10. Clean tools immediately after use with MEK, R6K10. Follow manufacturer's safety recommendations when using any solvent.

PERFORMANCE TIPS

Repair of Pitted Tank Bottoms
Extensive, deep pitting:
Options:
Option 1 ....Apply a full wet coat, by spray application, of Dura-Plate UHS Primer. Follow with rubber squeegee to work material into and fill the pitted areas. After recommended drying time, apply a full coat of Dura-Plate UHS at recommended film thickness.
Option 2 ....Apply Dura-Plate Laminant Resin with 1½ oz fiberglass mat over the pitted areas. After recommended drying time, apply a full coat of Dura-Plate UHS at recommended film thickness.
Option 3 ....Weld new steel plates, or use puddle welds, as required to repair pitted areas. Coat areas as recommended.
Shallow pitting, isolated areas:
Options:
Option 1 ....Same as number 1 above.
Option 2 ....Apply Steel-Seam FT910 as required to fill the pitted areas. Coat areas as recommended.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross-coat spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.
No reduction of material is recommended as this can affect film build, appearance, and adhesion.

Do not mix previously catalyzed material with new.

Do not apply the material beyond recommended pot life.

In order to avoid blockage of spray equipment and hose, flush equipment with MEK, R6K10 or R7K104 Reducer at least once every 30 minutes when using the B62V210 Hardener and after each kit when using the Low Temperature Hardener, and before periods of extended downtime.

For Immersion Service: (if required) Holiday test in accordance with ASTM D5162 for steel, or ASTM D4787 for concrete.

May be applied up to 50.0-60.0 mils (1250-1500 microns) dft in one coat if required.

When using the B62L210 Primer containing the OAP fluorescent pigment, make sure a non-containing OAP fluorescent pigment Topcoat is used.

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

Heat curing is not acceptable for NSF approval.

Guidance on techniques and required equipment to inspect a coating system incorporating Opti-Check OAP Technology can be found in SSPC-TU 11.

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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Protective & Marine Coatings

ENVIROLASTIC® 940 DTM
POLYASPARTIC URETHANE

PART A	B65-940	SERIES
PART B	B65V940	HARDENER

Revised: February 6, 2014

PRODUCT INFORMATION

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PRODUCT DESCRIPTION

ENVIROLASTIC 940 DTM is a single coat, direct-to-metal urethane finish. It is a fast dry, polyaspartic urethane formulated to provide high build, high performance protection and gloss and color retention through airless spray.

- Single coat application
- Direct to metal
- Corrosion resistant
- High film build in one coat
- Cures quickly to improve productivity
- No gassing
- Outstanding application properties

PRODUCT CHARACTERISTICS

Finish: Gloss

Color: Wide range of colors possible

Volume Solids: 68% ± 2%, mixed, may vary by color

Weight Solids: 80% ± 2%, mixed, may vary by color

VOC (EPA Method 24): 265 g/L; 2.21 lb/gal, mixed, may vary by color

Mix Ratio: 2:1 by volume

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**9.0** (225)	**13.0** (325)
Dry mils (microns)	**6.0** (150)	**9.0** (225)
~Coverage sq ft/gal (m^2/L)	**121** (3.0)	**182** (4.5)
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil / 25 microns dft	**1089** (26.7)	

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 9.0 mils wet (225 microns):

	@ 35°F/1.6°C	@ 50°F/10°C	@ 77°F/25°C 50% RH	@ 120°F/49°C
To touch:	5 hours	3 hours	1 hour	30 minutes
To handle:	16 hours	7 hours	2 hours	1 hour
To recoat:				
minimum:	16 hours	7 hours	2 hours	1 hour
maximum:	3 months	3 months	3 months	45 days
To cure:	7 days	7 days	4 days	2 days
Pot Life:	4 hours	3 hours	2 hours	30 minutes
Sweat-in-Time:	None required			

If maximum recoat time is exceeded, abrade surface before recoating. Drying time is temperature, humidity, and film thickness dependent.

Shelf Life:	Part A - 24 months, unopened Part B - 24 months, unopened Store indoors at 40°F (4.5°C) to 100°F (38°C).
Flash Point:	57°F (14°C), mixed (Seta Flash)
Reducer/Clean Up:	
Below 80°F (27°C):	MEK, R6K10
Above 80°F (27°C):	Reducer R7K216
Brush / Roll:	Reducer R7K216

RECOMMENDED USES

- Direct to properly prepared steel and galvanizing in industrial environments
- Replaces conventional epoxy/urethane systems
- Ideal for maintenance or new construction applications
- Suitable for use in USDA inspected facilities
- Acceptable for use in high performance architectural applications
- Suitable for use in the Mining & Minerals Industry
- Not recommended for electrostatic spray or air-assisted airless spray

PERFORMANCE CHARACTERISTICS

Substrate*: Steel

Surface Preparation*: SSPC-SP10/NACE 2

System Tested*:

1 ct. Envirolastic 940 DTM @ 6.0-9.0 mils (150-225 microns) dft

*unless otherwise noted below

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load	120 mg loss
Adhesion	ASTM D4541	1400 psi
Direct Impact Resistance	ASTM G14	60 in lb
Dry Heat Resistance	ASTM D2485	200°F (93°C)
Flexibility	ASTM D522, 180° bend, 3/4" mandrel	Passes
Pencil Hardness	ASTM D3363	H

continued on back

Protective & Marine Coatings

ENVIROLASTIC® 940 DTM
POLYASPARTIC URETHANE

PART A	B65-940	SERIES
PART B	B65V940	HARDENER

Revised: February 6, 2014

PRODUCT INFORMATION

5.52

RECOMMENDED SYSTEMS

	Dry Film Thickness / ct. Mils	(Microns)
Steel:		
1 ct. Envirolastic 940 DTM	6.0-9.0	(150-225)
Galvanizing:		
1 ct. DTM Wash Primer	0.7-1.3	(18-32)
1 ct. Envirolastic 940 DTM	6.0-9.0	(150-225)
Galvanizing:		
1 ct. Envirolastic 940 DTM	6.0-9.0	(150-225)
Steel, if primer is required:		
1 ct. Corothane I GalvaPac Zinc Primer	3.0-4.0*	(75-100)
1 ct. Envirolastic 940 DTM	6.0-9.0	(150-225)
Previously Painted Surfaces:		
1 ct. Envirolastic 940	4.0-7.0	(100-200)
Check Compatibility		

* other acceptable primers
- Fast Clad Zinc HS
- Macropoxy 646 Epoxy
- Steel Spec Epoxy Primer
- Zinc Clad III HS
- Zinc Clad IV

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

The systems listed above are representative of the product's use, other systems may be appropriate.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

Minimum recommended surface preparation:

Iron & Steel: SSPC-SP6/NACE 3, 2 mil (50 micron) profile

Galvanizing: SSPC-SP16, 2 mil (50 micron) profile

Surface Preparation Standards

Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal	Sa 3	Sa 3	SP 5	1
Near White Metal	Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast	Sa 2	Sa 2	SP 6	3
Brush-Off Blast	Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning Rusted	C St 2	C St 2	SP 2	-
Hand Tool Cleaning Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning Rusted	C St 3	C St 3	SP 3	-
Power Tool Cleaning Pitted & Rusted	D St 3	D St 3	SP 3	-

TINTING

Tint with Maxitoner colorants only into Part A Ultra Deep at 100% tint strength and 150% tint strength for Extra White. Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

APPLICATION CONDITIONS

Temperature: 35°F (1.6°C) minimum, 120°F (49°C) maximum
(air, surface, and material)
At least 5°F (2.8°C) above dew point

Relative humidity: 85% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:

Part A: 2 qts. (1.9L) gallon can
Part B: 1 qt. (0.95L) quart can

Part A: 3 gallon (12.04L) pail
Part B: short filled 2 gallon (6.28L) pail

Weight: 11.4 ± 0.2 lb/gal ; 1.4 Kg/L
mixed, may vary with color

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.
Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Protective & Marine Coatings

ENVIROLASTIC® 940 DTM
POLYASPARTIC URETHANE

PART A	B65-940	SERIES
PART B	B65V940	HARDENER

Revised: February 6, 2014

APPLICATION BULLETIN

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SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel
Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Commercial Blast Cleaning per SSPC-SP6/NACE 3. For better performance, use Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils / 50 microns). Prime any bare steel the same day as it is cleaned or before flash rusting occurs.

Aluminum
Remove all oil, grease, dirt, oxide and other foreign material by Solvent Cleaning per SSPC-SP1. Primer required.

Galvanized Steel
Surface Preparation Specification SSPC-SP 16 must be followed obtaining a surface profile of minimum 2.0 mils (50 microns).

Previously Painted Surfaces
If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, or if this product attacks the previous finish, removal of the previous coating may be necessary. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above.

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

APPLICATION CONDITIONS

Temperature:	35°F (1.6°C) minimum, 120°F (49°C) maximum (air, surface, and material) At least 5°F (2.8°C) above dew point
Relative humidity:	85% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer/Clean Up
- Above 80°F.....Reducer R7K216
- Below 80°F .....MEK, R6K10
- Brush and roll.....Reducer R7K216

Airless Spray
- Pump.....30:1
- Pressure.....2800 - 3000 psi
- Hose.....3/8" ID
- Tip .....017" - .021"
- Filter.....60 mesh
- Reduction.....As needed up to 5% by volume

Conventional Spray
- Gun .....Binks 95
- Cap 63P
- Fluid Tip 67
- Atomization Pressure.....50-70 psi
- Fluid Pressure.....20-25 psi
- Reduction.....As needed, up to 10% by volume

Brush (small areas only)
- Brush.....Natural bristle
- Reduction.....As needed up to 5% by volume

Roller (small areas only)
- Cover .....1/4" woven with solvent resistant core
- Reduction.....As needed up to 5% by volume

If specific application equipment is not listed above, equivalent equipment may be substituted.

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Protective & Marine Coatings

ENVIROLASTIC® 940 DTM
POLYASPARTIC URETHANE

PART A	B65-940	SERIES
PART B	B65V940	HARDENER

Revised: February 6, 2014

APPLICATION BULLETIN

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APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mix contents of each component thoroughly with low speed power agitation. Make certain no pigment remains on the bottom of the can. Then combine 2 parts by volume of Part A with 1 part by volume of Part B. Thoroughly agitate the mixture with power agitation.

If reducer solvent is used, add only after both components have been thoroughly mixed.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**9.0** (225)	**13.0** (325)
Dry mils (microns)	**6.0** (150)	**9.0** (225)
~Coverage sq ft/gal (m^2/L)	**121** (3.0)	**182** (4.5)
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil / 25 microns dft	**1089** (26.7)	

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 9.0 mils wet (225 microns):

	@ 35°F/1.6°C	@ 50°F/10°C	@ 77°F/25°C *50% RH*	@ 120°F/49°C
To touch:	5 hours	3 hours	1 hour	30 minutes
To handle:	16 hours	7 hours	2 hours	1 hour
To recoat:				
minimum:	16 hours	7 hours	2 hours	1 hour
maximum:	3 months	3 months	3 months	45 days
To cure:	7 days	7 days	4 days	2 days
Pot Life:	4 hours	3 hours	2 hours	30 minutes
Sweat-in-Time:	None required			

If maximum recoat time is exceeded, abrade surface before recoating. Drying time is temperature, humidity, and film thickness dependent.

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with MEK, R6K10. Clean tools immediately after use with MEK, R6K10. Follow manufacturer's safety recommendations when using any solvent.

DISCLAIMER

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PERFORMANCE TIPS

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

Do not use Quik-Thane Urethane Accelerator.

Do not apply the material beyond recommended pot life.

Do not mix previously catalyzed material with new.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with MEK, R6K10.

Mixed coating is sensitive to water. Use water traps in all air lines. Moisture contact can reduce pot life and affect gloss and color.

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

4 – DETAILED TECHNICAL DOCUMENTATION

4.3 – SHOP DRAWINGS

4.3.3 – CENTRIFUGE

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Project name:	AMARUQ
Project#:	5000218009
Document #:	SPK_0003_CTF
by:	GH
chkd:	GP
appvd:	CB

SUBMITTAL PACKAGE

CENTRIFUGE

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Project name:	AMARUQ
Project#:	5000218009
Document #:	SPK_0003_CTF
by:	GH
chkd:	GP
appvd:	CB

CENTRIFUGE

PROCESS DATASHEET

OIM manual section: 4.3.3.1

REFER TO 5000218009_PSDS_0003_CTF_VWT

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Project name: AMARUQ

Project#: 5000218009

Document #: SPK_0003_CTF

by: GH

chkd: GP

appvd: CB

CENTRIFUGE

GENERAL ARRANGEMENT DRAWING

OIM manual section: 4.3.3.2

REFER TO 5000218009_GA_0003_CTF_VWT

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Project name: AMARUQ

Project#: 5000218009

Document #: SPK_0003_CTF

by: GH

chkd: GP

appvd: CB

CENTRIFUGE

INSTRUMENTS

OIM manual section: 4.3.3.3

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CS-451-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
FLYGT	IESWLE201155	LSHH6-011	N/A	HIGH HIGH LEVEL SWITCH	LEVEL SWITCH/MANUFACTURER:FLYGT// MODEL: ENM-10 (6m)	N/A	N/A	CENTRIFUGE		rev1
FLYGT	IESWLE201155	LSHH6-021	N/A	HIGH HIGH LEVEL SWITCH	LEVEL SWITCH/MANUFACTURER:FLYGT// MODEL: ENM-10 (6m)	N/A	N/A	CENTRIFUGE		rev1
FLYGT	IESWLE201155	LSLL6-011	N/A	HOPPER LOW LEVEL SWITCH	LEVEL SWITCH/MANUFACTURER:FLYGT// MODEL: ENM-10 (6m)	N/A	N/A	CENTRIFUGE		rev1
FLYGT	IESWLE201155	LSLL6-021	N/A	HOPPER LOW LEVEL SWITCH	LEVEL SWITCH/MANUFACTURER:FLYGT// MODEL: ENM-10 (6m)	N/A	N/A	CENTRIFUGE		rev1

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Technical
specification

ENM-10 Level regulator

FLYGT
a xylem brand

Table of Contents

PRODUCT DESCRIPTION

Product description

The simplest possible method for level control! A mechanical switch in a plastic casing, freely suspended at the desired height from its own cable. When the liquid level reaches the regulator, the casing will tilt and the mechanical switch will close or break the circuit, thereby starting or stopping a pump or actuating an alarm device. No wear, no maintenance! In sewage pumping stations, for ground water and drainage pumping – in fact, for most level control applications – the ENM-10 is the ideal solution.

The regulator casing is made of polypropylene and the cable is sheathed with a special PVC or Nitrile/PVC rubber compound. The plastic components are welded and screwed together. Adhesive is never used. Impurities and deposits will not adhere to the smooth casing.

This level regulator is available in different versions, depending upon the medium in which it is to be used. As standard, the regulator can be obtained with 6, 13, 20, 30 or 50 metres (20, 42, 65, 100 or 167 feet) of cable for liquids with specific density between 0.95 and 1.10 g/cm3; for other specific densities and for the Ex-version, the regulator is only available with 20 metres (65 ft) of cable. The regulator can withstand up to 60°C (140°F).

Technical data

Liquid temperature:	min. 0°C (32°F) max. 60°C (140°F)
Liquid density:	min. 0.65 g/cm^3 max. 1.5 g/cm^3
Degree of protection:	IP68, 20 m (65 ft)
Interrupting capacity of micro switch:	AC, resistive load, 250V 10A AC, inductive load, 250V 3A cos ϕ = 0.5 DC, 30V 5A
With gold plated micro switch:	same as above, except: DC, 24V 10mA

Note that local regulations may limit the voltage.

Materials

Body:	Body:
Bending relief:	EPDM rubber
Cable:	special compound PVC or NBR/PVC nitrile/PVC rubber

Dimensions

Table 1

For density g/cm^3	Regulator length mm (in.)	Diameter mm (in.)
0.65–0.80	194 (7 10/16)	100 (4)
0.80–0.95	177 (7)	100 (4)
0.95–1.10	162 (6 3/8)	100 (4)
1.05–1.20	142 (5 9/16)	100 (4)
1.20–1.30	133 (5 1/4)	100 (4)

For density g/cm^3	Regulator length mm (in.)	Diameter mm (in.)
1.30–1.40	130 (5 2/16)	100 (4)
1.40–1.50	126 (5)	100 (4)

Weight: approx. 2 kg (4.5 lb) for a standard density regulator with 20 m cable.

Approvals: CE, CSA, SEMKO, NEMKO, DEMKO

LVD approval according to EN61058

CSA approval: Cert no. 1330172

Cl.I Zone 0, Gr. IIC;

CL.I Div.1 Gr A, B, C&D;

Cl.II Gr. E, F&G;

Cl.III when installed to the certified Intrinsically Safe relay, Ex ia, rated for the locations per submitter controll drawing and installation manual.

Intrincically safe circuits are required for the automatic control system. - Use a EX-safety barrier (e.g. Prod. no. 84 01 07).

0080

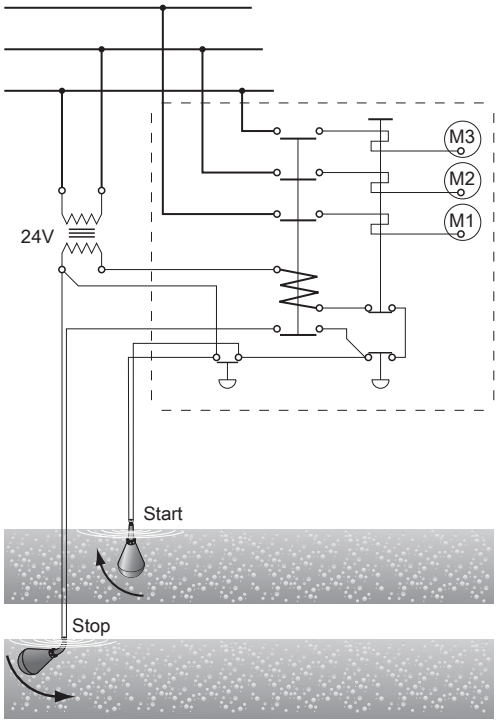
Figure 1

Wiring alternative

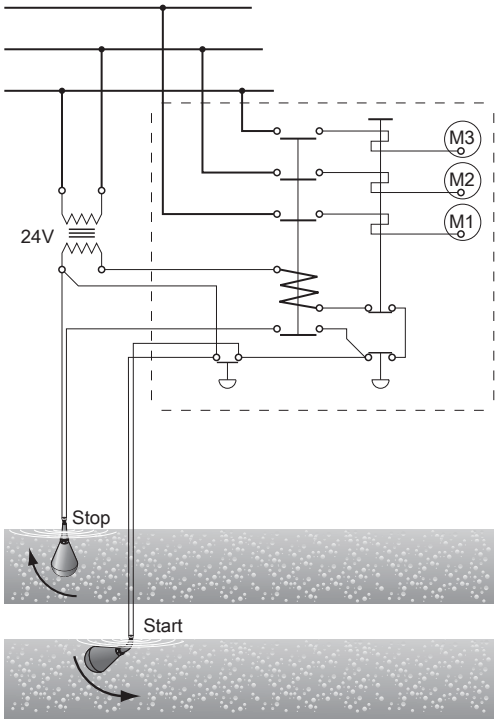
To conform to local regulations, the level regulators are normally connected through a transformer to a low-tension control circuit.

Two regulators are used; one for starting and one for stopping. A third regulator can be connected if an alarm is required at a given level.

Identical regulators can be used for all functions.



Connect the gray and black leads.



Connect the gray and brown leads.

Insulate the brown lead.
Figure 2: Connected for emptying

Insulate the black lead.
Figure 3: Connected for emptying

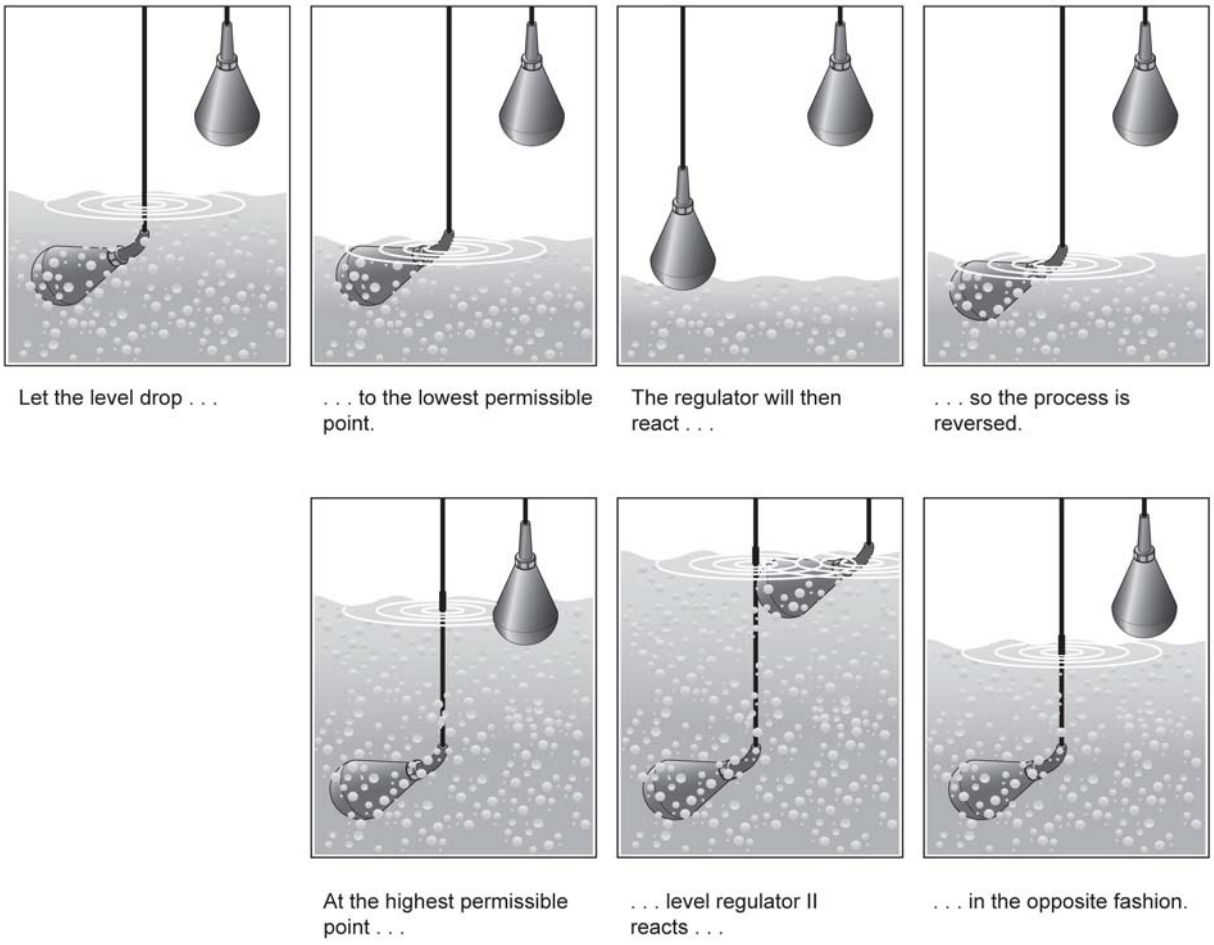


Figure 4

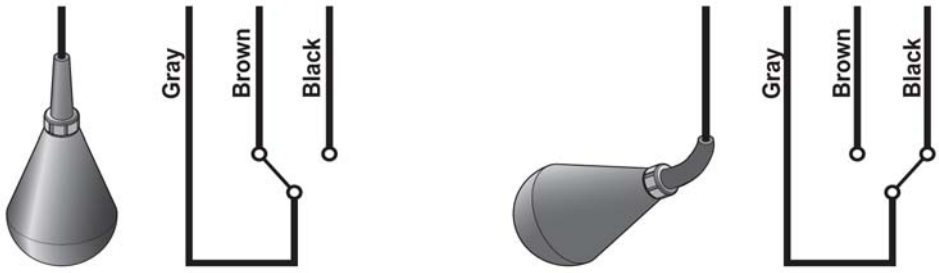


Figure 5: Colour code

Maintenance and repair

ENM-10 is very durable and practically maintenance free. You only have to check on it occasionally, to ensure its continual operation.

- It is recommended to occasionally clean ENM-10, and especially when fat/grease covers the plastic surface.
- At the same time, make an occular inspection of the regulator to make sure neither cable, protective sleeve or plastic casing show any signs of damage.

- A damaged ENM-10 cannot be repaired in any way, due to the hermetic encapsulation. If the unit is found to be damaged, replace it with a new one.
- For Ex-installations, also make absolutely sure that the Ex-barrier (e.g. Prod. no. 84 01 07) is operating correctly - The LED changes when the switch is toggled.

The manufacturers reserve the right to alter performance specification or design without notice.

CHEMICAL RESISTANCE LIST

Chemical resistance list

The liquid in which level regulation is practiced most frequently is, of course, water. Of the millions of regulators in use all over the world today, it is estimated that nine out of ten work in water.

However, with a float body of polypropylene, a cable of PVC or NBR/PVC nitrile/PVC rubber and a bending relief of EPDM rubber, the ENM-10 is virtually insensitive to many aggressive liquids.

The table shows how resistant the ENM-10 equipped with either PVC or NBR/PVC nitrile/PVC rubber cable, is to different chemicals at two different temperatures.

The classification is broken down into the following categories:

0 = No effect, 1 = Minor to moderate and 2 = Severe effect. The sign – means that information is not available.

Keep in mind also that the density of the liquid determines the bouyancy of the regulator. The ENM-10 is made for seven different densities. See *Product description* (page 2).

Always observe local regulations:

Take particular note of:

- risk of fire/explosion
- hygiene requirements

Acids	PVC cable		NBR/PVC nitrile/PVC rubber cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetic Acid 50%	1	2	0	0
Acetic Acid 75%	2	2	0	0
Benzoic Acid	2	2	0	0
Boric Acid 5%	0	—	0	0
Butyric Acid	2	2	2	2
Chromic Acid 10%	0	2	2	2
Citric Acid	0	1	0	0
Hydrobromic Acid 5%	1	2	0	0
Hydrochloric Acid 10%	0	1	0	1
Hydrochloric Acid 37%	1	2	0	2
Hydrocyanic Acid 10%	0	0	1	2
Hydrofluoric Acid 5%	0	2	0	1
Hypochloric Acid	1	2	2	2
Maleic Acid	2	2	2	2
Nitric Acid 5%	1	1	1	1
Nitric Acid 65%	2	2	2	2
Oleic Acid	1	2	2	2
Oxalic Acid 50%	1	1	1	2
Phosphoric Acid 25%	0	0	1	2
Phosphoric Acid 85%	0	0	1	2
Sulphuric Acid 10%	1	2	1	2
Sulphuric Acid 78%	2	2	2	2
Tannic Acid	0	0	0	0
Tartaric Acid	1	1	1	1
Bases				
Ammonium Hydroxide	0	—	0	0
Calcium Hydroxide	0	0	0	0
Potassium Hydroxide	1	2	0	0
Sodium Hydroxide	1	2	0	0

Salts	PVC cable		NBR/PVC nitrile/PVC rubber cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Aluminium Chloride	0	0	0	0
Calcium Sulphate	0	0	0	0
Calcium Chloride	0	0	0	0
Calcium Nitrate	0	0	0	0
Copper Chloride	0	0	0	0
Copper Sulphate	0	0	0	0
Ferric Chloride	0	0	0	0
Ferrous Sulphate	0	0	0	0
Magnesium Chloride	0	0	0	0
Potassium Sulphate	0	0	0	0
Potassium Nitrate	0	0	0	0
Potassium Carbonate	1	1	1	1
Potassium Bicarbonate	0	0	0	0
Sodium Sulphate	0	0	0	0
Sodium Chloride	0	0	0	0
Sodium Nitrate	0	0	0	0
Sodium Bicarbonate	0	0	0	0
Sodium Carbonate	0	0	0	0
Tin Chloride	1	1	1	1
Zinc Sulphate	0	0	0	0
Zinc Chloride	0	0	0	0
Oils				
Castor Oil	1	1	1	1
Cocoanut Oil	0	—	0	2
Corn Oil	2	2	2	2
Diesel Oil	2	2	2	2
Linseed Oil	2	2	2	2
Mineral Oils	2	2	2	2
Olive Oil	1	1	1	1
Silicone Oils	0	0	0	0

Solvents and miscellaneous	PVC cable		NBR/PVC nitrile/PVC rubber cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Aceton	2	2	2	2
Aniline	2	2	1	2
Benzene	2	2	2	2
Butyl Alcohol	2	2	0	1
Carbon Tetrachloride	2	2	2	2
Chlorobenzene	2	2	2	2
Chloroform	2	2	2	2
Ethyl Alcohol	2	2	0	1
Ethyl Ether	2	2	2	2
Ethyl Acetate	2	2	2	2
Ethylene Dichloride	2	2	2	2
Ethylene Chloride	2	2	2	2
Formaldehyde 37%	1	2	0	0
Gasoline	2	2	2	2
Kerosene	2	2	2	2
Methyl Alcohol	2	2	0	0
Methyl Ethyl Ketone	2	2	2	2
Methylene Chloride	2	2	2	2
Nitrobenzene	2	2	2	2
Phenol	2	2	2	2
Toluene	2	2	2	2
Trichlorethylene	2	2	2	2
Turpentine	2	2	2	2
Xylene	2	2	2	2
Gases				
Carbon Dioxide	0	0	0	0
Carbon Monoxide	0	0	0	0
Chlorine (wet)	2	2	2	2
Hydrogen Sulphide	0	0	1	1
Sulphur Dioxide (wet)	1	1	2	2

0 = No effect, 1 = Minor to moderate, 2 = Severe effect. – = No information available.

Figure 6

PRODUCT RANGE

Product range

Part no.	For density [g/cm³]	Color of level switch	Type of cable	Cable length [m]	Approvals	For market	Notes
5828800	0,65-0,80	Blue	1	20	CE		
5828801	0,80-0,95	Blue	1	20	CE		
5828802	0,95-1,10	Blue	1	6	CE		
5828803	0,95-1,10	Blue	1	13	CE		
5828804	0,95-1,10	Blue	1	20	CE		
5828805	1,05-1,20	Blue	1	20	CE		
5828806	1,2-1,3	Blue	1	20	CE		
5828807	1,3-1,4	Blue	1	20	CE		
5828808	1,4-1,5	Blue	1	20	CE		
5828809	0,65-0,80	Grey	5	20	CSA/CE	Canada	
5828810	0,80-0,95	Grey	5	20	CSA/CE	Canada	
5828811	0,95-1,10	Grey	5	6	CSA/CE	Canada	
5828812	0,95-1,10	Grey	5	13	CSA/CE	Canada	
5828813	0,95-1,10	Grey	5	20	CSA/CE	Canada	
5828814	1,05-1,20	Grey	5	20	CSA/CE	Canada	
5828815	1,2-1,3	Grey	5	20	CSA/CE	Canada	
5828816	1,3-1,4	Grey	5	20	CSA/CE	Canada	
5828817	1,4-1,5	Grey	5	20	CSA/CE	Canada	
5828818	0,65-0,80	Grey	1	20	CSA/CE	Canada	
5828819	0,80-0,95	Grey	1	20	CSA/CE	Canada	
5828820	0,95-1,10	Grey	1	6	CSA/CE	Canada	
5828821	0,95-1,10	Grey	1	13	CSA/CE	Canada	
5828822	0,95-1,10	Grey	1	20	CSA/CE	Canada	
5828823	1,05-1,20	Grey	1	20	CSA/CE	Canada	
5828824	1,2-1,3	Grey	1	20	CSA/CE	Canada	
5828825	1,3-1,4	Grey	1	20	CSA/CE	Canada	
5828826	1,4-1,5	Grey	1	20	CSA/CE	Canada	
5828827	0,65-0,80	Blue	2	20	CE	USA	
5828828	0,80-0,95	Blue	2	20	CE	USA	
5828829	0,95-1,10	Blue	2	6	CE	USA	
5828830	0,95-1,10	Blue	2	13	CE	USA	
5828831	0,95-1,10	Blue	2	20	CE	USA	
5828832	1,05-1,20	Blue	2	20	CE	USA	
5828833	1,2-1,3	Blue	2	20	CE	USA	
5828834	1,3-1,4	Blue	2	20	CE	USA	
5828835	1,4-1,5	Blue	2	20	CE	USA	
5828836	0,95-1,10	Grey	5	30	CSA/CE	Canada	
5828837	0,95-1,10	Grey	5	50	CSA/CE	Canada	
5828838	0,95-1,10	Grey	5	100	CSA/CE	Canada	
5828839	0,95-1,10	Grey	5	150	CSA/CE	Canada	
5828851	0,95-1,10	Red	3	65	CE		
5828852	0,95-1,10	Red	3	6	CE		
5828853	0,95-1,10	Red	3	13	CE		
5828854	0,95-1,10	Red	3	20	CE		
5828855	0,95-1,10	Red	3	6	CSA/CE	Canada	
5828856	0,95-1,10	Red	3	13	CSA/CE	Canada	
5828857	0,95-1,10	Red	3	20	CSA/CE	Canada	

Cont. →

Figure 7

5828858	0,95-1,10	Red	4	6	CE	USA	
5828859	0,95-1,10	Red	4	13	CE	USA	
5828860	0,95-1,10	Red	4	20	CE	USA	
5828870	0,65-0,80	Blue	5	20	CE		
5828871	0,80-0,95	Blue	5	20	CE		
5828872	0,95-1,10	Blue	5	6	CE		
5828873	0,95-1,10	Blue	5	13	CE		
5828874	0,95-1,10	Blue	5	20	CE		
5828875	1,05-1,20	Blue	5	20	CE		
5828876	1,2-1,3	Blue	5	20	CE		
5828877	1,3-1,4	Blue	5	20	CE		
5828878	1,4-1,5	Blue	5	20	CE		
5828879	0,95-1,10	Blue	1	65	CE		
5828880	0,95-1,10	Blue	1	30	CE		
5828881	0,95-1,10	Blue	1	50	CE		
5828882	0,95-1,10	Grey	1	30	CSA/CE	Canada	
5828883	0,95-1,10	Grey	1	50	CSA/CE	Canada	
5828884	0,95-1,10	Blue	2	30	CE	USA	
5828885	0,95-1,10	Blue	2	50	CE	USA	
5828886	0,95-1,10	Red	3	30	CE		
5828887	0,95-1,10	Red	3	50	CE		
5828890	0,95-1,10	Blue	5	30	CE		
5828891	0,95-1,10	Blue	5	50	CE		
5828892	0,95-1,10	Red	3	6	CE	Japan	
5828893	0,95-1,10	Red	3	13	CE	Japan	
5828894	0,95-1,10	Red	3	20	CE	Japan	
5828895	0,95-1,10	Blue	1	6	CE	Japan	
5828896	0,95-1,10	Blue	1	13	CE	Japan	
5828897	0,95-1,10	Blue	1	20	CE	Japan	
5828898	0,95-1,10	Blue	1	50	CE	Japan	
5947919	0,95-1,10	Blue	5	20	CE		Designed for low current and slow movements
5947920	0,95-1,10	Grey	5	20	CSA/CE		Designed for low current and slow movements

Type of cable:

1. Blue PVC jacket with color coding of wires: Grey/Brown/Black
2. Blue PVC jacket with color coding of wires: Red/White/Black
3. Red PVC jacket with color coding of wires: Grey/Brown/Black
4. Red PVC jacket with color coding of wires: Red/White/Black
5. BLACK NBR/PVC jacket with color coding of wires: Grey/Brown/Black (NBR=Nitrile rubber)

Xylem |ˈzīləm|

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2) A leading global water technology company

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Visit our Web site for the latest version of this document and more information

The original instruction is in English. All non-English instructions are translations of the original instruction.

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Project name: AMARUQ

Project#: 5000218009

Document #: SPK_0003_CTF

by: GH

chkd: GP

appvd: CB

CENTRIFUGE

PUMPS

OIM manual section: 4.3.3.4

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CS-999-011 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
Sulzer	ST-999-011	P6-011		CENTRATE SUMP PUMP	Sulzer pump Duty Point 20m3/h @ 8m H20, Tag: P6-011 & P6-021 // Submersible Ejector Model #EJ15D-2,1.5HP-1710RPM,575/60/3,complete with contrablock impeller system,double mechanical seals, 2" Discharge,20ft Cable (External Overload Protection by Others)	Lifting Chain, 10ft Galvanized		CENTRIFUGE		
Sulzer	ST-999-011	P6-021		CENTRATE SUMP PUMP	Sulzer pump Duty Point 20m3/h @ 8m H20, Tag: P6-011 & P6-021 // Submersible Ejector Model #EJ15D-2,1.5HP-1710RPM,575/60/3,complete with contrablock impeller system,double mechanical seals, 2" Discharge,20ft Cable (External Overload Protection by Others)	Lifting Chain, 10ft Galvanized		CENTRIFUGE		

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MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled, non toxic oil
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120° C
Motor Protection	Single Phase: Internal thermal protection with automatic reset. Installer must provide circuit breaker for short circuit protection per N.E.C standards. Three Phase: Installer must provide external motor overload protection device such as a contactor w/ thermal relay, and circuit breaker for short circuit protection per N.E.C. standards.
Service Factor	1.15
Voltage Tolerance	± 10% from name plate rating

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Pole/ Speed (rpm)
EJ 15W-2	1*	1.5	230	15.0	59	L	4/1750
EJ 15D-2	3**	1.5	208-230	7.7-7.0	45-40	M	4/1750
	3**	1.5	460	3.5	20	M	4/1750
	3	1.5	575	2.8	16	M	4/1750

* Start switch and capacitor integrated into top of pump.

** These three phase motors are tri-voltage, 208/230/460.

MATERIALS of CONSTRUCTION

Upper Motor Lid	Cast Iron ASTM A48 Class 30
Motor Housing	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Bottom Plate	Cast Iron ASTM A48 Class 30
Impeller	Cast Iron ASTM A48 Class 30
Lifting Bail	AISI 304 Stainless Steel
Oil (motor & oil chamber)	Non-toxic white mineral oil (Marcol 52)
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Upper Bearing	Single row ball bearing
Lower Bearing(s)	Single row ball bearing
Upper Shaft Seal (secondary)	Rotating carbon face w/ stationary ceramic face.
Lower Shaft Seal (primary)	Rotating carbon face w/ stationary ceramic face. Includes V-ring lip seal for lower seal protection. Option: Silicon Carbide mechanical seal

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, lb. (kg)	90 (41) [EJ 15W-2], 84 (38) [EJ 15D-2]
Maximum submergence, ft. (m)	65 (20)
Discharge size, standard	2 inch horizontal
Discharge type	Flange with standard ANSI class 125 bolt pattern.
Maximum temp. of pumped fluid	40°C continuous, 50°C intermittent
Agency Approvals	Approved by CSA to UL 778 and CSA C22.2-108 standards

CABLE SPECIFICATIONS

POWER CABLE	VOLTAGE	DIAMETER	LENGTH	OUTER JACKET
14/3 SJEOOW (EJ 15W-2)	230	0.36in (9.2mm)	20 ft (6m)	Thermoplastic elastomer
16/4 SEOOW (EJ 15D-2)	208-230/460/575	0.43in (10.9mm)		

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4 – DETAILED TECHNICAL DOCUMENTATION

4.3 – SHOP DRAWINGS

4.3.4 – SULFURIC ACID DOSING SKID

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Project name:	AMARUQ
Project#:	5000218009
Document #:	SPK_0004_PCH
by:	GH
chkd:	GP
appvd:	CB

SUBMITTAL PACKAGE

SULFURIC ACID DOSING SKID

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Project name:	AMARUQ
Project#:	5000218009
Document #:	SPK_0004_PCH
by:	GH
chkd:	GP
appvd:	CB

SULFURIC ACID DOSING SKID

PROCESS DATASHEET

OIM manual section: 4.3.4.1

REFER TO 5000218009_PSDS_0004_PCH_VWT

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Project name: AMARUQ

Project#: 5000218009

Document #: SPK_0004_PCH

by: GH

chkd: GP

appvd: CB

SULFURIC ACID DOSING SKID

GENERAL ARRANGEMENT DRAWING

OIM manual section: 4.3.4.2

REFER TO 5000218009_GA_0004_PCH_VWT

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Project name: AMARUQ

Project#: 5000218009

Document #: SPK_0004_PCH

by: GH

chkd: GP

appvd: CB

SULFURIC ACID DOSING SKID

PUMP(S)

OIM manual section: 4.3.4.3

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CS-999-002 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
GRUNDFOS	ST-999-002	P9-531		SULFURIC ACID METERING PUMP	Grundfos // Fluid: Sulfuric acid dosing skid // PN 97722590 - DDA 17-7 AR-PV/T/C-F-31U7U7BG // PN 96609016, Input signal control cable, 4-20mA, pulse, start/stop // PN 96609019, Relay Output, Relay 1+2; tank Lvl error, stroke signal //			SULFURIC ACID DOSING SKID		
GRUNDFOS	ST-999-002	P9-532		SULFURIC ACID METERING PUMP	Grundfos // Fluid: Sulfuric acid dosing skid // PN 97722590 - DDA 17-7 AR-PV/T/C-F-31U7U7BG // PN 96609016, Input signal control cable, 4-20mA, pulse, start/stop // PN 96609019, Relay Output, Relay 1+2; tank Lvl error, stroke signal //			SULFURIC ACID DOSING SKID		

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GRUNDFOS

Company name:
Created by:
Phone:

Date: 4/6/2018

Position	Count	Description
	1	**DDA 17-7**

Product photo could vary from the actual product

Product No.: 97722590
DDA 17-7 AR-PV/T/C-F-31U7U7BG

The SMART Digital DDA is a compact positive displacement, diaphragm dosing pump with variable-speed drive (stepper motor) and intelligent control electronics with minimum energy consumption. The SMART Digital Dosing series operates at full stroke length to ensure optimum accuracy, priming and suction, even for high-viscosity or degassing liquids. The duration of each discharge stroke varies according to the capacity set, resulting in optimum smooth and continuous discharge flow.
The click-stop mounting plate allows installation in three different positions without using any additional accessories. The control cube can be turned easily into front, left or right position. The click wheel and the multi-coloured backlit graphical, plain-text LC display make commissioning and operation intuitive. The control elements are protected by a transparent cover.

The dosing head is composed of:
- Long lifetime and universal, chemically resistant full-PTFE diaphragm.
- Double ball valves for highest dosing accuracy.
- Deaeration valve for easy start-up.

Operation modes:
- Manual dosing in ml/h, l/h or gph.
- Pulse control in ml/pulse (incl. memory function).
- Analog control 0/4-20 mA (scalable).
- Pulse-based batch function in ml, l or gal.
- Timer-based batch function (Dosing timer, cycle or week).
- Fieldbus control (Genibus prepared for ProfibusDP E-box).

Other features:
- Auto deaeration during pump standby to avoid breakdowns due to air-locking.
- Two SlowMode steps (anti-cavitation), 50 % (maximum flow: 8.5 l/h) and 25 % (maximum flow: 4.25 l/h), e.g. for high-viscosity or degassing liquids.
- Service information display to show when service and which wear-part order number is required.
- Two-step key lock function to protect the pump against unauthorised access.
- Additional display function to provide further information, e.g. the actual mA input signal.
- Counter for total dosed volume (resettable), operating hours, etc.
- Save and load customised settings as well as reload of factory settings.

Signal inputs/outputs:
- Input for pulse, analog 0/4-20mA, external stop.
- Input for low-level and empty-tank signal.
- Two potential-free output relays for max. 30 V AC/DC (configurable, e.g. alarm, stroke signal, pump dosing, timer etc.)
- Output analog 0/4-20mA.
- Fieldbus communication interface (GeniBus, also for additional Profibus DP E-box to retrofit).

Technical:

GRUNDFOS

Company name:
Created by:
Phone:

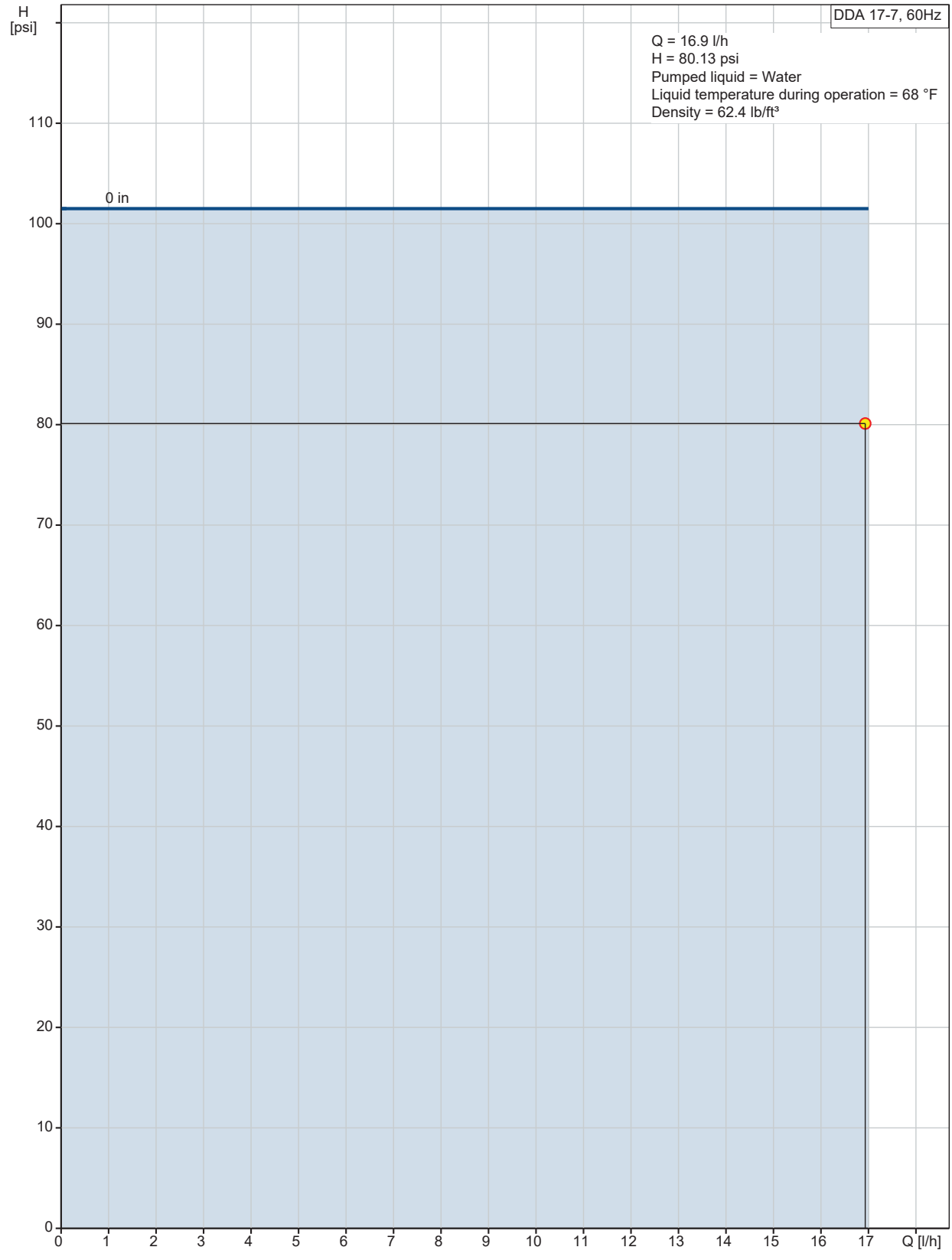
Date: 4/6/2018

Position	Count	Description	
		Type key:	DDA 17-7 AR-PV/T/C-F-31U7U7BG
		Max. Flow:	17 l/h
		Max. flow in slow mode 50%:	8.5 l/h
		Max. flow in slow mode 25%:	4.25 l/h
		Min flow:	17,0 ml/h
		Turn-down ratio:	1:1000
		Approvals on nameplate:	CE,CSA-US,NSF61,RCM
		Valve type:	Standard
		Maximum viscosity at 100 %:	300 mPas
		Maximum viscosity in slow mode 50 %:	1300 mPas
		Maximum viscosity in slow mode 25 %:	2500 mPas
		Accuracy of repeatability:	1 %
		Materials:	
		Dosing head:	PVDF (Polyvinylidene fluoride)
		Valve ball:	Ceramic
		Gasket:	PTFE
		Installation:	
		Range of ambient temperature:	32 .. 113 °F
		Maximum operating pressure:	101.53 psi
		Installation set:	NO
		Installation type:	No installation set
		Pump inlet:	0.17x 1/4, 1/4x3/8, 3/8x1/2"
		Pump outlet:	0.17x 1/4, 1/4x3/8, 3/8x1/2"
		Max. Suction lift during operation:	19.7 ft
		Max. Suction lift during priming:	9.84 ft
		Liquid:	
		Pumped liquid:	Water
		Liquid temperature range:	14 .. 113 °F
		Liquid temperature during operation:	68 °F
		Density:	62.4 lb/ft³
		Electrical data:	
		Maximum power input - P1:	24 W
		Main frequency:	60 Hz
		Rated voltage:	1 x 100-240 V
		Enclosure class (IEC 34-5):	IP65 / NEMA 4X
		Length of cable:	4.92 ft
		Type of cable plug:	USA, Canada
		Inrush current:	25A at 230V for 2ms
		Controls:	
		Control variant:	AR
		Level control:	YES
		Analog input:	0/4-20 mA
		Pulse control:	YES
		Ext. Stop input:	YES
		Analog output:	0/4-20 mA
		Output relays:	2
		Bus communication:	YES
		Others:	
		Net weight:	6.62 lb
		Gross weight:	8.82 lb
		COLOR:	RED
		Custom tariff no.:	8413.50.0050

Company name:
Created by:
Phone:

Date: 4/6/2018

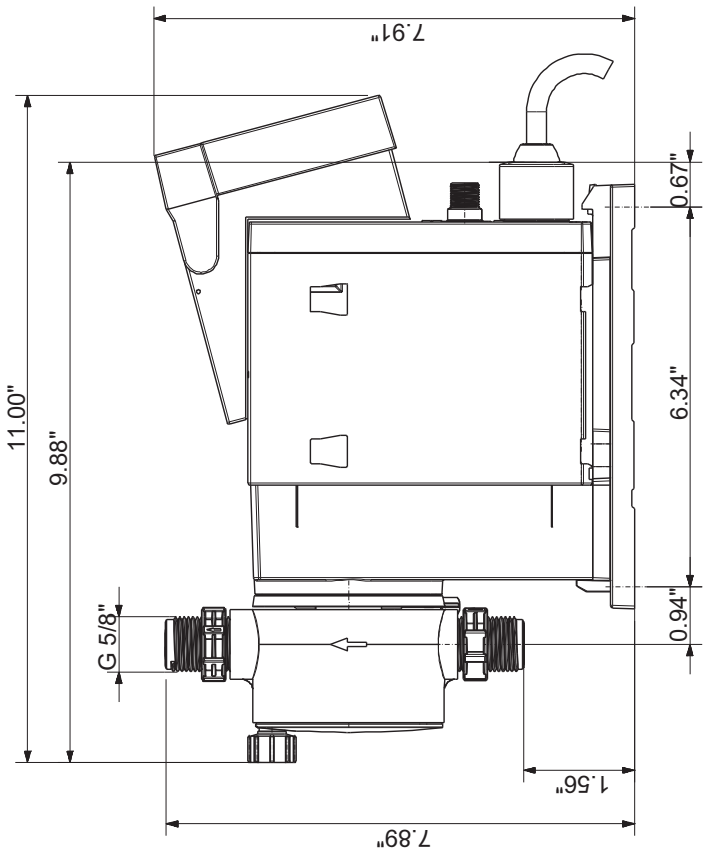
97722590 DDA 17-7 60 Hz

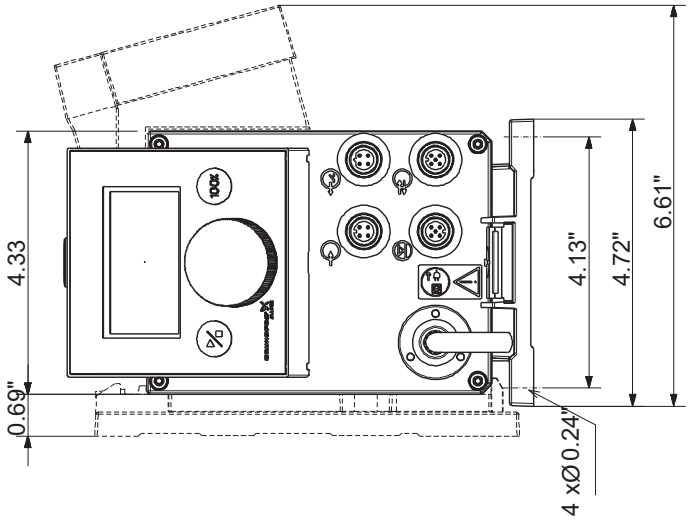


Company name:
Created by:
Phone:

Date: 4/6/2018

97722590 DDA 17-7 60 Hz





Note! All units are in [mm] unless otherwise stated.
Disclaimer: This simplified dimensional drawing does not show all details.

Project name: AMARUQ

Project#: 5000218009

Document #: SPK_0004_PCH

by: GH

chkd: GP

appvd: CB

SULFURIC ACID DOSING SKID

VALVES

OIM manual section: 4.3.4.4

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CS-301-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPD207828	P9-531-V001	DIA: 13 mm (1/2")	ISOLATION VALVE (SUCTION)	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		
CHEMLINE	VABLPD207828	P9-531-V002	DIA: 13 mm (1/2")	ISOLATION VALVE (SUCTION)	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		
CHEMLINE	VABLPD207828	P9-531-V003	DIA: 13 mm (1/2")	ISOLATION VANNE (DISCHARGE)	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPD207828	P9-531-V004	DIA: 13 mm (1/2")	ISOLATION VANNE (DISCHARGE)	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		
CHEMLINE	VABLPD207828	P9-531-V005	DIA: 13 mm (1/2")	CLEANING VALVE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		
CHEMLINE	VABLPD207828	P9-532-V001	DIA: 13 mm (1/2")	ISOLATION VALVE (SUCTION)	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		
CHEMLINE	VABLPD207828	P9-532-V002	DIA: 13 mm (1/2")	ISOLATION VALVE (SUCTION)	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPD207828	P9-532-V003	DIA: 13 mm (1/2")	ISOLATION VANNE (DISCHARGE)	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		
CHEMLINE	VABLPD207828	P9-532-V004	DIA: 13 mm (1/2")	ISOLATION VANNE (DISCHARGE)	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		
CHEMLINE	VABLPD207828	P9-532-V005	DIA: 13 mm (1/2")	CLEANING VALVE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		
CHEMLINE	VABLPD207828	PD9-531-V002	DIA: 13 mm (1/2")	CLEANING VALVE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPD207828	V9-536	DIA: 13 mm (1/2")	DRAIN VALVE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		
CHEMLINE	VABLPD207828	V9-537	DIA: 13 mm (1/2")	ISOLATION VALVE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		
PRIMARY FLUID	VABLPD207828	PD9-531-V001	DIA: 13 mm (1/2")	ISOLATION VALVE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-K-005-V-CF+(2x)21005-4K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF (ASTM D-3222)// SEAL | SEAT :PTFE | VITON// STEM : PVDF			SULFURIC ACID DOSING SKID		

PDF Published March 1, 2013

Type 21 Ball Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

The Chemline Type 21 True Union Ball valve incorporates state of the art features for long term performance. This is a full port, full blocking True Union valve pressure rated at 16 bar (230 psi)[4]. Double stem o-rings and Safety Shear stem design provide for a high degree of safety on hazardous fluid applications. All sizes have an ISO standard actuator mounting platform integral to the valve body. This provides for sturdy and secure mounting of pneumatic or electric actuators.

PVC | CPVC | PP | PVDF

CRN Registered Consult Chemline

NSF[5] Certified to NSF/ANSI 61

SERIES: Type 21

SIZES: 3/8" – 4"

ENDS: Socket, Threaded, Flanged, Butt[1] or ChemFlare™

SEATS: PTFE

SEALS[2]: EPDM, FKM (Viton®), CPE[3]

features

Pressure rated to 230 psi[4]
- Provides a high factor of safety

Integral Actuator Mounting Platform
- Actuation is easy. Electric or pneumatic actuators may be mounted in the field.

Full Port
- High capacity and low pressure drops

Fully Blocking
- Downstream union nut may be safely disassembled for piping maintenance while valve is closed off under full system pressure

Built-In Spanner Wrench
- Top of the handle is designed to be used as a tool for accessing internal parts

Safety Shear Stem Design
- Stem has double o-rings
- Designed to hold full pressure even if stem breaks due to excessive torque

High Chemical Resistant Material
- PVC and CPVC compounds have an "A" chemical resistance rating as per ASTM D-1784. They have outperformed other PVC and CPVC compounds on aggressive chemicals.

[1] Butt ends for fusion to Chemline metric PP, PVDF or ECTFE (Halar®) piping.
[2] Other materials are available.
[3] CPE=Chlorinated Polyethylene.
[4] PVC, CPVC and PVDF 1/2" to 2" are rated at 230 psi; 2-1/2" to 4" and all size PP valves are rated at 150 psi at 20°C.
[5] PVC valves with EPDM or FKM (Viton®) seals are certified under NSF/ANSI Standard 61 for contact with drinking water.

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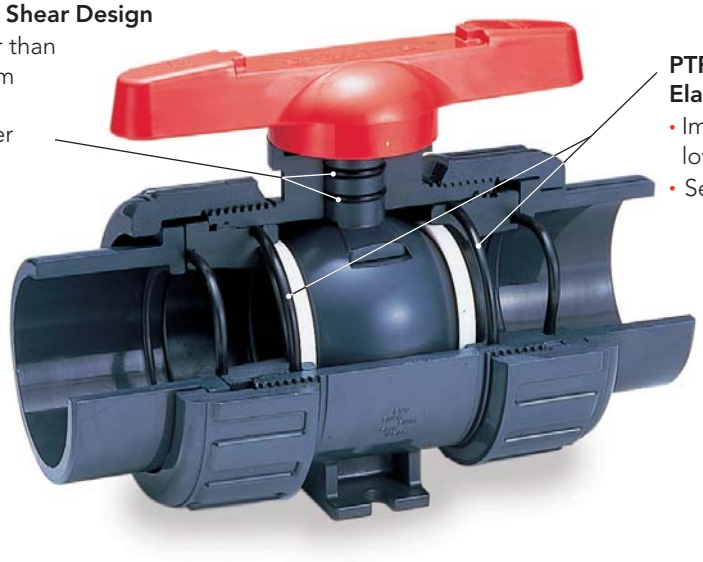
Type 21 Ball Valves

features

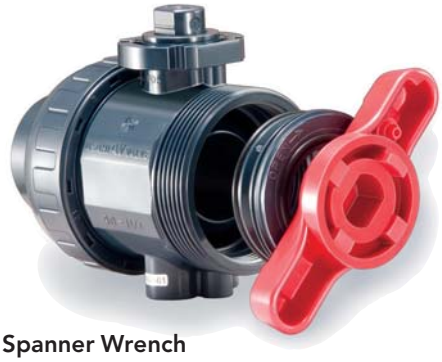
Double Stem O-Rings – Safety Shear Design

- Upper o-ring groove is deeper than lower. In case of excessive stem torque, stem will shear at the upper groove, leaving the inner o-ring intact to seal against full line pressure.



PTFE Seats have Elastomer Cushions

- Improved sealing while lowering stem torques
- Self adjusts for seat wear



Built in Spanner Wrench

- For removing or tightening the seat carrier
- All parts are replaceable

Integral Actuator Mounting Platform

- Actuation is easy. Electric or pneumatic actuators may be mounted in the field. Simply pull off the handle to reveal a standard ISO 5211 mounting platform which accepts bolt-on hardware.

Fully Blocking

- Downstream pipe may be removed while upstream side is still pressurized. This may be done with valve installed in either direction.

Base Mounting Pad

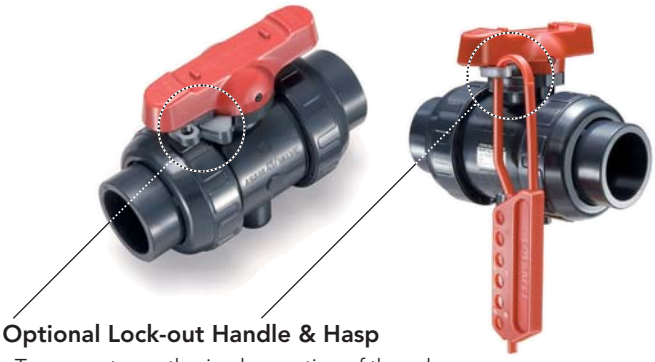
- Optional threaded inserts allow valves to be securely anchored
- Supplied standard with actuated valves

Type 21 Ball Valves

options + accessories

ChemFlare™ Ends

- For connection to PFA tube. Leak-free connections for difficult services such as sodium hypochlorite



Optional Lock-out Handle & Hasp

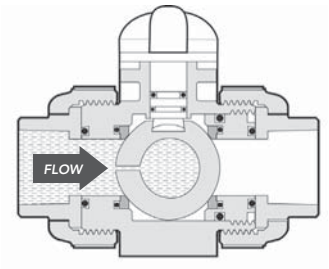
- To prevent unauthorized operation of the valve
- Used during maintenance shut-downs

One-piece moulded PVC and CPVC 6" socket ends

- Allows installation of 4" valve in 6" line
- Factory moulded, not fabricated with couplings and reducers cemented together
- Fixed to valve mechanically just like the one-piece moulded factory flanges

Different Colour Handles

- Choose a handle colour other than standard red for colour coding different services



Vented Ball

- For sodium hypochlorite services at any concentration
- Valve shown in closed position

electric + pneumatic actuation

Pneumatic and Electric Actuators

- A complete range of actuators and control accessories are available, mounted to valves using PPG plastic brackets and stainless steel couplings. Refer to separate data sheets.

Electromni® Electric

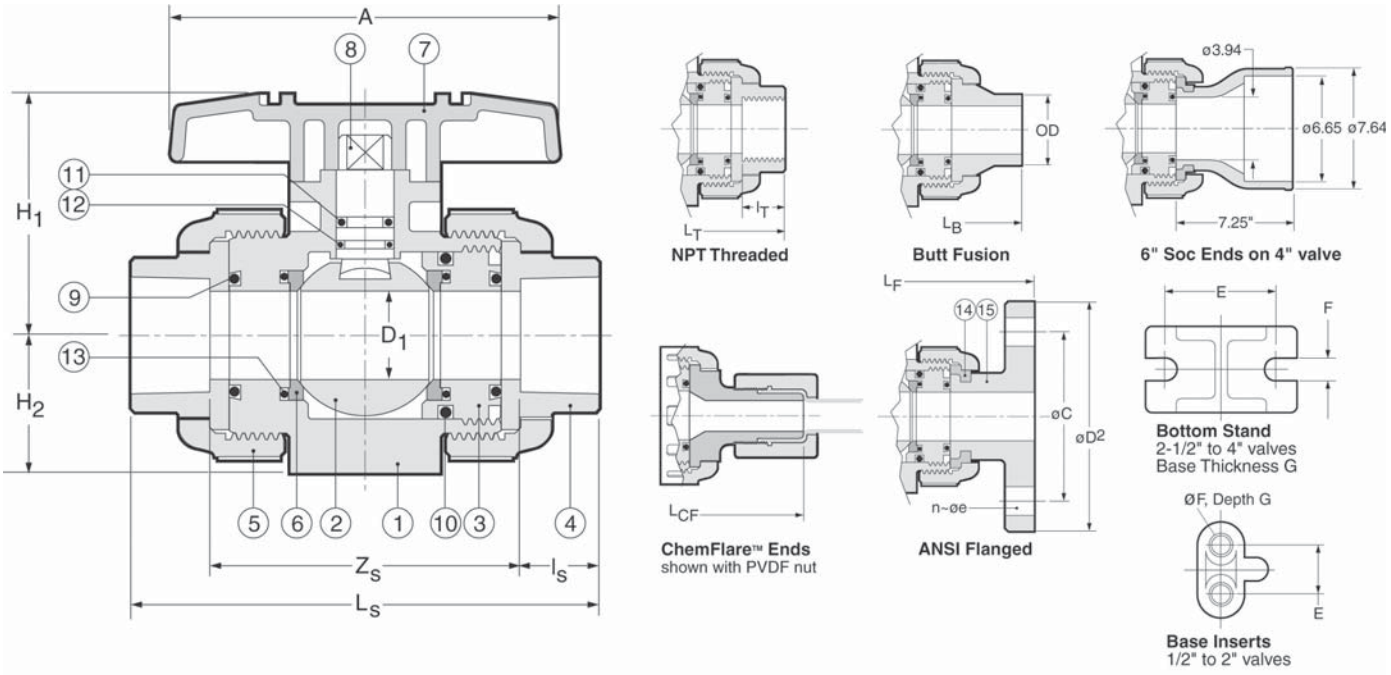
Q Series Electric

A Series Electric

V Series Electric
with Local Control Station

PA Series Pneumatic

Type 21 Ball Valves



PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, CPVC, PP, PVDF
2	Ball	1	PVC, CPVC, PP, PVDF
3	Carrier[1]	1/2	PVC, CPVC, PP, PVDF
4	End Connector	2	PVC, CPVC, PP, PVDF
5	Union Nut	2	PVC, CPVC, PP, PVDF
6▲	Ball Seat	2	PTFE
7	Handle	1	ABS

[1] 1 carrier for sizes 1/2" to 2", 2 carriers for sizes 2-1/2" to 4"
[2] EPDM seals standard with PVC, CPVC, PP; FKM (Viton®) with PVDF valves
[3] 2 pcs 1/2" to 2", 6 pcs 2-1/2" to 4"

PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
8	Stem	1	PVC, CPVC, PP, PVDF
9▲	Face O-Ring[2]	2	EPDM, FKM (Viton®)
10▲	Carrier O-Ring[2]	2	EPDM, FKM (Viton®)
11▲	Upper Thicker Stem O-Ring[2]	1	EPDM, FKM (Viton®)
12▲	Lower Thinner Stem O-Ring[2]	1	EPDM, FKM (Viton®)
13	Seat Cushion[2]	2	EPDM, FKM (Viton®)
14	Flange Retainer[3]	2/6	PVDF
15	Flange	2	PVC, CPVC, PP, PVDF

DIMENSIONS INCHES

					End Connections														Valve Base		
					Socket			Threaded		Factory Flanged					Butt		ChemFlare™				
Size	D Bore	A	H_1	H_2	L_S	Z_S	l_S	l_T	L_T	L_F	D_2	C	n	e	L_B	OD	L_{CF}	Tube[4]	E	F[5]	G
1/2"	.59	3.6	2.03	1.14	4.45	2.70	.875	.64	4.02	5.63	3.50	2.38	4	.62	4.88	.79	6.12	1/2"	.75	.29	.43
3/4"	.79	3.9	2.34	1.38	5.08	3.08	1.00	.65	4.72	6.77	3.88	2.75	4	.62	5.67	.98	6.52	3/4"	.75	.29	.43
1"	.98	4.3	2.68	1.54	5.75	3.50	1.13	.81	5.16	7.36	4.25	3.12	4	.62	6.06	1.26	7.26	1"	.75	.29	.43
1-1/4"	1.22	4.8	3.17	1.85	6.46	5.21	1.25	.85	5.91	7.48	4.62	3.50	4	.62	6.85	1.57	9.58	1-1/4"	1.18	.35	.59
1-1/2"	1.57	5.2	3.50	2.17	7.24	4.49	1.38	.85	6.42	8.35	5.00	3.88	4	.62	7.64	1.97	–	–	1.18	.35	.59
2"	2.01	6.3	4.02	2.60	8.23	5.23	1.50	1.90	7.76	9.21	6.00	4.75	4	.75	8.82	2.48	–	–	1.18	.35	.59
2-1/2"	2.28	7.87	4.96	2.83	9.45	5.95	1.75	1.21	8.46	10.20	7.00	5.49	4	.75	9.72	2.95	–	–	1.89	.35	.23
3"	2.70	9.45	5.51	3.35	11.10	7.35	1.88	1.30	10.39	11.97	7.50	6.00	4	.75	11.61	3.54	–	–	2.17	.43	.28
4"	3.54	11.81	7.01	4.33	13.88	9.87	2.00	1.38	14.17	14.65	9.00	7.50	8	.75	14.76	4.33	–	–	2.56	.43	.32

[4] ChemFlare™ ends are available for reduced tube sizes down to 1/4".
[5] Optional threaded inserts: 1/2" to 1" valves – UNC 1/4"-20; 1-1/4" to 2" valves – UNC 5/16"-18. 'Recoil' brand inserts require drilling before insertion.

Type 21 Ball Valves

WORKING PRESSURES PSI, Water, Non-Shock

VACUUM RATING • 29.9 inches mercury

Size	PVC			CPVC						PP			PVDF				
	20°C 68°F	40°C 104°F	50°C 122°F	20°C 68°F	40°C 104°F	50°C 122°F	60°C 140°F	80°C 176°F	90°C 194°F	20°C 68°F	60°C 140°F	80°C 176°F	20°C 68°F	40°C 104°F	60°C 140°F	80°C 176°F	100°C 212°F
1/2"– 2"	230	165	150	230	165	150	120	75	55	150	85	55	230	185	150	110	85
2-1/2"– 4"	150	150	150	150	150	150	120	75	55	150	70	40	150	150	150	110	85

Temperature Ranges: PVC 0 to 60°C (32 to 140°F), **CPVC** 0 to 95°C (32 to 203°F), **PP** –20 to 80°C (–4 to 176°F), **PVDF** –40 to 100°C (–40 to 212°F)

WEIGHTS LB. THREADED or SOCKET

WEIGHTS LB. FLANGED

Size	PVC	CPVC	PP	PVDF	PVC	CPVC	PP	PVDF
1/2"	0.4	0.4	0.4	0.4	0.9	0.9	0.7	1.1
3/4"	0.7	0.7	0.7	0.9	1.3	1.5	1.1	1.5
1"	0.9	1.1	0.9	1.1	1.8	2.0	1.5	2.2
1-1/4"	1.5	1.5	1.3	1.8	2.6	2.9	2.0	3.3
1-1/2"	2.4	2.6	1.5	2.9	3.7	4.0	2.6	4.4
2"	4.0	4.4	2.6	4.9	5.5	6.0	4.0	8.2
2-1/2"	5.1	5.5	3.7	6.2	7.3	7.7	5.3	8.8
3"	8.2	8.8	5.5	9.9	10.1	11.0	7.5	12.6
4"	19.4	21.8	13.2	24.9	21.6	23.4	15.4	26.7

Cv VALUES VS. BALL ANGLE

Size	0%	25%	50%	75%	100%
1/2"	0	0.35	1.3	5.5	14.
3/4"	0	0.73	2.8	11.5	29.
1"	0	1.2	4.5	18.6	47.
1-1/4"	0	1.8	6.8	28.4	72.
1-1/2"	0	3.9	14.7	61.2	155.
2"	0	4.8	18.0	75.0	190.
2-1/2"	0	9.1	34.7	144.0	365.
3"	0	10.2	39.0	162.0	410.
4"	0	17.0	64.6	269.0	680.

SAMPLE SPECIFICATION

1. All True Union Ball Valves in PVC, CPVC, PP or PVDF shall be Chemline Type 21 or equal sizes 1/2" to 2" in PVC, CPVC, and PVDF rated at 230 psi and in PP 150 psi maximum working pressure. Sizes 2-1/2", 3" and 4" rated at 150 psi maximum working pressure with EPDM, FKM (Viton®) or CPE seals. Ball seats shall be PTFE with elastomer cushions for closure with minimum stem torques.
2. All valves will have Safety Shear stem design, blowout-proof with double o-rings for safety. The top o-ring groove shall be deeper so that if the stem breaks off under excessive torque the lower o-ring will remain intact and the valve will hold pressure.
3. All valves shall be full port and two-way blocking design.
4. All valves will be CRN (Canadian Registration Number) registered with TSSA.
5. PVC valves with EPDM or FKM (Viton®) seals shall be certified under NSF/ANSI Standard 61 for contact with drinking water.
6. All valves shall have chemical resistant labels permanently marked with manufacturing number to provide production level traceability.
7. PVC compound shall have an ASTM cell classification 12454-A with a minimum suffix "A" designation for chemical resistance as per ASTM D-1784 (CSA report LO 4000-172).
8. CPVC compound shall have an ASTM cell classification 23567-A with a minimum suffix "A" designation for chemical resistance as per ASTM D-1784.
9. PP material will conform to ASTM D-4101 PP 021 B 67272 material requirements.
10. PVDF material shall be unpigmented conforming to ASTM D-3222 material requirements and to be USDA Title 21 Chapter 1 Part 177. 2510 requirements for contact with food.
11. Socket ends in PVC and CPVC shall be Schedule 80 and conform to ASTM D-2467.
12. Threaded ends shall be Schedule 80 and conform to ASTM D-2464.
13. Butt fusion ends in PP or PVDF will be compatible with Chemline PP or PVDF metric piping systems.
14. Flanged ends shall be ANSI Class 150 one-piece factory moulded (not fabricated) to ensure maximum strength and close tolerance end to end dimensions.

ORDERING EXAMPLE

Chemline True Union Ball Valves	21	A	020	E	S
Body Material	**A** – PVC **B** – PP	**C** – CPVC **K** – PVDF			
Size[1]	**002** – 1/4" **010** – 1" **025** – 2-1/2"	**003** – 3/8" **012** – 1-1/4" **030** – 3"	**005** – 1/2" **015** – 1-1/2" **040** – 4"	**007** – 3/4" **020** – 2" **060** – 6"	
Seals	**E** – EPDM	**V** – FKM (Viton®)	**C** – CPE	**B** – Nitrile	**A** – Aflas®
Ends	**S** – Socket	**T** – Threaded	**F** – Flanged	**B** – Butt[2]	**CF** – ChemFlare™

Example: Chemline Type 21 True Union Ball Valve, PVC, 2", with EPDM seals, socket ends.

[1] 1/4" is normally the 3/8" valve reduced. 6" is 4" valve with 6" end connections.

[2] PP, PVDF and ECTFE (Halar®) metric butt fusion ends (1/2" to 4") connect to Chemline PP, PVDF and ECTFE (Halar®) piping systems.

OTHER OPTIONS & ACCESSORIES

- **Alternate O-Ring Seals**
- **Stem Extensions** made to any length
- **Limit Switches** – For open and/or closed position indication
- **Municipal Operating Nut**
- **Lubrication-free Valves** – Factory clean room assembled
- **Vented Ball** – For sodium hypochlorite applications

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

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CS-303-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VARFPD200193	PRV9-531	DIA: 13 mm (1/2")	RELIEF VALVE	TYPE: RELIEF VALVE | 150#//MANUFACTURER : CHEMLINE//MODEL : SB12K005VCFx+(2x)SB005-17K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF// SEAL | SEAT :VITON | VITON// STEM : N/A			SULFURIC ACID DOSING SKID		
CHEMLINE	VARFPD200193	PRV9-532	DIA: 13 mm (1/2")	RELIEF VALVE	TYPE: RELIEF VALVE | 150#//MANUFACTURER : CHEMLINE//MODEL : SB12K005VCFx+(2x)SB005-17K8N-1//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF// SEAL | SEAT :VITON | VITON// STEM : N/A			SULFURIC ACID DOSING SKID		

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PDF Published September 17, 2014

SB12 Series Back Pressure/Relief Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

PVC PP PVDF

CRN Registered as Category C Fittings Consult Chemline

NSF[3] Certified to NSF/ANSI 61

SERIES: SB12

SIZES: 3/8" – 4"

ENDS: True Union Socket, Threaded or ChemFlare™[1] Spigot[2] Bodies with Plain, Socket, Threaded or Flanged ends

DIAPHRAGM: PTFE Bonded EPDM

SEALS: EPDM, FKM (Viton®)

The Chemline SB Series Back Pressure/ Relief Valve has two functions. As a ***back pressure valve***, installed in-line downstream of a pump, the back pressure below the metering pump is maintained. When installed in the branch of a tee it is a ***pressure relief valve***. The valve stays closed until inlet pressure reaches the set pressure which is adjusted by turning the spring tensioning bolt. Inlet pressure acts upward against the piston allowing excess pressure to flow upwards through the orifice.

The SB12 Series has a built-in check valve function, desirable for dosing applications. It is not so sensitive as to open with every pulsation from a metering pump.

features

True Union Ends

- Easy installation and maintenance
- Eliminate chemical leakage problems common with old fashioned threaded connections

Long Cycling Life

- Dynamic seal is PTFE bonded EPDM for high chemical resistance
- This moulded diaphragm is designed for superior sealing and flex life

Superior Performance in Dosing Systems

- Valves are hydraulically designed for very low hysteresis ("backlash") and to eliminate chatter
- Built-in check (non-return) function
- Valve opening depends on inlet pressure only and is uneffected by changes in downstream (back) pressure

CRN Registration numbers by province

- Ontario: OC10134.5
- Newfoundland: OC10134.50
- Alberta: OC10134.52
- Saskatchewan/Manitoba/Quebec: OC10134.56
- New Brunswick: OC10134.57
- Nova Scotia: OC10134.58
- P.E.I.: OC10134.59
- British Columbia: not required

technical

Set Pressure Ranges

- 1/2" to 2" – 5 to 150 psi
- 2-1/2" and 3" – 7.5 to 150 psi
- 2-1/2" to 4" – 4 to 60 psi (optional)
- 4" – 7.5 to 90 psi

Maximum Viscosity

- 120cP is maximum recommended service viscosity

[1] For ChemFlare™ end connectors, consult Chemline.
[2] PP and PVDF spigot ends have DIN dimensions and will butt fuse directly to Chemline PP and PVDF piping systems.
[3] PVC valves with EPDM or FKM (Viton®) seals are certified under NSF/ANSI Standard 61 for contact with drinking water.

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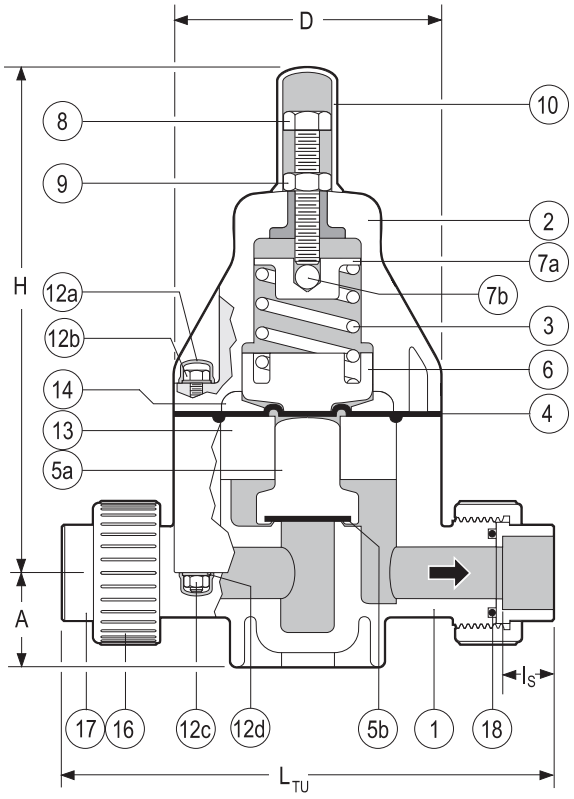
SB12 Series Back Pressure/Relief Valves 1/2" to 2"



True Union Body

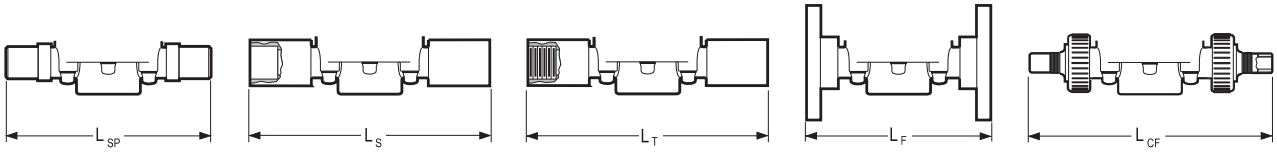
PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, PP, PVDF
2	Bonnet	1	PPG
3	Spring	1	Galvanized Steel
4▲	Control Diaphragm	1	PTFE bonded EPDM
5a▲	Piston	1	PVC, PP, PVDF
5b▲	Seat	1	EPDM, FPM(Viton®)
6	Lower Spring Retainer	1	PPG
7a	Upper Spring Retainer	1	Cad. Plated Steel
7b	Ball	1	304 SS
8	Spring Tensioning Bolt	1	304 SS
9	Lock Nut	1	304 SS
10	Spring Bolt Cap	1	PE
12a	Bolt/Nut Cap	8/12[1]	PE
12b	Hex Bolt	4/6[1]	304 SS
12c	Hex Nut	4/6[1]	304 SS
12d	Washer	8/12[1]	304 SS
13	Spacer Disc	1	PVC, PP, PVDF
14	Pressure Plate	1	PP
16	Union Nut	2	PVC, PP, PVDF
17	End Connector	2	PVC, PP, PVDF
18▲	Face O-Ring	2	EPDM, FPM(Viton®)

[1] 1/2" size / 3/4" to 2" sizes

OTHER ENDS



Spigot Body | Socket | Threaded | Flanged | ChemFlare™

DIMENSIONS INCHES

WEIGHTS LB.

Cv VALUES

Size	D	H	PVC A	PVC I_S	PVC L_{TU}[2]	PVC L_{SP}[3]	PVC L_S	PVC L_T	PVC L_F	PVC L_{CF}	PP and PVDF A	PP and PVDF L_{SP}[3]	PP and PVDF L_{TU}[2]	PVC	PP	PVDF	USGPM Flow at 1 psi △P
3/8"	3.2	6.9	1.0	0.6	6.5	5.7	7.4	7.2	4.5	8.2	0.9	5.7	**	1.8	1.5	2.2	2.1
1/2"	3.2	6.9	1.0	0.6	6.8	5.7	8.0	7.8	6.3	8.3[4]	0.9	5.7	7.1	1.9	1.6	2.4	3.0
3/4"	4.2	8.0	1.5	0.7	8.3	6.9	9.3	8.9	7.4	9.7	1.4	6.9	8.4	4.1	3.5	4.6	6.6
1"	4.2	8.0	1.5	0.9	8.5	6.9	9.6	9.3	7.4	10.2	1.4	6.9	8.7	4.2	3.5	4.7	8.7
1-1/4"	5.8	10.3	2.2	1.0	10.9	8.8	11.6	11.2	9.2	13.5	2.1	8.8	10.9	11.0	9.0	12.0	18.0
1-1/2"	5.8	10.3	2.2	1.2	11.1	8.8	12.2	11.5	9.5	–	2.1	8.8	11.2	11.2	9.2	12.2	20.0
2"	5.8	10.3	2.2	1.5	11.3	9.6	12.9	12.0	10.0	–	2.1	8.8	13.2	11.4	9.4	12.4	21.4

[2] True Union bodies come standard with socket ends. Threaded union ends are available. ** Consult Chemline.

[3] Spigot bodies are used for non union socket, threaded or flanged ends. All spigot ends have metric dimensions and the PP and PVDF spigots butt fuse directly to Chemline PP and PVDF piping. [4] Tube size can be reduced to 1/4" tube, LCF = 7.74" for 1/4", 8.26" for 3/8".

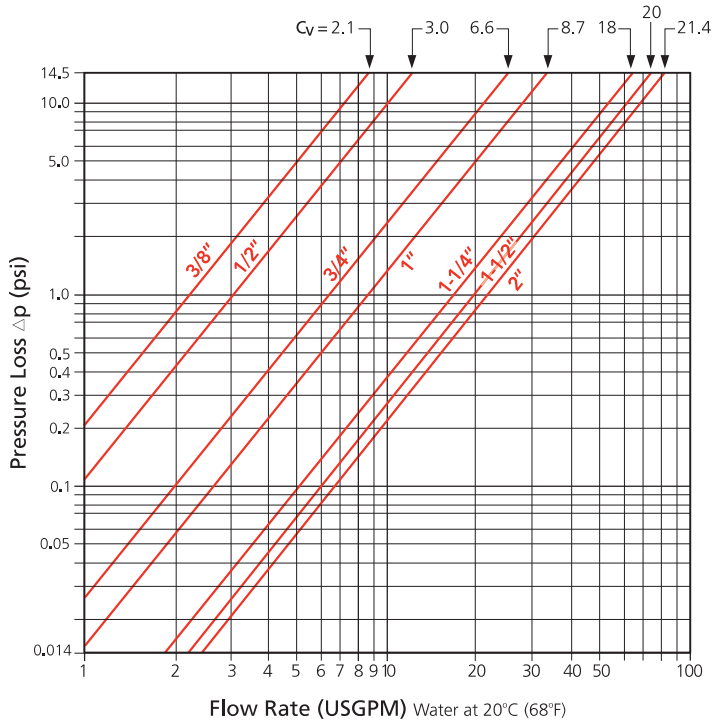
MAXIMUM PRESSURES PSI

Size	PVC 20°C 68°F	PVC 30°C 86°F	PVC 40°C 104°F	PVC 50°C 122°F	PP 30°C 86°F	PP 40°C 104°F	PP 50°C 122°F	PP 60°C 140°F	PP 70°C 158°F	PVDF 30°C 86°F	PVDF 50°C 122°F	PVDF 70°C 158°F	PVDF 80°C 176°F	PVDF 90°C 194°F	PVDF 100°C 212°F
1/2"– 2"	150	105	60	15	150	90	60	37.5	15	150	100	60	45	30	15

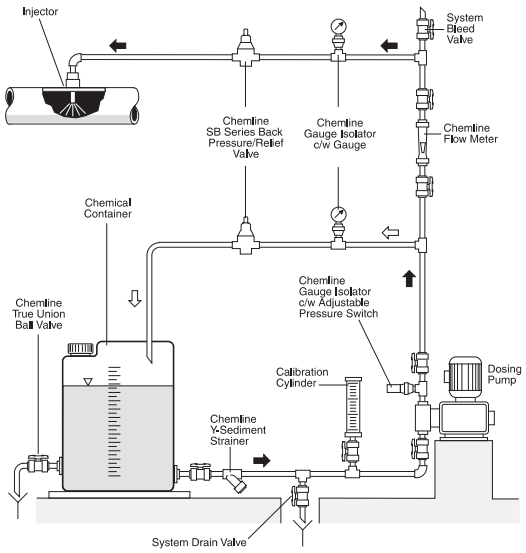
Temperature Ranges: PVC 0 to 50°C (32 to 122°F), **PP** 10 to 70°C (50 to 158°F), **PVDF** –30 to 100°C (–22 to 212°F).

SB12 Series Back Pressure/Relief Valves 1/2" to 2"

pressure loss nomogram for SB12 valves 3/8" to 2"

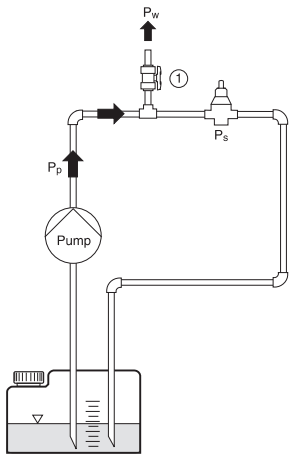


typical dosing system schematic



application of pressure relief valves

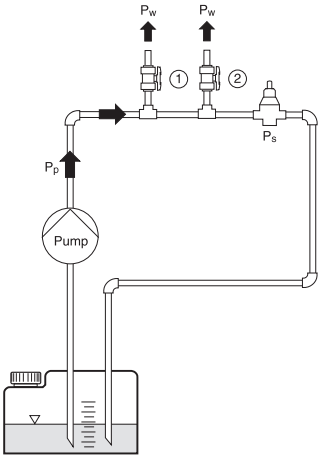
Constant System Pressure



$P_p \geq P_w$
$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

P_w = Working Pressure
P_p = Pump Pressure
P_s = Set Pressure

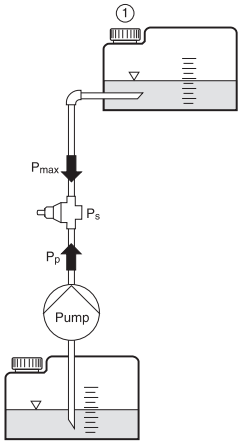
Consumer 1 and/or 2 Open, Valve Closes



$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

Non-Return Valve

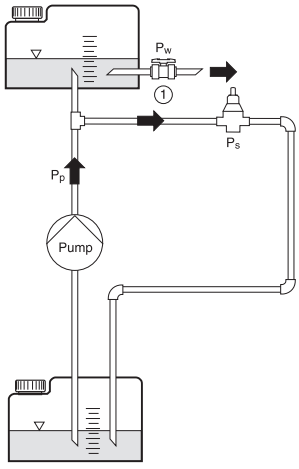
Container 1 is located above the pump



$P_s \geq P_{max}$
$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

Overflow Valve

Pressure of container or application system should not exceed the maximum pressure value



$P_s \leq P_w$
$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

SB12 Series Back Pressure/Relief Valves 1/2" to 2"

working pressure vs. flow rate

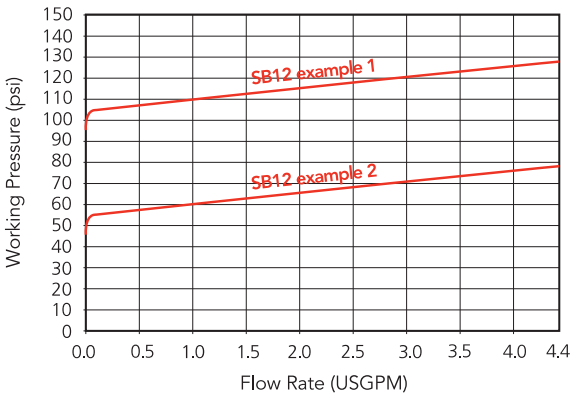
The curves show the relationship between the working pressure and the approximate flow rate through the valve for water at 20°C (68°F) . These values will vary depending on:

- The configuration of the piping and the pressure losses associated with it
- The fluid if not water at 20°C (68°F)
- Whether the pressure is rising or falling, hysteresis is approximately 4 psi for 1/2" to 2" valves. For valves 2-1/2" to 4", hysteresis is approximately 14.5 psi.

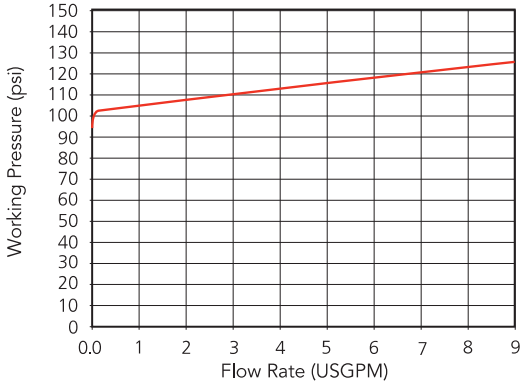
operation examples

1. The valve is set closed at 100 psi. At a pressure increase of 10 psi, a flow of approximately 1.0 USGPM will be reached.
   - set pressure = 100 psi
   - working pressure = 110 psi
   - opening pressure = approximately 104 psi
2. The valve is set closed at 50 psi. At a pressure increase of 10 psi, a flow of approximately 1.0 USGPM will be reached.
   - set pressure = 50 psi
   - working pressure = 60 psi
   - opening pressure = approximately 54 psi

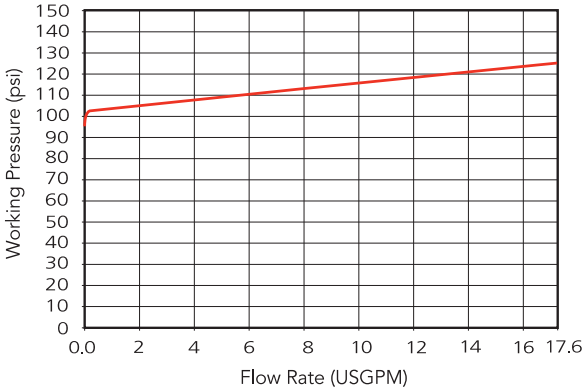
3/8" Valves



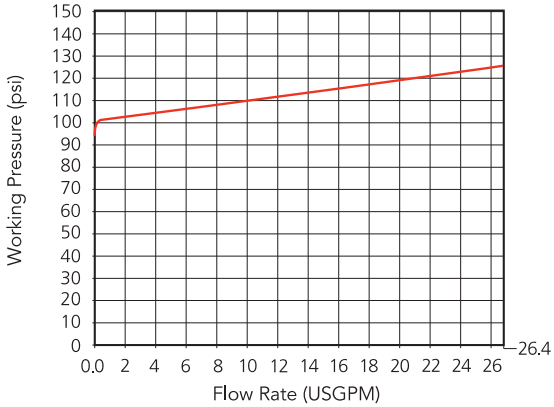
1/2" Valves



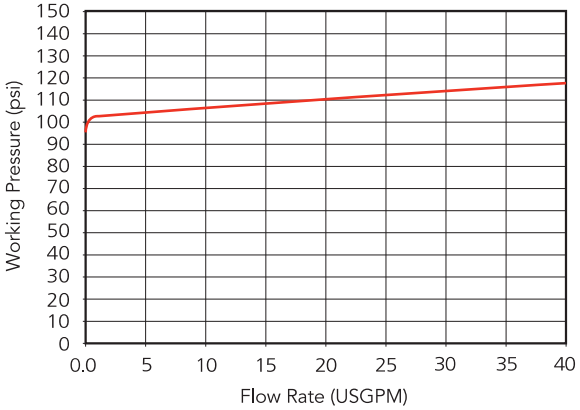
3/4" Valves



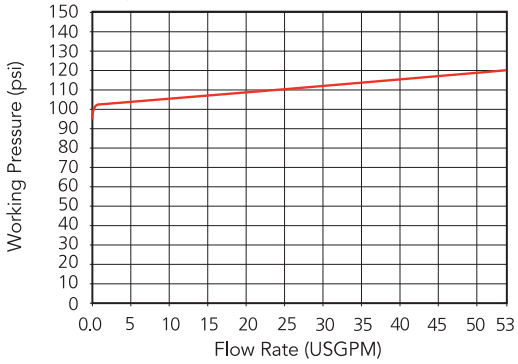
1" Valves



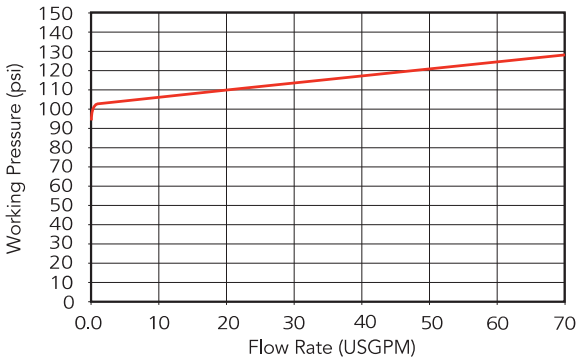
1-1/4" Valves



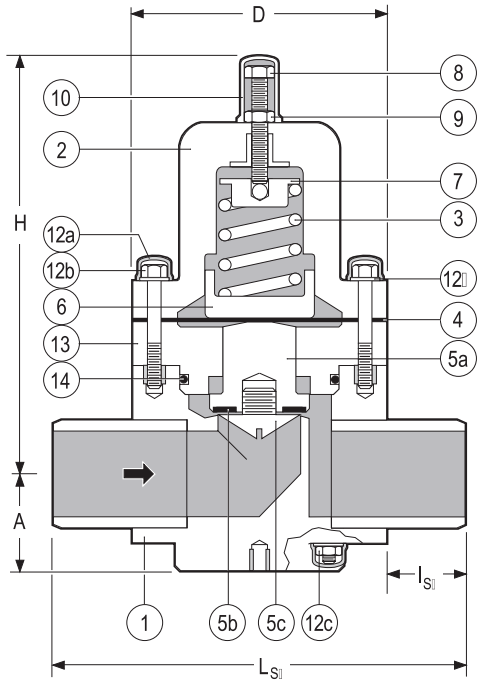
1-1/2" Valves



2" Valves



SB12 Series Back Pressure/Relief Valves 2-1/2" to 4"



Spigot Body

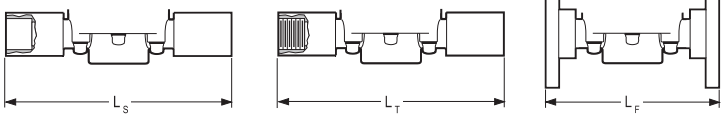
PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, PP, PVDF
2	Bonnet	1	PPG
3	Spring	1	Galvanized Steel
4▲	Control Diaphragm	1	PTFE bonded EPDM
5a▲	Piston	2	PVC, PP, PVDF
5b▲	Seat	1	EPDM, FPM(Viton®)
5c▲	Seat Retainer	1	PVC, PP, PVDF
6	Lower Spring Retainer	1	PPG
7	Upper Spring Retauner	1	304 SS
8	Spring Tensioning Bolt	1	304 SS
9	Lock Nut	1	304 SS
10	Spring Bolt Cap	1	PE
12a	Hex Bolt/Nut Cap	20	PE
12b	Hex Bolt/Stud	12[1]	304 SS
12c	Hex Nut	20	304 SS
12d	Washer	20	304 SS
13	Spacer Disc	1	PVC, PP, PVDF
14	Spacer O ring	1	EPDM, FPM(Viton®)

[1] 2 large upper bolts, 2 shorter lower bolts, 8 studs

OTHER ENDS



Socket Threaded Flanged

ChemFlare™ Ends
- For connection to PFA tube. Leak-free connections for difficult services such as sodium hypochlorite

DIMENSIONS INCHES

WEIGHTS LB.

Cv VALUES

Size	PVC, PP & PVDF A	D	H	L_{SP}[2]	I_{SP}	PVC L_F	PVC	PP	PVDF	USGPM Flow at 1 psi △P
2-1/2"	2.7	6.9	11.1	11.2	2.1	12.2	20.9	15.4	24.6	41
3"	3.0	7.9	12.2	14.2	3.1	15.0	26.4	23.8	30.8	63
4"	3.7	9.8	14.2	16.5	3.3	16.9	33.0	26.4	37.4	98

[2] Plain spigot ends in PP & PVDF may be butt fused directly to Chemline PP & PVDF piping systems. Weights based on spigot bodies.

MAXIMUM PRESSURES PSI

Size	PVC 20°C 68°F	30°C 86°F	40°C 104°F	50°C 122°F	PP 20°C 68°F	30°C 86°F	40°C 104°F	50°C 122°F	60°C 140°F	70°C 158°F	PVDF 30°C 86°F	50°C 122°F	70°C 158°F	80°C 176°F	90°C 194°F	100°C 212°F
2-1/2"–4"	150	90	44	15	150	116	90	60	37.5	15	150	90	55	40	30	15

Temperature Ranges: PVC 0 to 50°C (32 to 122°F), **PP** 10 to 70°C (50 to 158°F), **PVDF** –30 to 100°C (–22 to 212°F).

ORDERING EXAMPLE

Chemline Back Pressure/ Relief Valves	SB12	A	005	V	U
Body Material	**A** – PVC	**B** – PP	**K** – PVDF		
Size	**003** – 3/8" **010** – 1" **020** – 2"	**005** – 1/2" **012** – 1-1/4" **025** – 2-1/2"	**007** – 3/4" **015** – 1-1/2" **030** – 3"	**040** – 4"		
Elastomers	**E** – EPDM	**V** – FPM (Viton®)				
Ends	**S** – Socket **CFx** – ChemFlare™	**T** – Threaded	**F** – Flanged **Blank** – Spigot (Butt)	**U** – Union Socket		

Example: Chemline SB 12 Series, PVC, 1/2" diameter, FPM (Viton®) seals, Union socket ends.
x = 4 for 1/4", **6** for 3/8", **8** for 1/2", **12** for 1" ID tube connections.

OPTIONS

- 4 to 60 psi Pressure Range springs for 2-1/2" to 4" valves
- **Integral Pressure Gauge** – for inlet and/or outlet
- Bodies in 316 Stainless Steel and PTFE

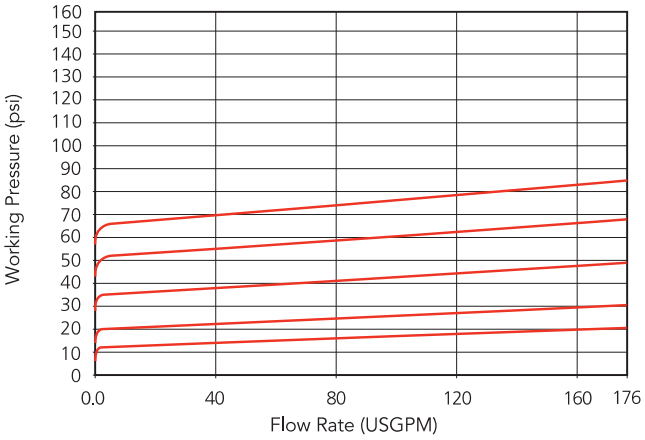
Optional Pressure Gauge
- For inlet and/or outlet

SB12 Series Back Pressure/Relief Valves 2-1/2" to 4"

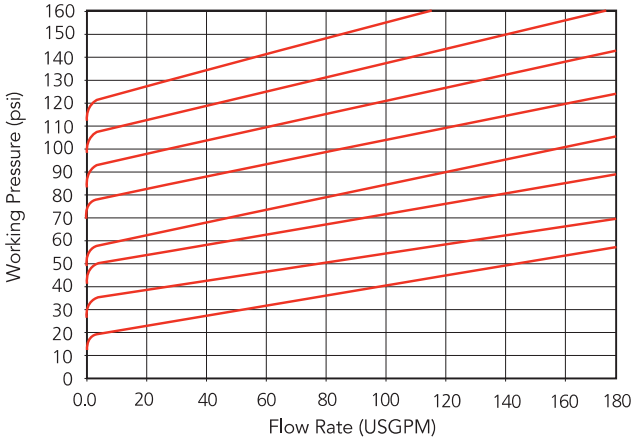
working pressure vs. flow rate

• Whether the pressure is rising or falling, hysteresis is approximately 14.5 psi for 2-1/2" to 4" valves

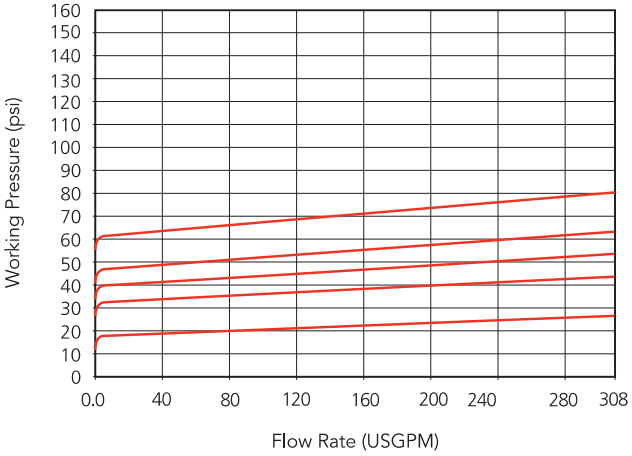
2-1/2" Valves / 4 to 60 psi set pressure range



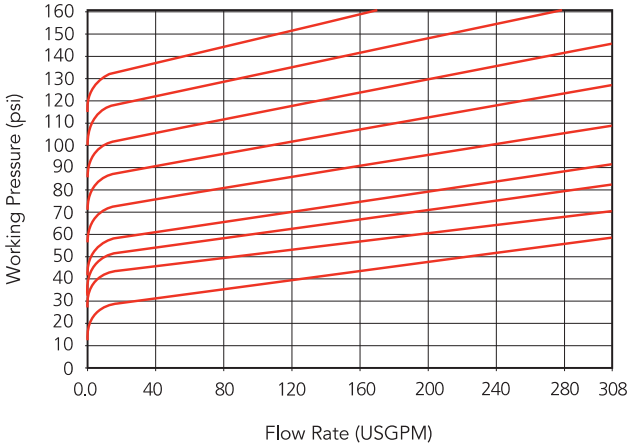
2-1/2" Valves / 7.5 to 150 psi set pressure range



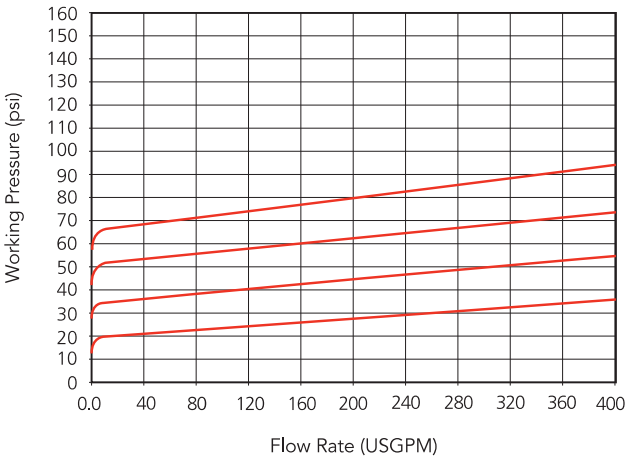
3" Valves / 4 to 60 psi set pressure range



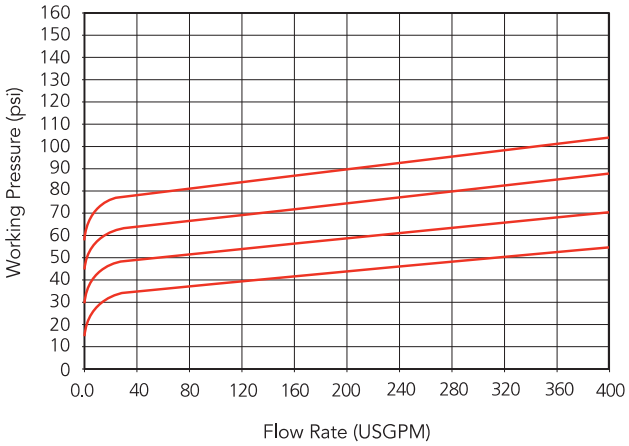
3" Valves / 7.5 to 150 psi set pressure range



4" Valves / 4 to 60 psi set pressure range



4" Valves / 7.5 to 90 psi set pressure range



CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

55 Guardsman Road, Thornhill, ON, L3T 6L2, Canada | ISO 9001:2008 Certified
tel.905.889.7890 | fax.905.889.8553 | request@chemline.com | chemline.com

CS-305-170 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VAPSPD351047	BPV9-532	DIA: 13 mm (1/2")	BACKPRESSURE VALVE	TYPE: BACK PRESSURE VALVE | 150#//MANUFACTURER : CHEMLINE//MODEL : SB12K005VCFx + SGK-005-002-P-G + P025-160-BM CONFIG L-U//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF// SEAL | SEAT :VITON | // STEM : N/A			SULFURIC ACID DOSING SKID		

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PDF Published September 17, 2014

SB12 Series Back Pressure/Relief Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

PVC PP PVDF

CRN Registered as Category C Fittings Consult Chemline

NSF[3] Certified to NSF/ANSI 61

SERIES: SB12

SIZES: 3/8" – 4"

ENDS: True Union Socket, Threaded or ChemFlare™[1] Spigot[2] Bodies with Plain, Socket, Threaded or Flanged ends

DIAPHRAGM: PTFE Bonded EPDM

SEALS: EPDM, FKM (Viton®)

The Chemline SB Series Back Pressure/ Relief Valve has two functions. As a ***back pressure valve***, installed in-line downstream of a pump, the back pressure below the metering pump is maintained. When installed in the branch of a tee it is a ***pressure relief valve***. The valve stays closed until inlet pressure reaches the set pressure which is adjusted by turning the spring tensioning bolt. Inlet pressure acts upward against the piston allowing excess pressure to flow upwards through the orifice.

The SB12 Series has a built-in check valve function, desirable for dosing applications. It is not so sensitive as to open with every pulsation from a metering pump.

features

True Union Ends

- Easy installation and maintenance
- Eliminate chemical leakage problems common with old fashioned threaded connections

Long Cycling Life

- Dynamic seal is PTFE bonded EPDM for high chemical resistance
- This moulded diaphragm is designed for superior sealing and flex life

Superior Performance in Dosing Systems

- Valves are hydraulically designed for very low hysteresis ("backlash") and to eliminate chatter
- Built-in check (non-return) function
- Valve opening depends on inlet pressure only and is uneffected by changes in downstream (back) pressure

CRN Registration numbers by province

- Ontario: OC10134.5
- Newfoundland: OC10134.50
- Alberta: OC10134.52
- Saskatchewan/Manitoba/Quebec: OC10134.56
- New Brunswick: OC10134.57
- Nova Scotia: OC10134.58
- P.E.I.: OC10134.59
- British Columbia: not required

technical

Set Pressure Ranges

- 1/2" to 2" – 5 to 150 psi
- 2-1/2" and 3" – 7.5 to 150 psi
- 2-1/2" to 4" – 4 to 60 psi (optional)
- 4" – 7.5 to 90 psi

Maximum Viscosity

- 120cP is maximum recommended service viscosity

[1] For ChemFlare™ end connectors, consult Chemline.
[2] PP and PVDF spigot ends have DIN dimensions and will butt fuse directly to Chemline PP and PVDF piping systems.
[3] PVC valves with EPDM or FKM (Viton®) seals are certified under NSF/ANSI Standard 61 for contact with drinking water.

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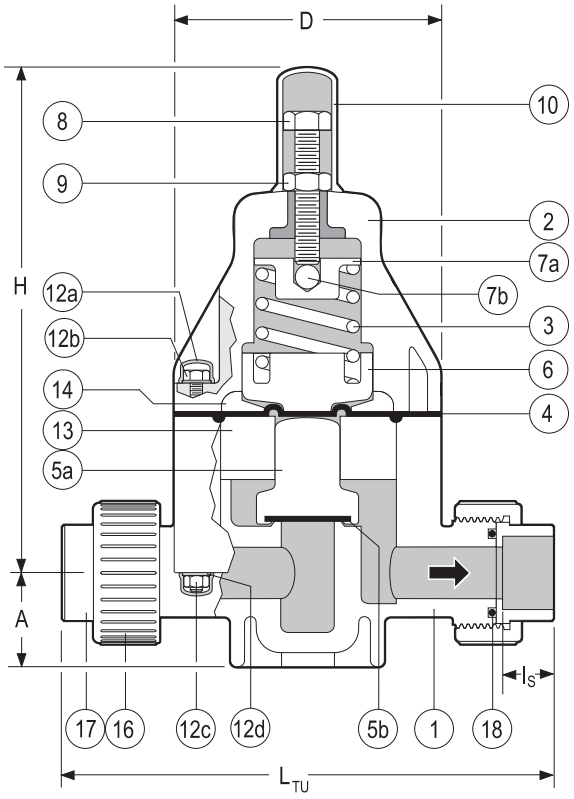
SB12 Series Back Pressure/Relief Valves 1/2" to 2"



True Union Body

PARTS

▲ Recommended Spare Parts

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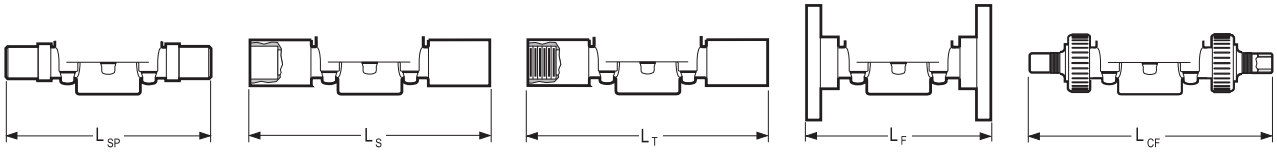
5a▲	Piston	1	PVC, PP, PVDF
5b▲	Seat	1	EPDM, FPM(Viton®)
6	Lower Spring Retainer	1	PPG
7a	Upper Spring Retainer	1	Cad. Plated Steel
7b	Ball	1	304 SS
8	Spring Tensioning Bolt	1	304 SS
9	Lock Nut	1	304 SS
10	Spring Bolt Cap	1	PE
12a	Bolt/Nut Cap	8/12[1]	PE
12b	Hex Bolt	4/6[1]	304 SS
12c	Hex Nut	4/6[1]	304 SS
12d	Washer	8/12[1]	304 SS
13	Spacer Disc	1	PVC, PP, PVDF
14	Pressure Plate	1	PP
16	Union Nut	2	PVC, PP, PVDF
17	End Connector	2	PVC, PP, PVDF
18▲	Face O-Ring	2	EPDM, FPM(Viton®)

[1] 1/2" size / 3/4" to 2" sizes

OTHER ENDS



Spigot Body | Socket | Threaded | Flanged | ChemFlare™

DIMENSIONS INCHES

WEIGHTS LB.

Cv VALUES

Size	D	H	PVC A	PVC I_S	PVC L_{TU}[2]	PVC L_{SP}[3]	PVC L_S	PVC L_T	PVC L_F	PVC L_{CF}	PP and PVDF A	PP and PVDF L_{SP}[3]	PP and PVDF L_{TU}[2]	PVC	PP	PVDF	USGPM Flow at 1 psi △P
3/8"	3.2	6.9	1.0	0.6	6.5	5.7	7.4	7.2	4.5	8.2	0.9	5.7	**	1.8	1.5	2.2	2.1
1/2"	3.2	6.9	1.0	0.6	6.8	5.7	8.0	7.8	6.3	8.3[4]	0.9	5.7	7.1	1.9	1.6	2.4	3.0
3/4"	4.2	8.0	1.5	0.7	8.3	6.9	9.3	8.9	7.4	9.7	1.4	6.9	8.4	4.1	3.5	4.6	6.6
1"	4.2	8.0	1.5	0.9	8.5	6.9	9.6	9.3	7.4	10.2	1.4	6.9	8.7	4.2	3.5	4.7	8.7
1-1/4"	5.8	10.3	2.2	1.0	10.9	8.8	11.6	11.2	9.2	13.5	2.1	8.8	10.9	11.0	9.0	12.0	18.0
1-1/2"	5.8	10.3	2.2	1.2	11.1	8.8	12.2	11.5	9.5	–	2.1	8.8	11.2	11.2	9.2	12.2	20.0
2"	5.8	10.3	2.2	1.5	11.3	9.6	12.9	12.0	10.0	–	2.1	8.8	13.2	11.4	9.4	12.4	21.4

[2] True Union bodies come standard with socket ends. Threaded union ends are available. ** Consult Chemline.

[3] Spigot bodies are used for non union socket, threaded or flanged ends. All spigot ends have metric dimensions and the PP and PVDF spigots butt fuse directly to Chemline PP and PVDF piping. [4] Tube size can be reduced to 1/4" tube, LCF = 7.74" for 1/4", 8.26" for 3/8".

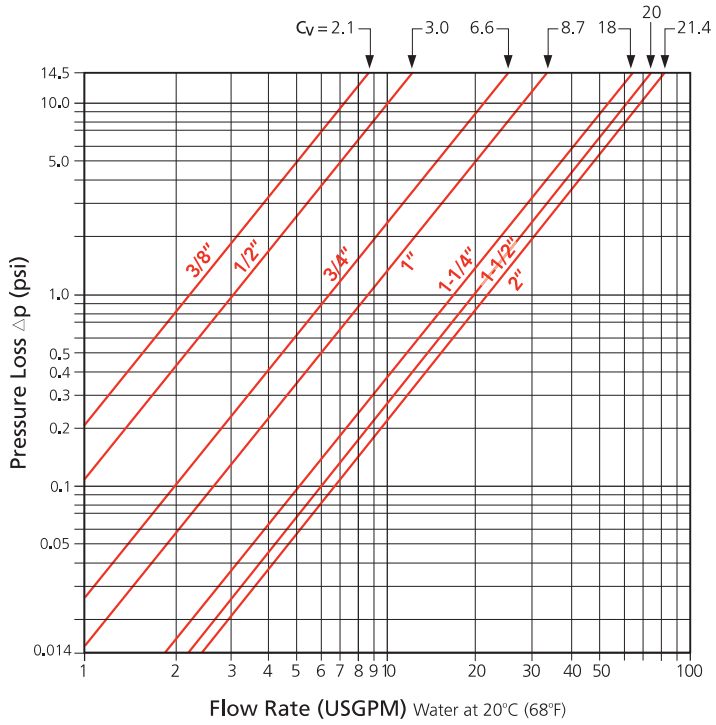
MAXIMUM PRESSURES PSI

Size	PVC 20°C 68°F	PVC 30°C 86°F	PVC 40°C 104°F	PVC 50°C 122°F	PP 30°C 86°F	PP 40°C 104°F	PP 50°C 122°F	PP 60°C 140°F	PP 70°C 158°F	PVDF 30°C 86°F	PVDF 50°C 122°F	PVDF 70°C 158°F	PVDF 80°C 176°F	PVDF 90°C 194°F	PVDF 100°C 212°F
1/2"– 2"	150	105	60	15	150	90	60	37.5	15	150	100	60	45	30	15

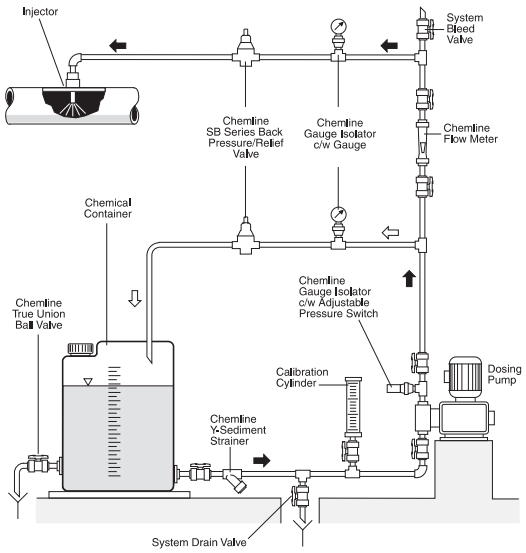
Temperature Ranges: PVC 0 to 50°C (32 to 122°F), **PP** 10 to 70°C (50 to 158°F), **PVDF** –30 to 100°C (–22 to 212°F).

SB12 Series Back Pressure/Relief Valves 1/2" to 2"

pressure loss nomogram for SB12 valves 3/8" to 2"

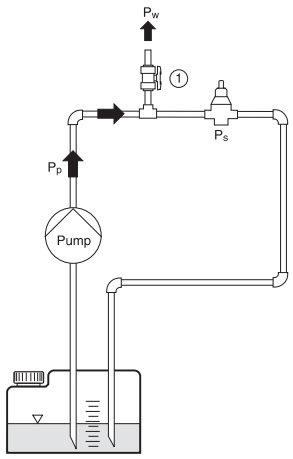


typical dosing system schematic



application of pressure relief valves

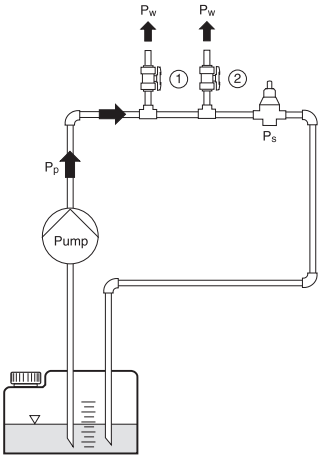
Constant System Pressure



$P_p \geq P_w$
$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

P_w = Working Pressure
P_p = Pump Pressure
P_s = Set Pressure

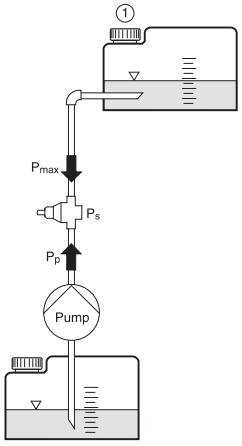
Consumer 1 and/or 2 Open, Valve Closes



$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

Non-Return Valve

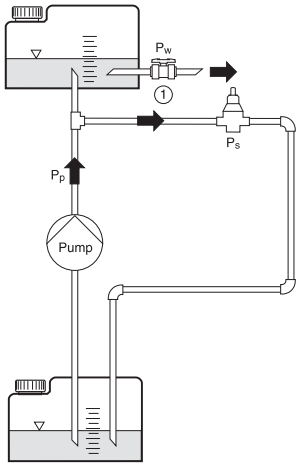
Container 1 is located above the pump



$P_s \geq P_{max}$
$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

Overflow Valve

Pressure of container or application system should not exceed the maximum pressure value



$P_s \leq P_w$
$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

SB12 Series Back Pressure/Relief Valves 1/2" to 2"

working pressure vs. flow rate

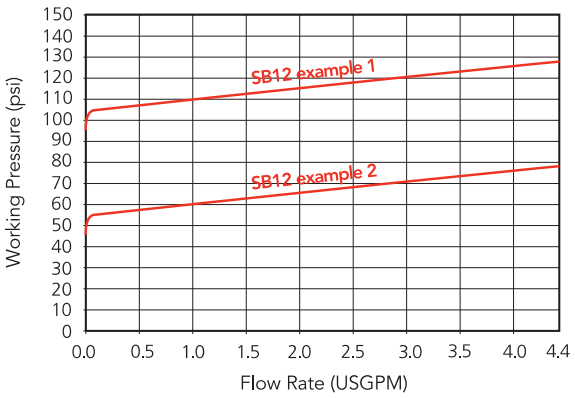
The curves show the relationship between the working pressure and the approximate flow rate through the valve for water at 20°C (68°F) . These values will vary depending on:

- The configuration of the piping and the pressure losses associated with it
- The fluid if not water at 20°C (68°F)
- Whether the pressure is rising or falling, hysteresis is approximately 4 psi for 1/2" to 2" valves. For valves 2-1/2" to 4", hysteresis is approximately 14.5 psi.

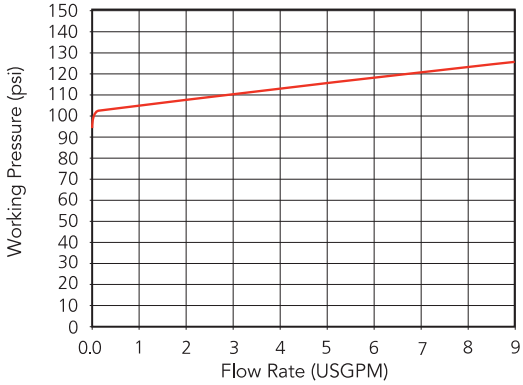
operation examples

1. The valve is set closed at 100 psi. At a pressure increase of 10 psi, a flow of approximately 1.0 USGPM will be reached.
   - set pressure = 100 psi
   - working pressure = 110 psi
   - opening pressure = approximately 104 psi
2. The valve is set closed at 50 psi. At a pressure increase of 10 psi, a flow of approximately 1.0 USGPM will be reached.
   - set pressure = 50 psi
   - working pressure = 60 psi
   - opening pressure = approximately 54 psi

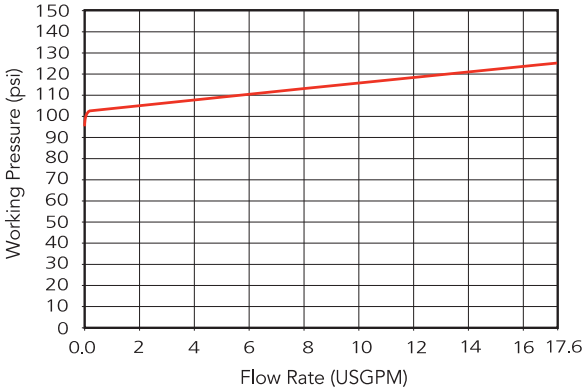
3/8" Valves



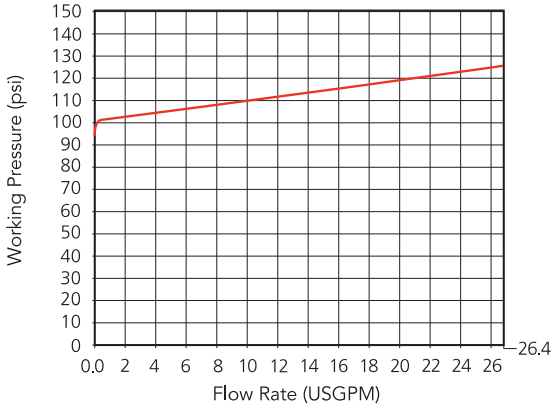
1/2" Valves



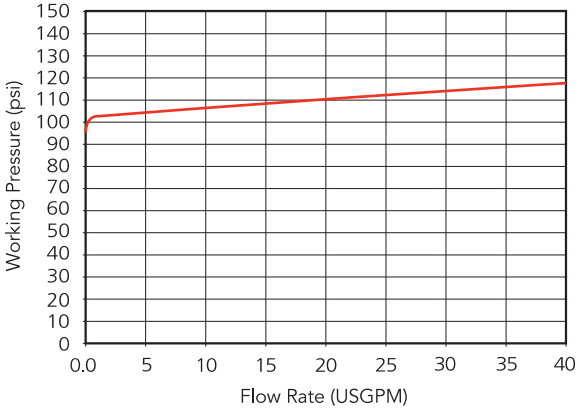
3/4" Valves



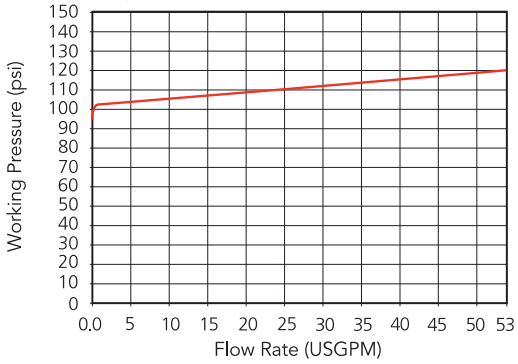
1" Valves



1-1/4" Valves



1-1/2" Valves



2" Valves