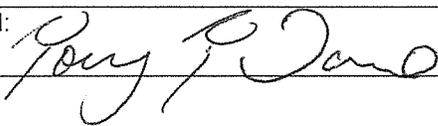


**CONTRACTOR SUBMITTAL FORM**

<b>Project Name:</b> Navajo Gallup Water Supply Project Reach 26.1 & 2	<input checked="" type="checkbox"/> <b>M</b> (Materials) <input type="checkbox"/> <b>T</b> (Testing) <input type="checkbox"/> <b>A</b> (Administrative)	<b>Submittal No.</b>
<b>SMA Project No:</b> 6921307		<b>M039C</b>
<b>Date:</b> 05-09-2019		
<b>Contractor:</b> Navajo Engineering and Construction Authority	<b>No. of Copies:</b> 1	

<b>Supplier:</b> Core & Main	<b>Manufacturer:</b> Pipestone
<b>Specification No.:</b> 33 12 17 – 2.2 A	<b>Drawing No.:</b> DT-13,14,15
<b>Bid Item No(s):</b> 41	
<b>Submittal Checklist No(s):</b> 353-367, 369-371, 373-375, 378, 381	
<b>Product Description:</b> RESUBMITTAL #3: Prefabricated Vault w/ Engineers comments addressed.	
<b>Are there any deviations from the Contract Documents?</b> <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes <b>Explain:</b>	
<b>Contractor's certification that product meets requirements of Contract Documents:</b> <input checked="" type="checkbox"/> Certified <input type="checkbox"/> Certified with variations as noted on shop drawings and/or attached sheets.	
<b>Signed:</b> Aaron L. Barton	<b>Date:</b> 05-09-2019

<b>Engineer's Comments:</b> <input checked="" type="checkbox"/> No Exception Taken <input type="checkbox"/> Approved as Corrected <input type="checkbox"/> Exceptions as Noted <input type="checkbox"/> Submittal Rejected <input type="checkbox"/> Revise and Resubmit to Engineer <input type="checkbox"/> Contractor to Submit Specified Information	<p>Review is limited to check for compliance with design concept. No changes from provisions of Contract Documents are intended and Contractor remains responsible for compliance with revisions therein.</p> <p>The Contractor is solely responsible for quantities; correctness of dimensions; verification of physical interrelation of elements of the work as required by the drawings and specifications and by field determination; fabrication procedures, construction methods, techniques and sequences. This review does not relieve the Contractor from these responsibilities.</p> <p>Non-conformities and errors detected have been noted but such markings, or lack thereof, shall not relieve the Contractor from compliance with all requirements of the contract drawings and specifications.</p>
<b>Signed:</b> 	<b>Date:</b> 5/14/19



May 8, 2019

HD Supply Waterworks  
6135 Second Street, NE  
Albuquerque, NM 87107

Attention: Joe Merrick

Reference: Navajo Gallup Reach 26.1 26.2 Revised Submittal 20190508 for Approval

Dear Mr. Merrick:

Thank you for sending me the engineer's review comments for the Pre-Fabricated Vault. I have attached revised submittals and hope to have addressed the following concerns:

SMA Project No. 6921307, Submittal No. M039B:

1. Cover letter 2.a.i. says "Reducing Pilots are Model CRD with 30-300psi Spring Ranges, one will be Factory set at 170psi, the other will be Factory set at 165psi." The intent of having the 2 valves in parallel is to have only one in operation at a time and the other isolated. Both valves should have a set point of 170psi. [Understood.](#)
2. Page 3 of submittal (DT13 Vault) In description of PRVs:
  - a. Please specify that rate of flow pilot set-point shall be factory preset to 690gpm. [Confirmed.](#)
3. Page 66 of submittal (Cla-Val data cover sheet)
  - a. Under Features & Options, X145 External Display should be checked. [We will be providing the new version of the X144D which describes and e-FlowMeter with integral Display.](#)
  - b. Says in Notes that "Factory set one CRD at 170psi, other at 165psi." Why 165psi? [Note removed.](#)
  - c. Per 33 12 17 2.3.A, model number should be 49G-03BCPSVYKCKD KXSSTKB. Submittal (page 3) has 49DG-03BCPSVYKCKD, ensure that the required KXSSTKB parts are included. [All Pilot system components are provided to meet the written description, part numbers might not be identical.](#)
4. Page 81: Where are the Fixed Flow Rate Orifices being used? [In the pilot system of the Pressure Reducing Valves to prevent the valve from opening or closing any faster than 180seconds.](#)
5. Page 85: where is the braided hose being used? [The pilot systems of the control valves.](#)
6. Page 91: Insertion Flow meter
  - a. Be sure sensor is pre-calibrated from factory for insertion flow meter. [Sensor will be factory calibrated.](#)
  - b. Ensure product includes all accessories to be able to be hooked up to the SCADA system. [This flowmeter has the ability to provide either/both 4-20mA and pulse outputs.](#)
7. Page 101: Per 33 12 17 2.4, pressure relief valve model should be Cla-Val Model 50-01 BPKDKCKO X105LCW KXSSTKB but submittal has Model 50G-13. Please check to ensure these are the same valves. [All Pilot system components are provided to meet the written description, part numbers might not be identical.](#)
8. Page 136: Ensure VB valve includes mounted Hood. [Hood is included.](#)

Best Regards,

Kira Witwer  
Mechanical Engineer/Inside Sales



676 Moss Street, Unit A  
 Golden, CO 80401  
 Phone: 303-579-9658  
 Fax: 303-567-2861

**Navajo Gallup Reaches 26.1 and 26.2  
 Ojo Encino to Pueblo Pintado**

**DT13 Vault**

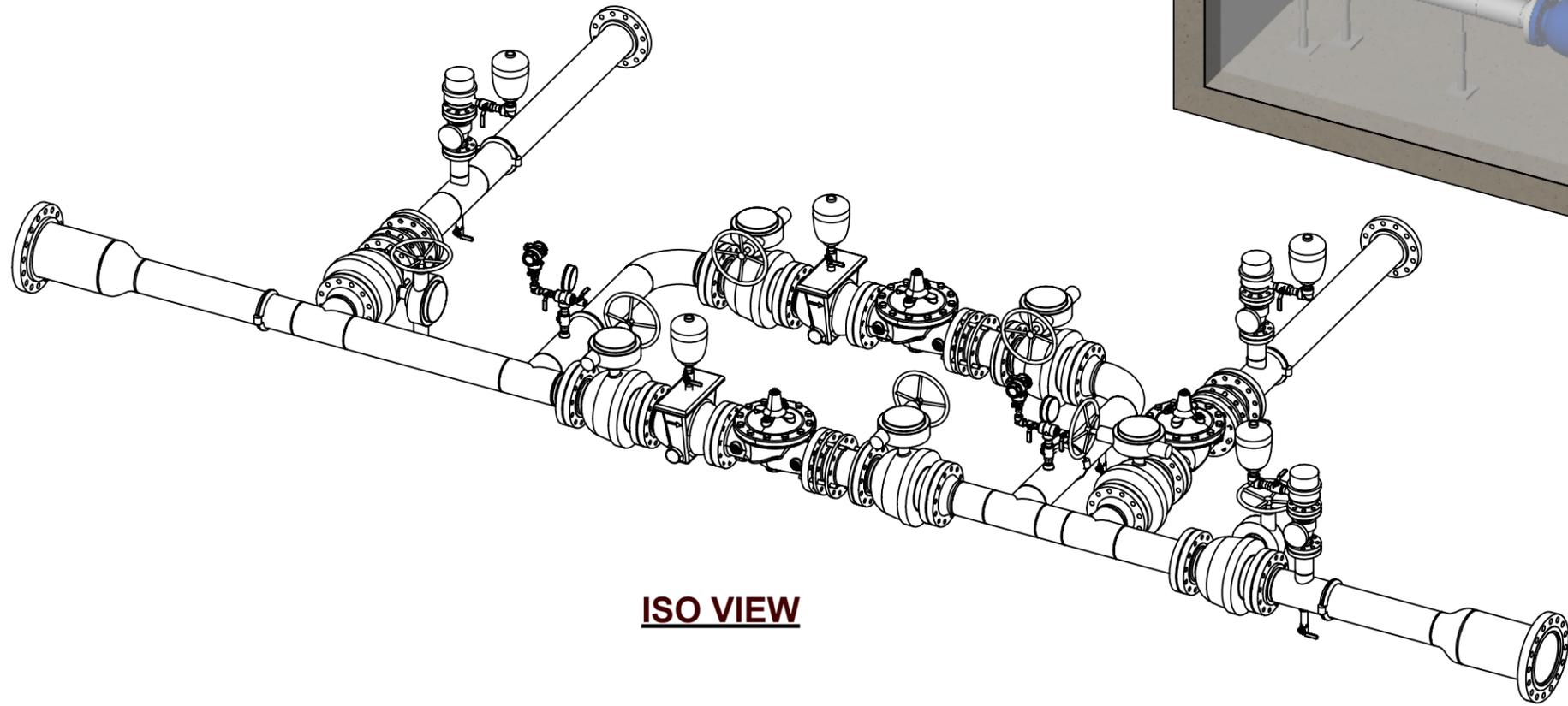
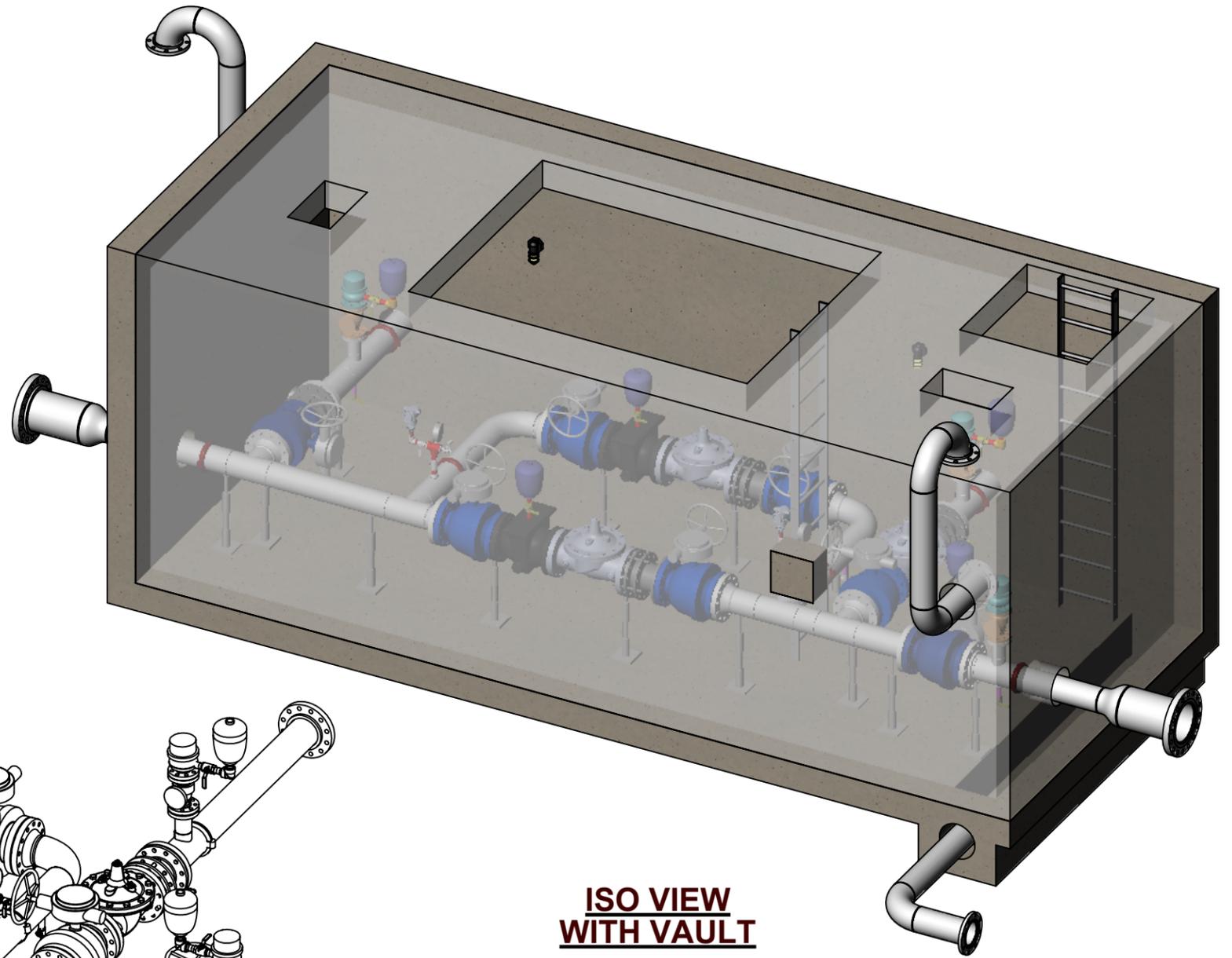
Qty

Product Description

2	6" Cla-Val 49DG-03BCPSVYKCKD D/S CL300 FL Combination Rate of Flow, Pressure Reducing, and Solenoid Shutoff Valve. Globe Style, Straight Pattern, Epoxy Coated, Ductile Iron Main Valve with Class 300 Flanged Ends, Dura-Kleen Stem, BunaN Elastomers, 316SS Trim, SST Fasteners and Position Indicator. All 316 Stainless Steel Pilot System consisting of: Isolation Ball Valves, Wye Strainer with Manual Blowdown (rated for 400psi), Fixed Restriction, Opening/Closing Speed Controls (Locking Caps), Constant Flow Orifice (180 Seconds or Greater Main Valve Operation), CRD Reducing Pilot (30-300psi, Set at 170psi), CDHS18 Rate of Flow Pilot (SST 30-480", set based on 690gpm), Normally Open Solenoid (24vdc, Manual Operation, Energize Solenoid to Close Main Valve), Upstream (0-300psi) and Downstream (0-300psi) Pressure Gauges with Bleed. X144D e-FlowMeter (24vdc) with Integrated Display (IP68), PTFE Lined SST Braided Hose with SST Ends and Fittings. X52D Orifice Plate Assembly (Bore 3.80" for 300-670gpm). VC-22D Controller
1	6" Cla-Val 50G-13BCPYKCKDKO D/S CL300 FL Pressure Relief Valve. Globe Style, Straight Pattern, Epoxy Coated, Ductile Iron Main Valve with Class 300 Flanged Ends, Dura-Kleen Stem, BunaN Elastomers, 316SS Trim, SST Fasteners, X105LCW Limit Switch, and Anti-Cavitation Trim. All Stainless Steel Pilot System consisting of: Isolation Ball Valves, Wye Strainer with Manual Blowdown (rated for 400psi), Fixed Restriction, Closing Speed Control (Locking Cap), Constant Flow Orifice (180 Seconds or Greater Main Valve Operation), CRL-60 Pressure Relief Pilot (100-300psi, set at 184psi), Upstream (0-300psi) Pressure Gauge with Bleed, PTFE Lined SST Braided Hose with SST Ends and Fittings.
2	6" Cla-Val X43H Style Strainer, Ductile Iron Body and Cover, 316SST Strainer, 400psi Rated, 300# RF Flanges, Fusion Bonded Epoxy Coating, Air Bleed and Drain Blowoff
2	6" ValMatic Series 4000 Ball Valves, AWWA C507 NSF61, Rated to 300psi Full Differential Working Pressure, Ductile Iron Body, Shell Test at 600psi, ANSI B16.1 Class 250 Flanges, 17-4 Stainless Steel Stem, Double Resilient Seats, Fusion Bonded Epoxy Coating, SS Body Fasteners, Gear Operator with Both a Handwheel and 2" Operating Nut
5	6" ValMatic Series 4000 Ball Valves, AWWA C507 NSF61, Rated to 300psi Full Differential Working Pressure, Ductile Iron Body, Shell Test at 600psi, ANSI B16.1 Class 250 Flanges, 17-4 Stainless Steel Stem, Double Resilient Seats, Fusion Bonded Epoxy Coating, SS Body Fasteners, Gear Operator with Handwheel
4	6" ROMAC DJ 400 Dismantling Joint with Class F Flanges, Ductile Iron End Ring and Body, Fusion Bonded Epoxy Coating, Stainless Bolts and Tie Rods, Rated for 300psi
6	6" Victualic Zero-Flex Rigid Coupling, Style 07, Enamel Coated Ductile Iron Housing, EPDM Gasket

1	6" Orifice, 3/8" Thick, 1.87" Bore
1	6" Orifice, 3/8" Thick, 1.73" Bore
3	2" ValMatic 1852VB.3SVH Vacuum Breaker Valve, ANSI Class 250 Flanged Inlet, Cast Iron Body, SST Trim, Fusion Bonded Epoxy Coating, SS Fasteners, Screened Hood, Rated 400psi
5	1" ValMatic 38HPDISVH Water Air Release Valve, Ductile Iron Body, 316SST Trim, EPDM Seating, Fusion Bonded Epoxy Coating, SST Bolts and Pipe Plugs, Screened Hood, Rated 500psi
3	2" Apollo 87A90801 Stainless Steel, Full Port, 300 Flanged Ball Valve
4	1/2" Apollo 76F10301A Stainless Steel, Full Port, NPT, Ball Valve
7	1" Apollo 76F10501A Stainless Steel, Full Port, NPT, Ball Valve
5	3/4" Apollo HBV2 38-314-AS Hose Connection Vacuum Breaker, Satin Brass, Manual Drain Feature
2	1/2" Ametek 88C-003-A-2 Electronic Pressure Transducer, 0-300psi Range, 316L Stainless Steel Base, Diaphragm, Silicone Fill, NPT Process Connector, 4-20mA Output
2	1/4" NPT Wika 233.34 Pressure Gauge, Plastic Case, SST Wetted Parts, 4.5" Safety Glass, Glycerine Filled, 0-300psi
2	RDA Lighting DVAKS100CG Vaporproof Fixture, cULus for Wet Locations, Wall Mount, Clear LED
2	McMaster-Carr 7628K77 Intrusion Switch, Low-Profile, Washdown, Roller Lever Limit Switch
2	6" ValMatic 1506 FrostSafe Two Way Air Damper, Corrosion Resistant Body with Stainless Steel Bolts
2	6" ValMatic 1606 VentSafe Vent Pipe Security Cage, PVC Body with Stainless Steel Screen and Cage
7	PS-475 Pen Seal for 6" Carbon Steel Pipe in 10" ID Core Drilled Hole, 10 links
4	PS-200 Pen Seal for 1.5" Ridig Steel Conduit in 3.5" ID Core Drilled Hole, 5 links
2	10" ROMAC Alpha Restrained Flanged Coupling, Standard for PVC Pipe, Fusion Bonded Epoxy Coated Ductile Iron, SBR Gasket, SST Fasteners
3	6" ROMAC Alpha Restrained Flanged Coupling, Standard for PVC Pipe, Fusion Bonded Epoxy Coated Ductile Iron, SBR Gasket, SST Fasteners

# NAVAJO GALLUP WATER SUPPLY GENERAL ARRANGEMENT



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FRACTIONAL:	DECIMAL:	FRACTIONAL:	DECIMAL:
±3/8"	±.1	±1"	±.1
2 PLACE	±.06	2 PLACE	±.06
3 PLACE	±.031	3 PLACE	±.031
BREAK ALL SHARP EDGES		BREAK ALL SHARP EDGES	

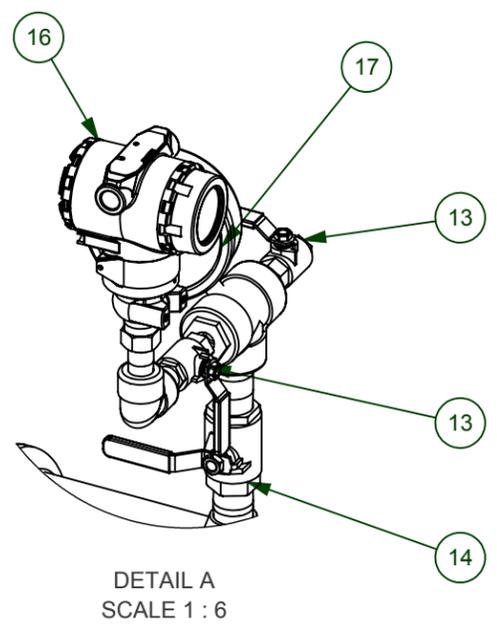
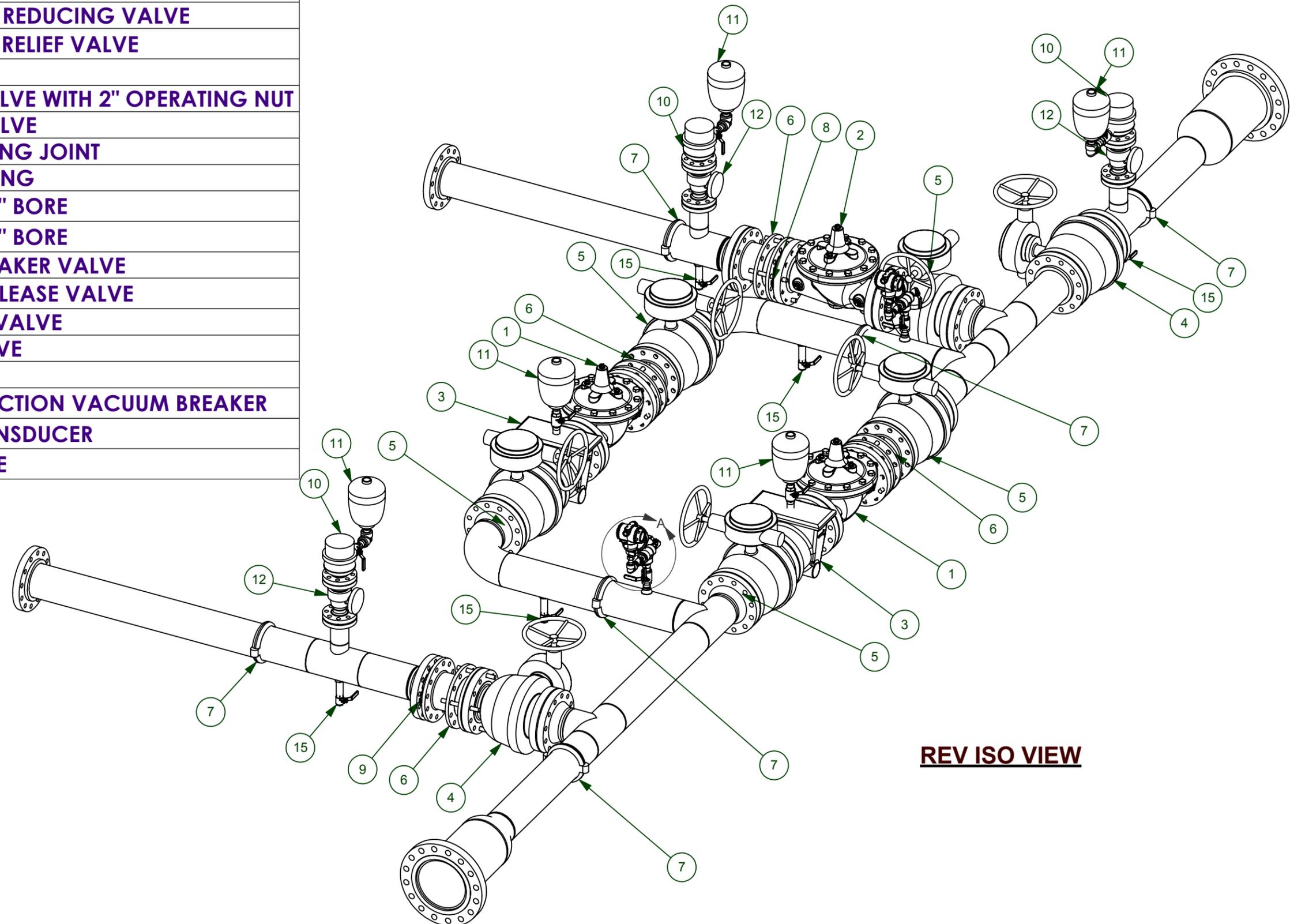
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DWG. NO.	TITLE

REVISIONS					
REV.	DESCRIPTION	BY	DATE	CHK	DATE
1	REPLACED PRESSURE VALVES/ORIFICE FOR CLA-VAL	CAL	4/4/19		

DRAWN BY: CAL	CHECKED BY: KCW	
DATE DRAWN: 9/27/2018	DATE CHECKED: 4/4/2019	
<b>NAVAJO GALLUP WATER SUPPLY GENERAL ARRANGEMENT DRAWING</b>		
SCALE: 1:36	PROJECT NO:	DWG NO: PE-17-0380-DWB
		REV. 1

SHEET 1 OF 7

ITEM#	QTY.	DESCRIPTION
1	2	6" 300# CLA-VAL PRESSURE REDUCING VALVE
2	1	6" 300# CLA-VAL PRESSURE RELIEF VALVE
3	2	6" 300# CLA-VAL STRAINER
4	2	6" 300# VALMATIC BALL VALVE WITH 2" OPERATING NUT
5	5	6" 300# VALMATIC BALL VALVE
6	4	6" 300# ROMAC DISMANTLING JOINT
7	6	6" VICTUALIC RIGID COUPLING
8	1	6" ORIFICE PLATE, WITH 1.87" BORE
9	1	6" ORIFICE PLATE, WITH 1.73" BORE
10	3	2" VALMATIC VACUUM BREAKER VALVE
11	5	1" VALMATIC WATER AIR RELEASE VALVE
12	3	2" APOLLO FLANGED BALL VALVE
13	4	1/2" APOLLO NPT BALL VALVE
14	7	1" APOLLO NPT BALL VALVE
15	5	3/4" APOLLO HOSE CONNECTION VACUUM BREAKER
16	2	1/2" AMETEK PRESSURE TRANSDUCER
17	2	1/4" WIKA PRESSURE GAUGE



**REV ISO VIEW**

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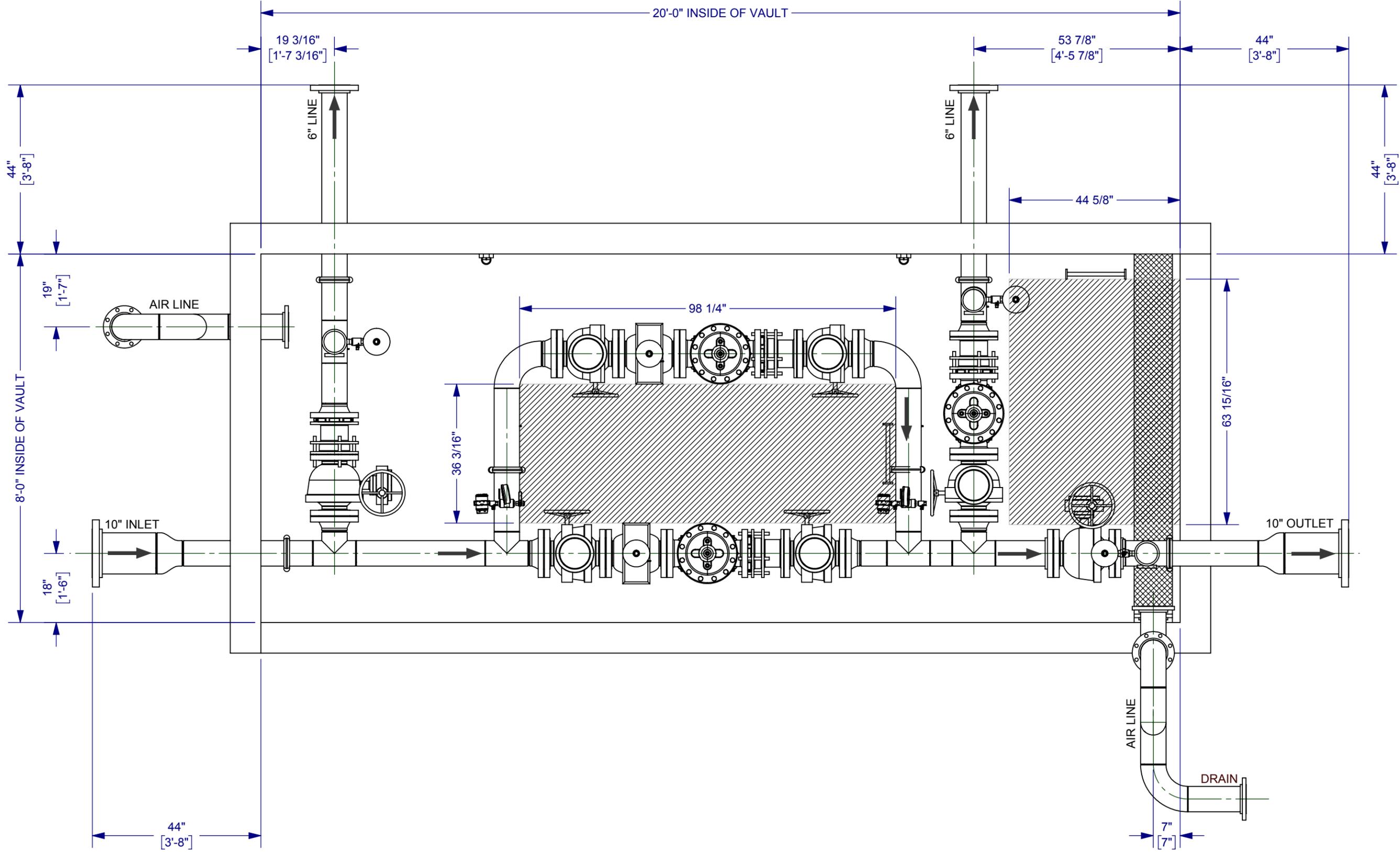
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2 PLACE ±.06  
3 PLACE ±.031  
BREAK ALL SHARP EDGES

**CUSTOMER CONN TOLERANCE UNLESS OTHERWISE SPECIFIED**  
FRACTIONAL: DECIMAL:  
FRACTION ±1" 1 PLACE ±.1  
2 PLACE ±.06  
3 PLACE ±.031  
BREAK ALL SHARP EDGES

DWG. NO.	TITLE

REVISIONS		BY	DATE	CHK	DATE	APPR	DATE
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DRAWN BY: CAL	CHECKED BY: KCW	
DATE DRAWN: 9/27/2018	DATE CHECKED: 4/4/2019	
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SCALE: 1:20	PROJECT NO: PE-17-0380-DWB	DWG NO: PE-17-0380-DWB
		REV. 1



**PLAN VIEW**

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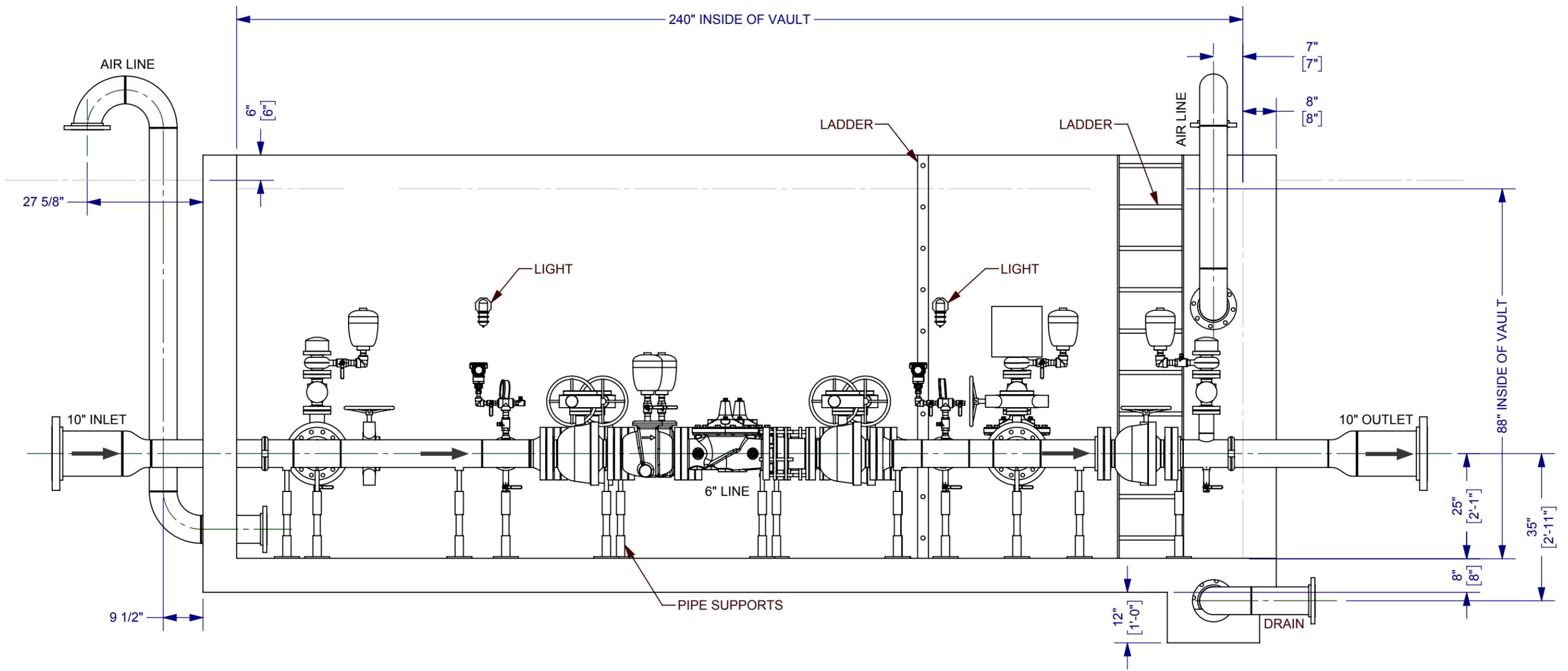
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FRACTION ±3/8"	1 PLACE ±.1	FRACTION ±1"	1 PLACE ±.1
	2 PLACE ±.06		2 PLACE ±.06
	3 PLACE ±.031		3 PLACE ±.031

BREAK ALL SHARP EDGES

REFERENCE DRAWINGS	
DWG. NO.	TITLE

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APPR DATE
1	REPLACED PRESSURE VALVES/ORIFICE FOR CLA-VAL	CAL	4/4/19	

DRAWN BY: CAL	CHECKED BY: KCW	
DATE DRAWN: 9/27/2018	DATE CHECKED: 4/4/2019	
<b>NAVAJO GALLUP WATER SUPPLY GENERAL ARRANGEMENT DRAWING</b>		
SCALE: 1:25	PROJECT NO: PE-17-0380-DWB	DWG NO: PE-17-0380-DWB
		REV. 1



**ELEVATION VIEW**

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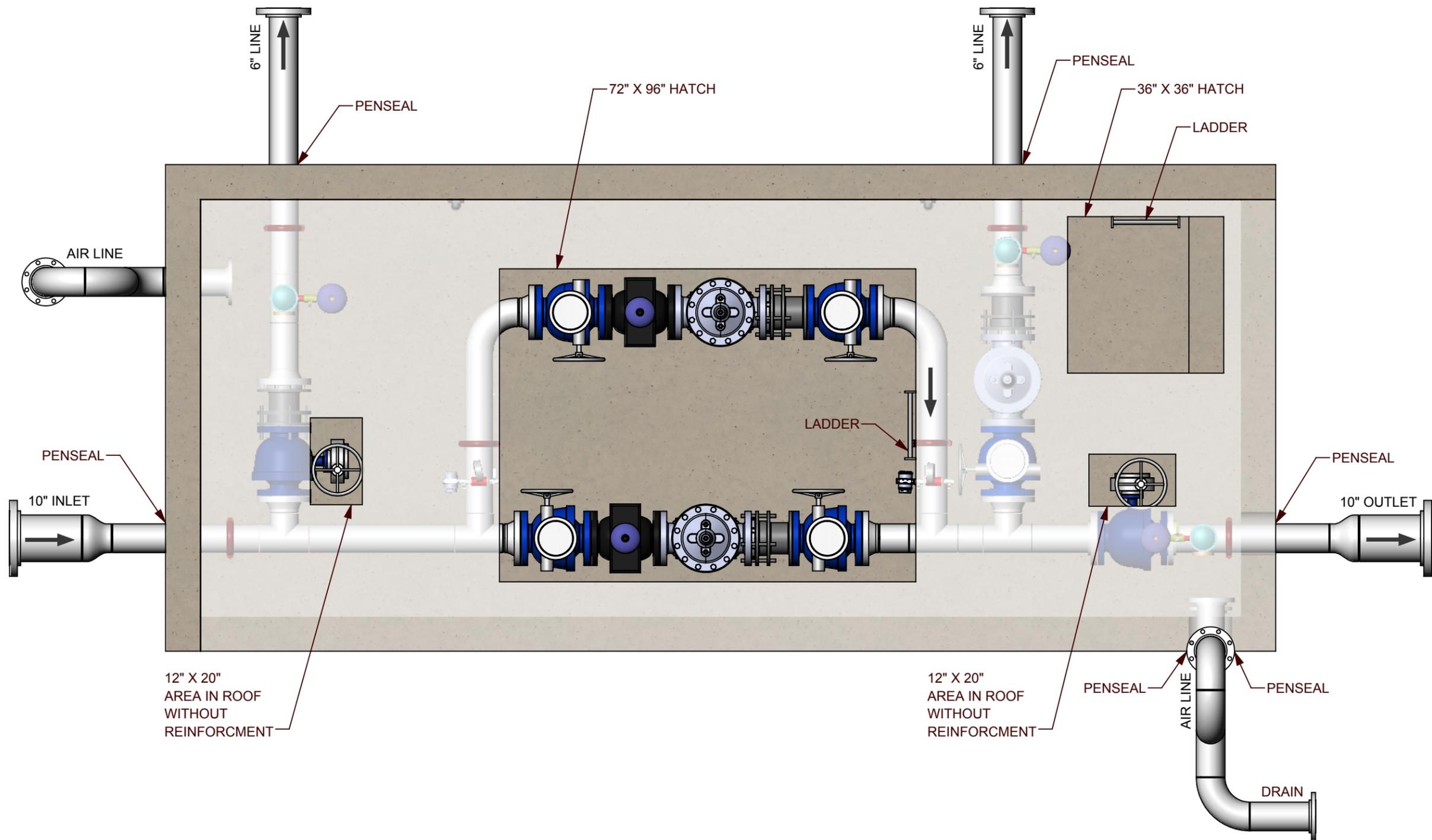
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FRACTION ±3/8"	1 PLACE ±.1	FRACTION ±1"	1 PLACE ±.1
	2 PLACE ±.06		2 PLACE ±.06
	3 PLACE ±.031		3 PLACE ±.031
BREAK ALL SHARP EDGES		BREAK ALL SHARP EDGES	

DWG. NO.	TITLE

REVISIONS		BY	DATE	CHK	DATE	APPR	DATE
1	REPLACED PRESSURE VALVES/ORIFICE FOR CLA-VAL	CAL	4/4/19				

DRAWN BY: CAL	CHECKED BY: KCW	
DATE DRAWN: 9/27/2018	DATE CHECKED: 4/4/2019	
<b>NAVAJO GALLUP WATER SUPPLY GENERAL ARRANGEMENT DRAWING</b>		
SCALE: 1:25	PROJECT NO:	DWG NO: PE-17-0380-DWB
		REV. 1

SHEET 4 OF 7



**COLOR PLAN VIEW**

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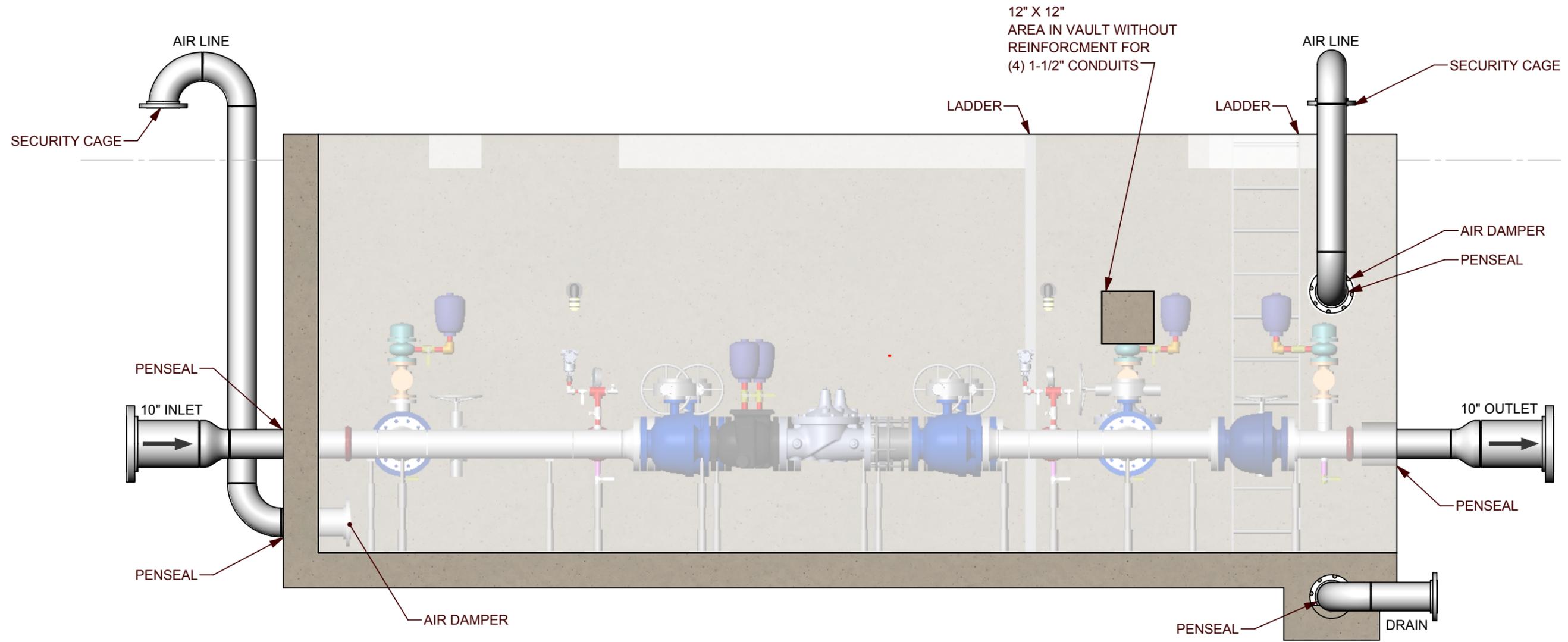
BREAK ALL SHARP EDGES

REFERENCE DRAWINGS	
DWG. NO.	TITLE

REVISIONS					
REV.	DESCRIPTION	BY	DATE	CHK	DATE
1	REPLACED PRESSURE VALVES/ORIFICE FOR CLA-VAL	CAL	4/4/19		

DRAWN BY: CAL	CHECKED BY: KCW	
DATE DRAWN: 9/27/2018	DATE CHECKED: 4/4/2019	
<b>NAVAJO GALLUP WATER SUPPLY GENERAL ARRANGEMENT DRAWING</b>		
SCALE: 1:25	PROJECT NO: PE-17-0380-DWB	DWG NO: PE-17-0380-DWB
		REV. 1

SHEET 5 OF 7



**COLOR ELEVATION VIEW**

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3 PLACE	±.031	3 PLACE	±.031
BREAK ALL SHARP EDGES		BREAK ALL SHARP EDGES	

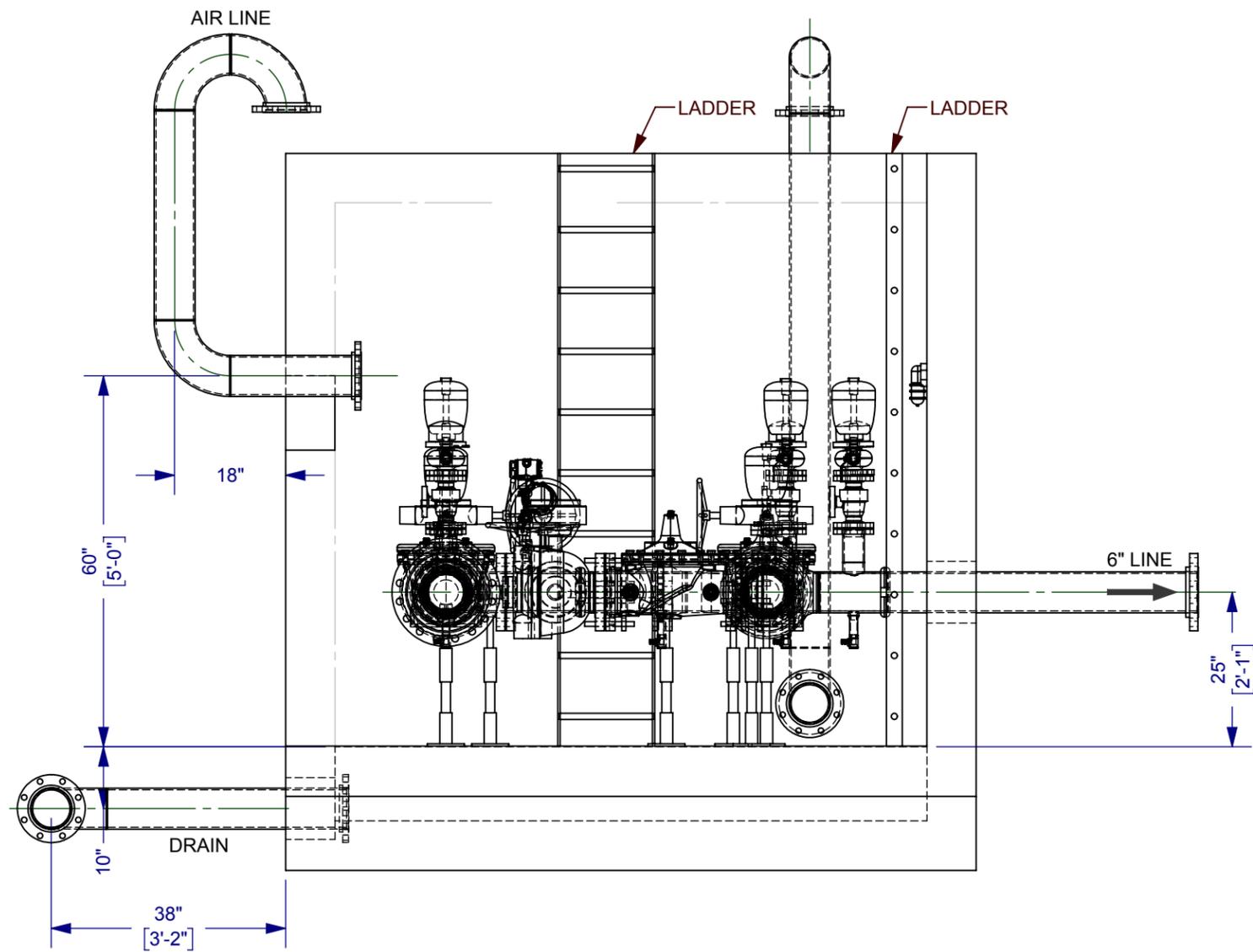
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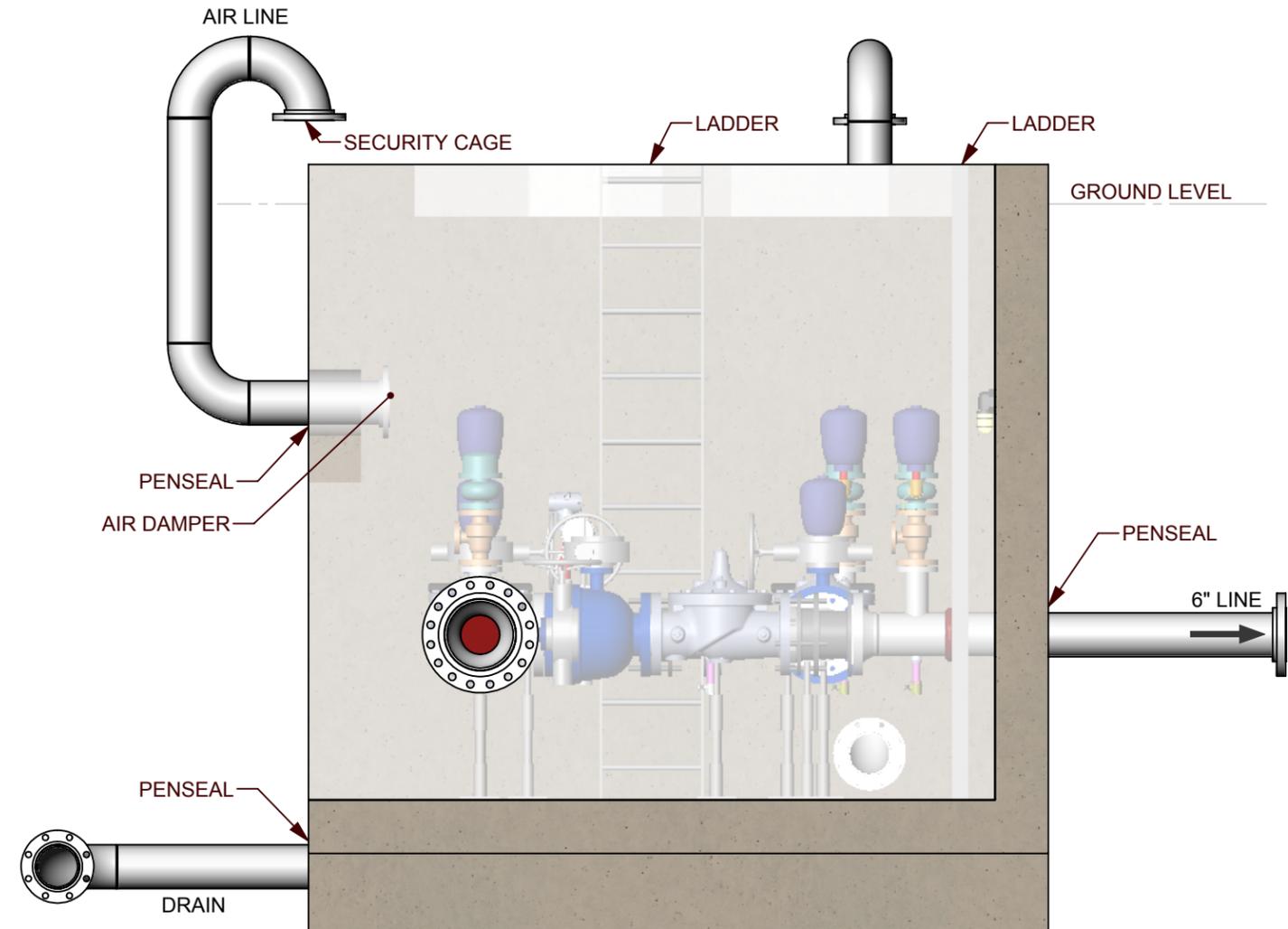
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DATE DRAWN: 9/27/2018	DATE CHECKED: 4/4/2019



<b>NAVAJO GALLUP WATER SUPPLY GENERAL ARRANGEMENT DRAWING</b>			
SCALE: 1:25	PROJECT NO:	DWG NO: PE-17-0380-DWB	REV. 1
SHEET 6 OF 7			1



**SIDE ELEVATION VIEW**



**COLOR SIDE ELEVATION VIEW**

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**STANDARD TOLERANCE UNLESS OTHERWISE SPECIFIED**  
 FRACTIONAL: DECIMAL:  
 1 PLACE ±.1  
 2 PLACE ±.06  
 3 PLACE ±.031  
 BREAK ALL SHARP EDGES

**CUSTOMER CONN TOLERANCE UNLESS OTHERWISE SPECIFIED**  
 FRACTIONAL: DECIMAL:  
 1 PLACE ±.1  
 2 PLACE ±.06  
 3 PLACE ±.031  
 BREAK ALL SHARP EDGES

DWG. NO.	TITLE

REVISIONS		BY	DATE	CHK	DATE	APPR	DATE
1	REPLACED PRESSURE VALVES/ORIFICE FOR CLA-VAL	CAL	4/4/19				

DRAWN BY: CAL	CHECKED BY: KCW	
DATE DRAWN: 9/27/2018	DATE CHECKED: 4/4/2019	
<b>NAVAJO GALLUP WATER SUPPLY GENERAL ARRANGEMENT DRAWING</b>		
SCALE: 1:25	PROJECT NO: PE-17-0380-DWB	DWG NO: PE-17-0380-DWB
		REV. 1

# **vaughn concrete products, inc.**

12650 Tucson Street Henderson, Colorado 80640-9443 (303) 659-3747 Fax (303) 659-1333  
2671 S. Greeley Hwy Cheyenne, Wyoming 82007-3681 (307) 634-0695 Fax (307) 634-0694  
10021 Amarillo Blvd E. Amarillo, Texas 79108-7542 (806) 374-3747 Fax (806) 335-3717  
Toll Free Phone (877) 827-8255 Toll Free Fax (877) 827-7363  
[www.vaughnconcreteproducts.com](http://www.vaughnconcreteproducts.com)

## ENGINEER'S CERTIFICATE

I, being a Registered Professional Engineer under the laws of New Mexico, hereby certify that this document was prepared by me or under my direct supervision, and is correct to the best of my knowledge and belief.

Our submittal packet was prepared for our standard size products that utilize industry standard precast production procedures and manufacturing techniques. The precast concrete products being submitted on herein may differ from that specified for this project but it is our belief they are suitable for this application.



P.E. No. 13161



12650 Tucson Street Henderson, Colorado 80640-9443 (303) 659-3747 Fax (303) 659-1333  
2671 S. Greeley Hwy Cheyenne, Wyoming 82007-3681 (307) 634-0695 Fax (307) 634-0694  
10021 Amarillo Blvd E. Amarillo, Texas 79108-7542 (806) 374-3747 Fax (806) 335-3717  
Toll Free Phone (877) 827-8255 Toll Free Fax (877) 827-7363  
[www.vaughnconcreteproducts.com](http://www.vaughnconcreteproducts.com)

## **REQUEST FOR DEVIATIONS**

We request a thorough review of our submittal. The attached submittal packet includes product drawings that are for standard size products that utilize standard precast manufacturing techniques, materials and items that are industry standard that may differ from that shown on the project drawings.

We are submitting on the vault to be supplied with our alternate standard 20' inside length. We request approval to supply the vault on this project as submitted on herein.

# PRECAST CONCRETE VAULT

8'-0" WIDE X 20'-0" LONG X 7'-4" HIGH INSIDE DIMENSIONS

USED FOR CONTROL VALVE VAULT DETAILED ON SHEETS DT-12, DT-13 & DT-14

PIPESTONE EQUIPMENT

NAVAJO GALLUP WATER SUPPLY

PROJECT REACH 26.1

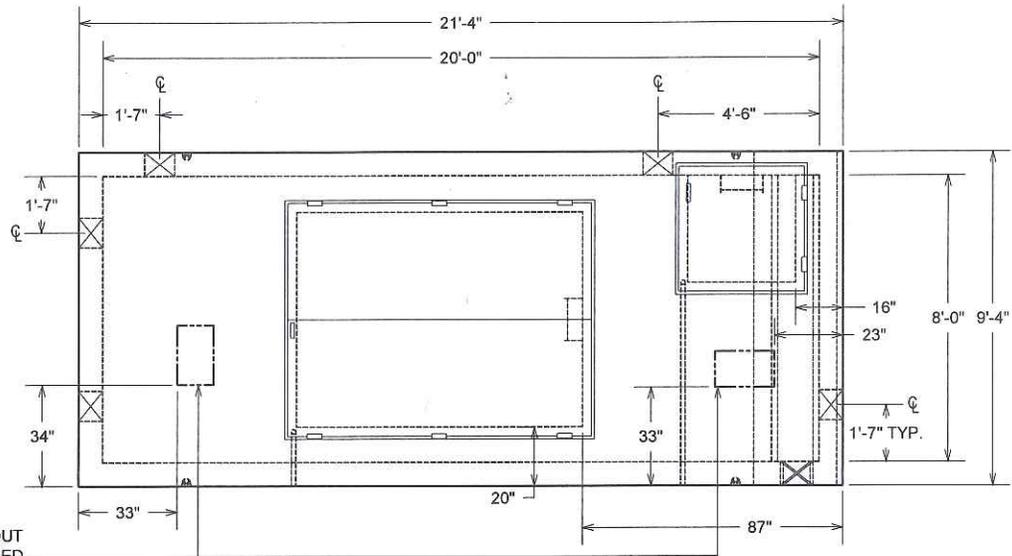
GALLUP, NM

1 REQUIRED

SHEET 1 OF 1

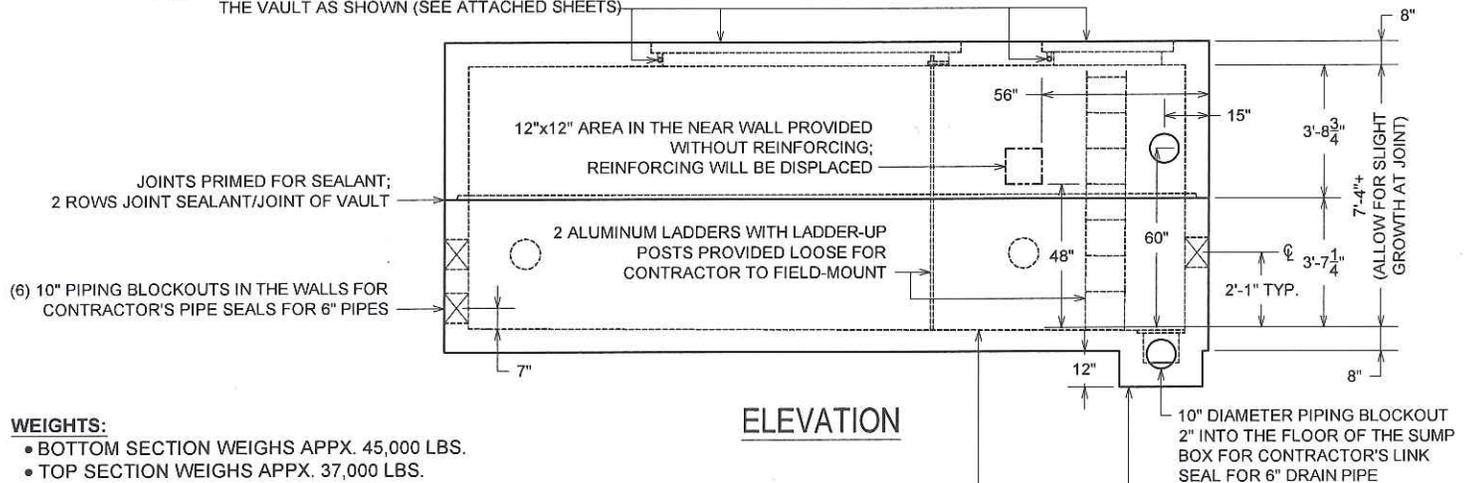


(2) 12"x20" AREAS IN ROOF PROVIDED WITHOUT REINFORCING; REINFORCING WILL BE DISPLACED



**PLAN VIEW**

TPD 96"x72" & TPS 36"x36" ALUMINUM HATCHES CAST IN THE ROOF OF VAULT; WITH DRAINS TO EXIT THE SIDE OF THE VAULT AS SHOWN (SEE ATTACHED SHEETS)



**ELEVATION**

**WEIGHTS:**

- BOTTOM SECTION WEIGHS APPX. 45,000 LBS.
- TOP SECTION WEIGHS APPX. 37,000 LBS.

**LIFTING:**

- SECTIONS TO LIFT FROM 4 RECESSED GALVANIZED LIFT BARS

**NOTES:**

- CONCRETE: 5000 PSI MINIMUM
- REINFORCING: GRADE 60 MINIMUM
- FLOOR, WALLS & ROOF TO BE 8" THICK
- VAULT MANUFACTURED TO SATISFY AASHTO HS-20-44 LOADINGS
- HATCHES ONLY SUITABLE FOR 300PSF PEDESTRIAN LOADINGS
- INTERIOR WALLS & ROOF COATED WITH SHERWIN-WILLIAMS EXTERIOR WHITE PAINT PRIOR TO SHIPMENT
- EXTERIOR COATED WITH CS-55 DAMPPROOFING COATING PRIOR TO SHIPMENT

FLOOR TO SLOPE APPX. 1" TO SUMP, 12"x96"x12" ID PRECAST CONCRETE SUMP BOX WITH 8" FLOOR & 8" WALLS CAST MONOLITHIC WITH BOTTOM VAULT SECTION; NOTCH PROVIDED IN FLOOR FOR 1" ALUMINUM GRATING

DRAWING SCALE IS 1:64

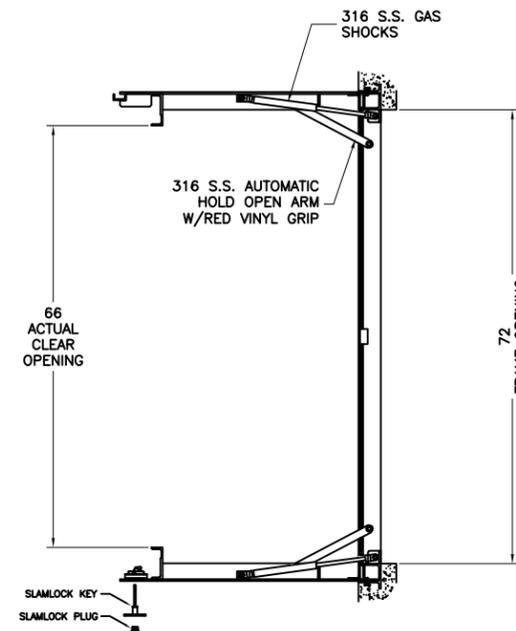
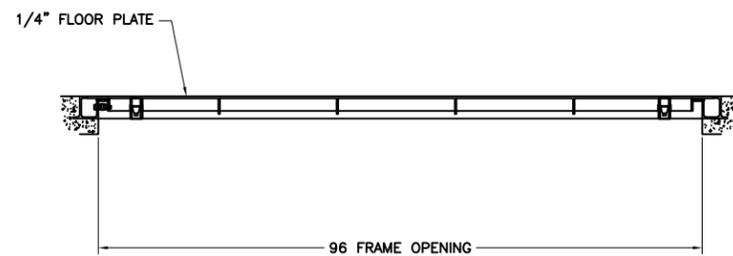
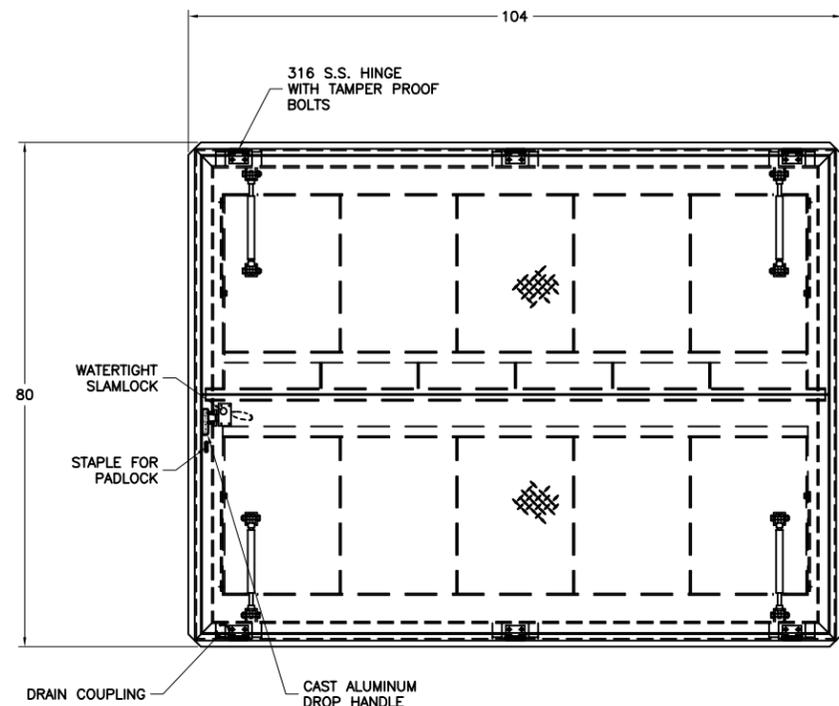
**vaughn concrete products, inc.**

12650 Tucson Street Henderson, Colorado 80640-9443  
Toll Free (877) 827-8255 Toll Free Fax (877) 827-7363  
(303) 659-3747 Fax (303) 659-1333

2671 So. Greeley Hwy Cheyenne, Wyoming 82007-3681 (307) 634-0695  
10021 Amarillo Blvd. East Amarillo, Texas 79108-7542 (806) 374-3747

ACTUAL DIMENSIONS OF CONCRETE PRODUCTS MAY VARY SLIGHTLY

BX20 CONTROL VALVE VAULT, PIPESTONE, NAVAJO GALLUP.DWG  
DATE CREATED: 9.28.18



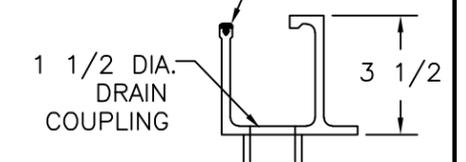
**SELECTED FEATURES**

1. S.S GAS SHOCKS
2. SLAMLOCK

**NOTES**

1. MATERIAL: ALUMINUM
2. FINISH: MILL
3. LOADING: 300 PSF
4. 316 SS NUTS & BOLTS
5. APPROX HATCH WT: 425.93 LBS

**ODOR REDUCTION GASKET/CUSHION**



1/4" EXTRUDED TROUGH SECTION W/INTEGRAL CONT. ANCHOR FLANGE & GROOVE FOR GASKET/CUSHION  
 FRAME MAT'L: ALUMINUM 6063-T5

FRAME DETAIL

**NOTE:**  
 AS AN AUTOMATED DRAWING, THE DESIGN HAS NOT BEEN REVIEWED BY USFF ENGINEERING AND IS THEREFORE TO BE USED FOR REFERENCE ONLY. USFF RESERVES THE RIGHT TO ADJUST DIMENSIONS TO INSURE ADHERENCE TO CUSTOMER REQUIREMENTS AND PROPER OPERATION OF THE PRODUCT.

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INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M

BREAK ALL SHARP CORNERS & EDGES TO 0.01

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONAL

INCHES = ± 1/16  
 1/16 = ± 1/32  
 1/32 = ± 1/64

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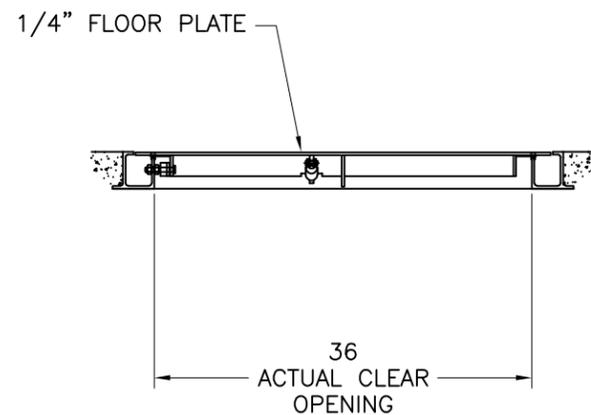
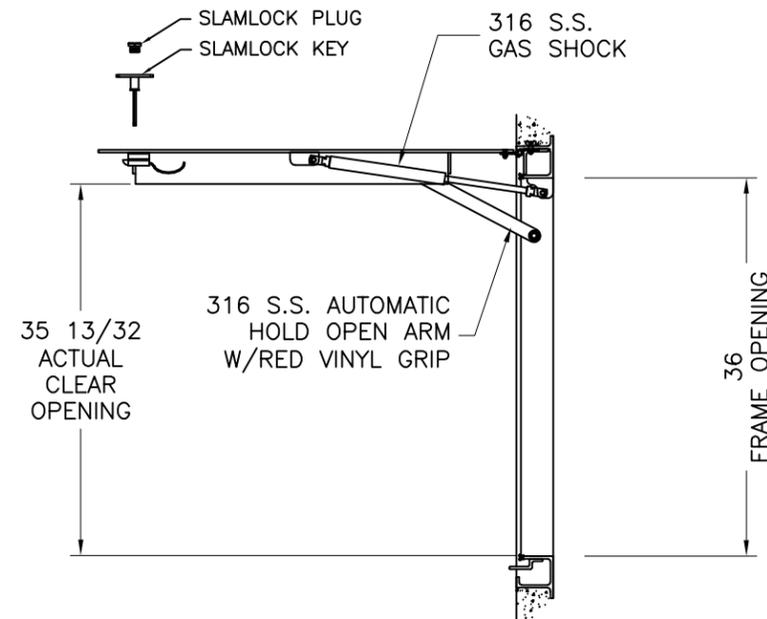
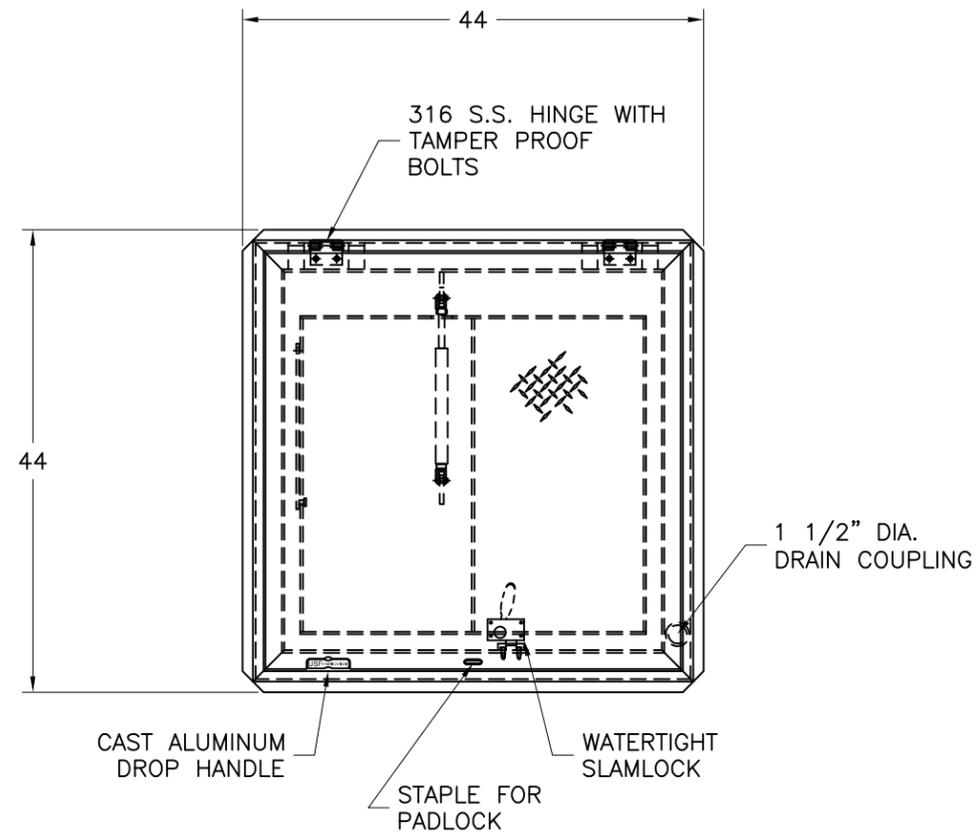


**U.S.F. FABRICATION INC.**

HIALEAH, FL

**HATCH TPD 96 X 72 ALUM**

DWN. BY:	BOB	SCALE:	1:40	SHEET:	1 OF 1	DATE:	11/06/17
CHK. BY:	BOB	DWG #	1000086777	SHEET SIZE:	A	REV:	0



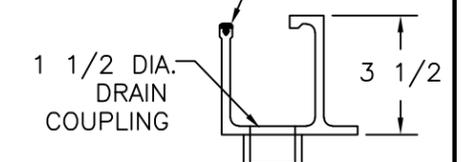
**SELECTED FEATURES**

1. S.S GAS SHOCKS
2. SLAMLOCK

**NOTES**

1. MATERIAL: ALUMINUM
2. FINISH: MILL
3. LOADING: 300 PSF
4. 316 SS NUTS & BOLTS
5. APPROX HATCH WT: 134.67 LBS

**ODOR REDUCTION GASKET/CUSHION**



1/4" EXTRUDED TROUGH SECTION W/INTEGRAL CONT. ANCHOR FLANGE & GROOVE FOR GASKET/CUSHION  
 FRAME MAT'L: ALUMINUM 6063-T5

**FRAME DETAIL**

**NOTE:**  
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INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M

BREAK ALL SHARP CORNERS & EDGES TO 0.01

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONAL

INCHES = ± 1/16  
 1/16 = ± 1/32  
 1/32 = ± 1/64

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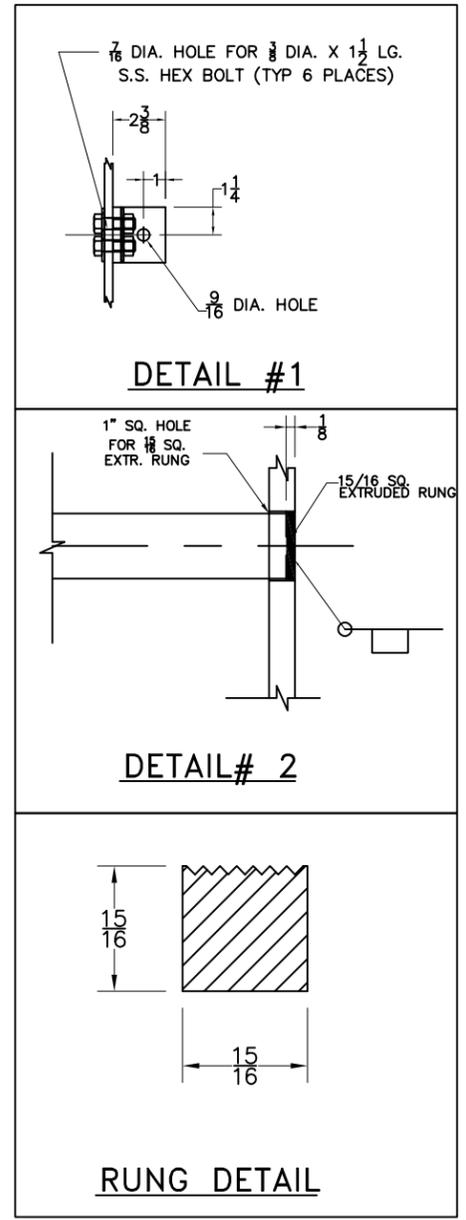
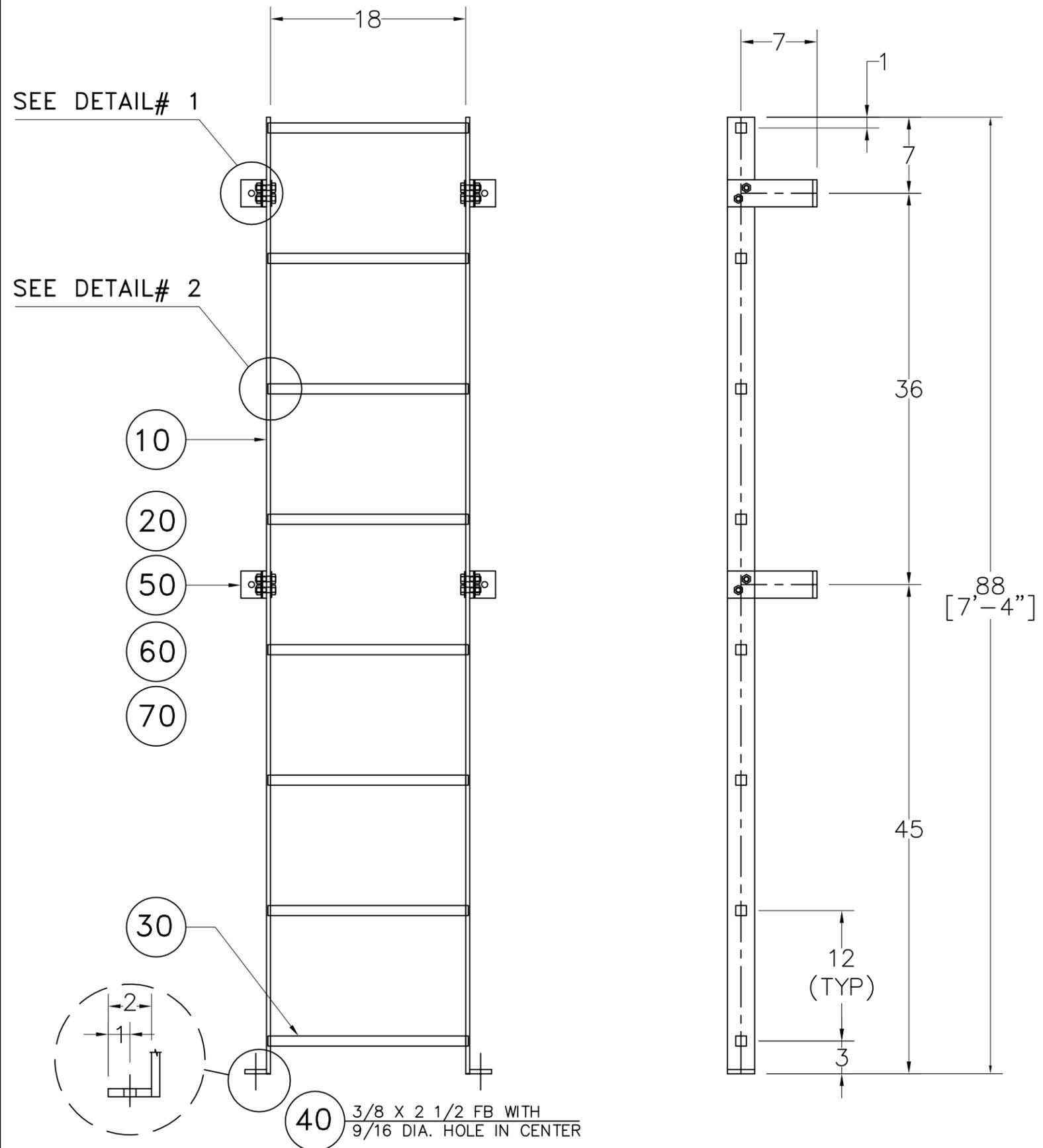


**U.S.F. FABRICATION INC.**

HIALEAH, FL

**HATCH TPS 36 X 36 ALUM**

DWN. BY: BOB	SCALE: 1:24	SHEET: 1 OF 1	DATE: 11/06/17
CHK. BY: BOB	DWG # 1000086779	SHEET SIZE: A	REV: 0



**NOTE:**

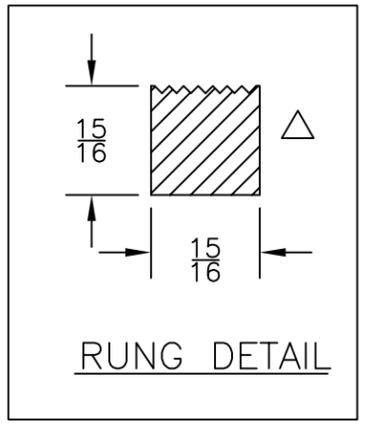
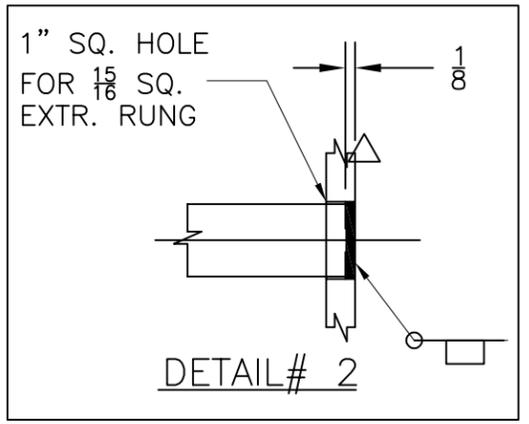
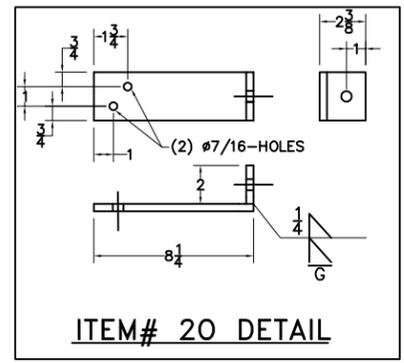
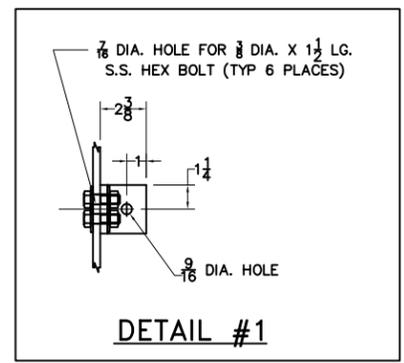
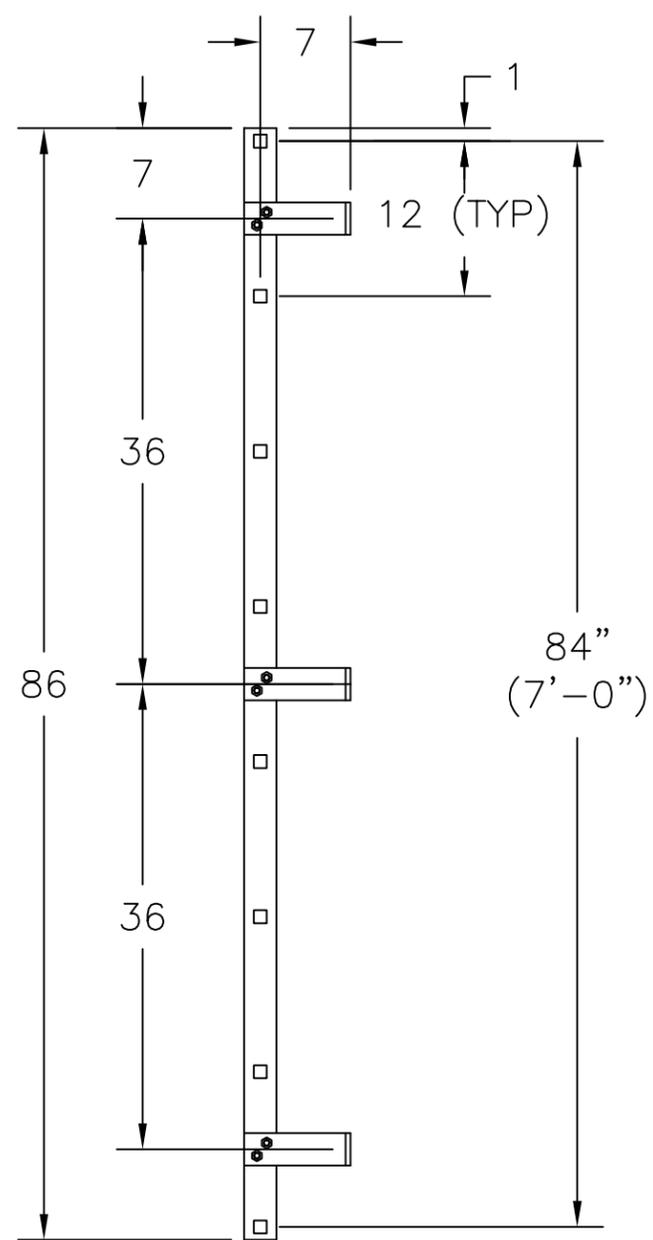
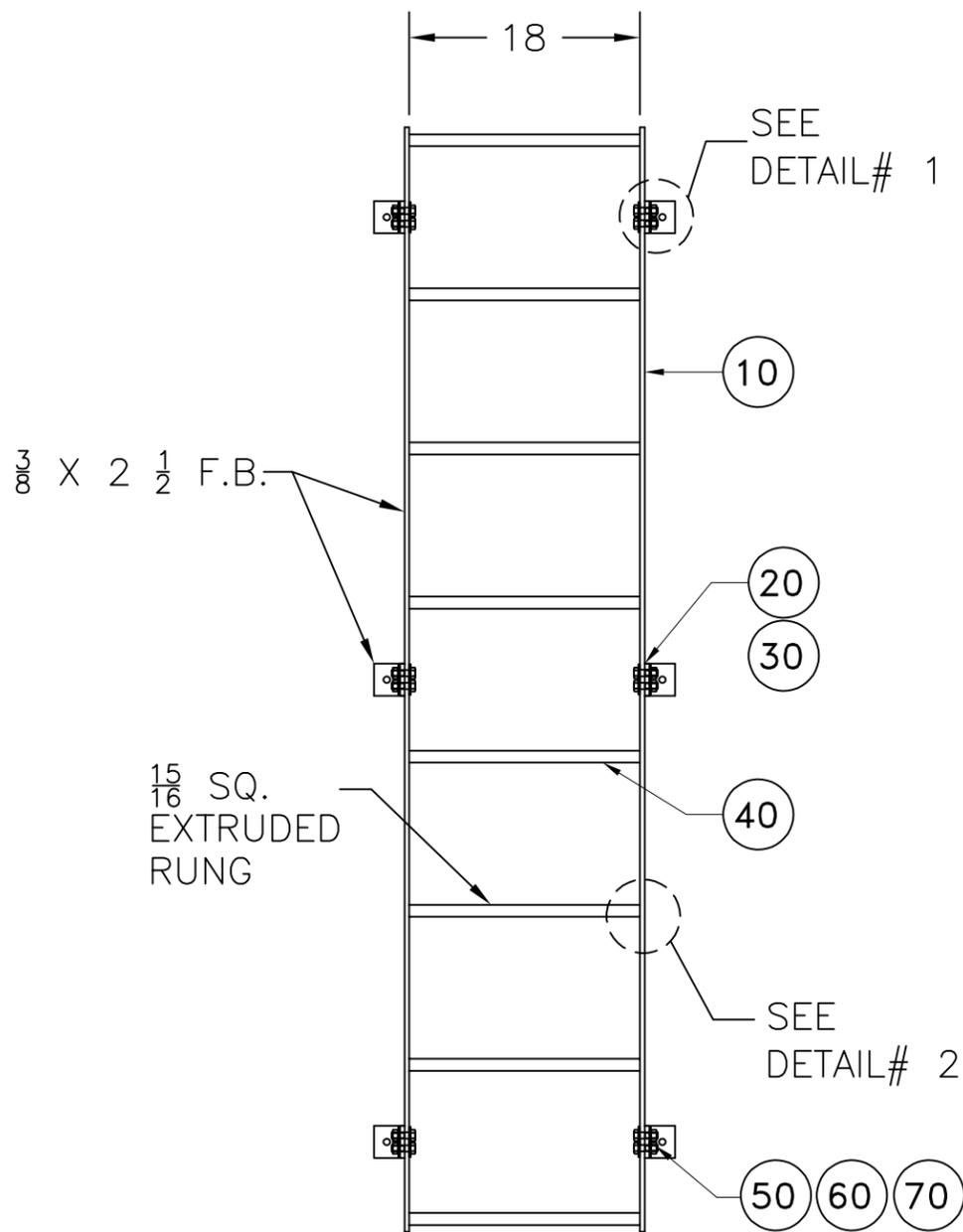
1- MATERIAL: ALUMINUM

2- APPROX. WEIGHT: 35 LBS.

INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M		 <b>U.S.F. FABRICATION INC.</b> HIALEAH, FLORIDA	
BREAK ALL SHARP CORNERS & EDGES TO 0.01			
<b>TOLERANCES UNLESS OTHERWISE SPECIFIED:</b> INCHES = $\pm \frac{1}{16}$ $\frac{1}{16}$ = $\pm \frac{1}{32}$ $\frac{1}{32}$ = $\pm \frac{1}{64}$		<b>ALUMINUM LADDER – FLOOR MOUNTED</b> <b>7'-4" LG.(OVERALL)</b>	
DRAWN BY: RT APP'D BY: RT	SCALE: 1:16 DWG. NO: 1000042796	SHEET: 1 OF 1 SHEET SIZE: B	DATE: 08/30/16 REV: 0

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NOTES:  
 1- MATERIAL: ALUMINUM  
 2- APPROXIMATE WEIGHT: 37 LBS.

REV.	DATE	BY	CHK.	DESCRIPTION
3	09/26/16	A.Q.	A.Q.	ADDED B.O.M
2	05/18/16	A.Q.	A.Q.	STAND OFF NOW ARE BOLTING.

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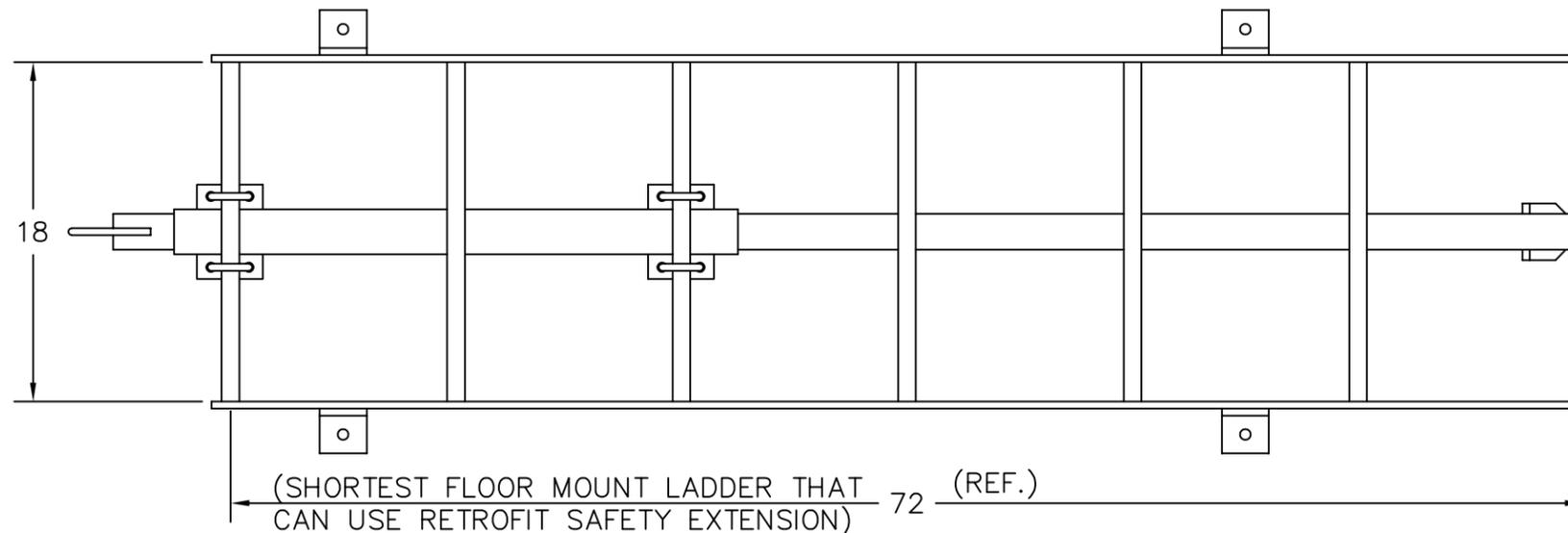
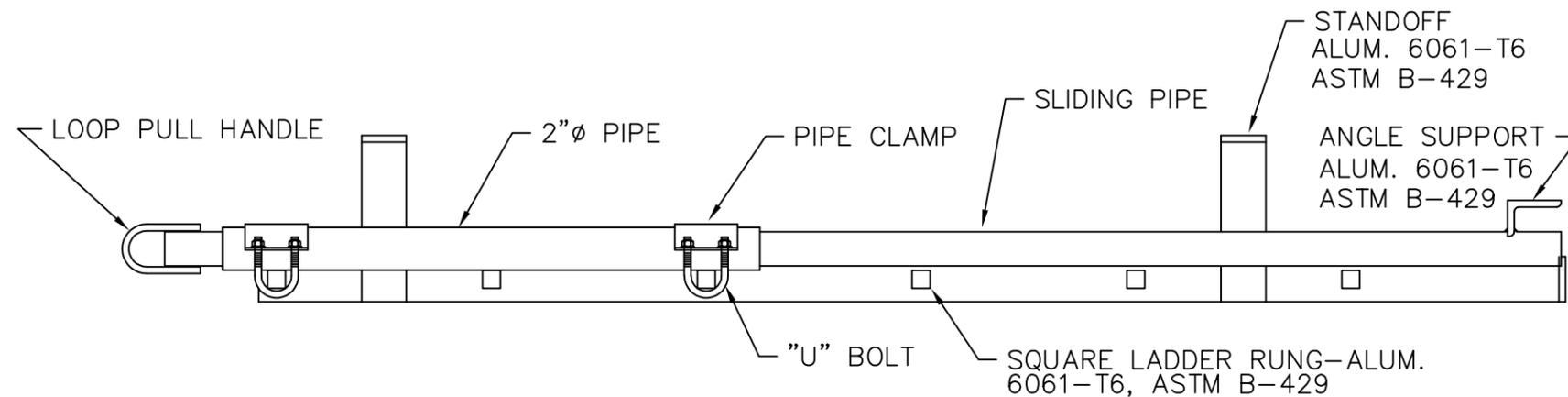
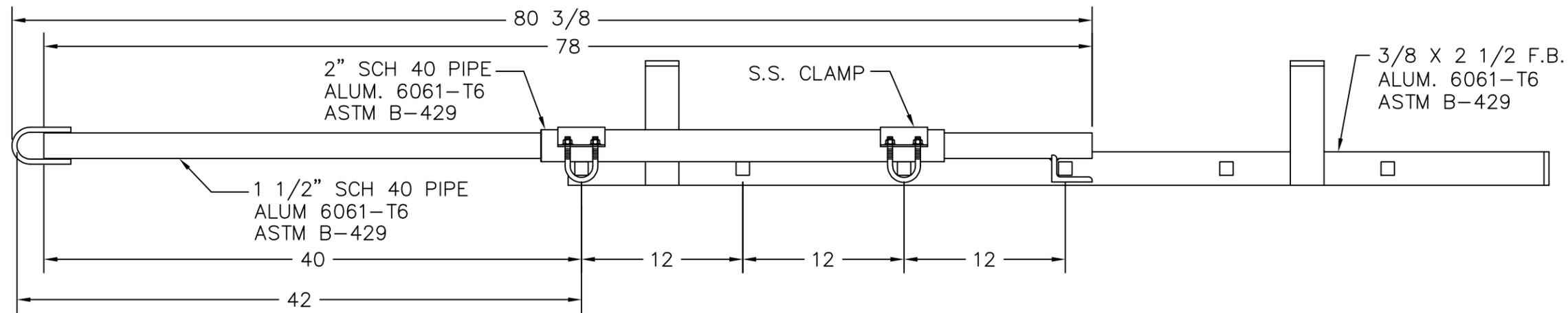
INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M  
 BREAK ALL SHARP CORNERS & EDGES TO 0.01  
 TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONAL  
 INCHES = ± 1/16  
 1/16 = ± 1/32  
 1/32 = ± 1/64

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 **U.S.F. FABRICATION INC.**  
 HIALEAH, FLORIDA

LADDER WALL 7'-0

DWN. BY: AQ/ALJ	SCALE: 1=16	SHEET: 1 OF 1	DATE: 8/3/15
CHK. BY: OR/ALJ	DWG.# 1000001049	SHEET SIZE: B	REV: 3



INSTALLATION & OPERATION INSTRUCTIONS

INSTALLATION INSTRUCTIONS:

- 1- PLACE THE LADDER ON A FLAT SURFACE WITH THE STANDOFFS FACING UP.
- 2- LAY THE SLIDING PIPE ASSEMBLY IN THE CENTER OF THE SQUARE LADDER RUNGS WITH THE PULL LOOP AT THE TOP OF THE LADDER.
- 3- PLACE THE (2) PIPE CLAMPS OVER THE 2"Ø PIPE CENTERED ON THE FIRST AND THIRD RUNGS OF THE LADDER.
- 4- PLACE THE (4) "U" BOLTS OVER THE SQUARE RUNGS AND THROUGH THE HOLES IN THE PIPE CLAMPS.
- 5- TIGHTEN ALL THE "U" BOLT NUTS APPLYING 10 - 15 FT LB. TORQUE TO EACH.
- 6- VERIFY THAT THE EXTENSION ASSEMBLY IS ATTACHED SECURELY TO THE LADDER.

OPERATION INSTRUCTIONS:

- 1- TO ENGAGE THE SAFETY LADDER EXTENSION, GRASP THE LOOP HANDLE AT THE TOP OF THE SLIDING PIPE ASSEMBLY AND PULL STRAIGHT UP UNTIL THE ANGLE AT THE BOTTOM OF THE SLIDING PIPE PASSES THE SQUARE LADDER RUNG ON WHICH YOU WANT IT TO SEAT.
- 2- ROTATE THE SLIDING PIPE 180 DEG. AND LOWER THE ANGLE UNTIL IT SEATS SECURELY ON THE SQUARE LADDER RUNG.
- 3- VERIFY THAT THE EXTENSION IS SECURELY SEATED BEFORE STEPPING ONTO THE LADDER.

APPROXIMATE WEIGHT: 13 LBS.  
MATERIAL: ALUMINUM

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INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M

BREAK ALL SHARP CORNERS & EDGES TO 0.01

TOLERANCES UNLESS OTHERWISE SPECIFIED:

INCHES = ± 1/16  
1/16 = ± 1/32  
1/32 = ± 1/64

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**U.S.F. FABRICATION INC.**  
HIALEAH, FLORIDA

**RETROFIT SAFETY EXTENSION  
FOR LADDER - ASSEMBLY DETAIL**

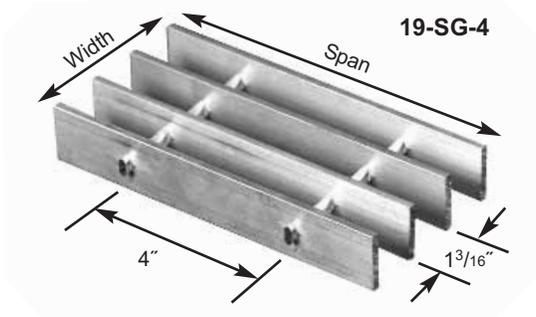
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APP'D BY: RT	DWG. NO: 1000001804	SHEET SIZE: B	REV: 0

# ALUMINUM PROFILES

## 19 SPACE

1" TALL ALUMINUM GRATING USED FOR SUMP GRATE

ALUMINUM **RECTANGULAR BAR** – 19-SG-4



% Open Area*		
Bars	1/8"	3/16"
4" cc	85%	80%
2" cc	81%	77%

# ConSeal™ CS-55

## Water Based Acrylic Coating



## Water Based Damp Proof Coating for All Concrete Structures

### Applications

For use on most concrete structures.

### Sealing Properties

- Fast drying concrete damp-proof coating.
- Can be applied effectively with a brush, paint roller or sprayer.
- Soap and water clean up.
- Environmentally responsible. VOC content as low as 59 g/L.
- Suitable for indoor application without specialized paint areas.
- Nearly three times the coverage of typical tar or asphalt based products (300 - 350 sq. ft. per gallon).
- Smooth, hard, polymer film that protects against water intrusion.
- Wide range of standard colors.
- Custom colors available upon request.
- Recycled Content, % by weight:
  - Post Industrial: 17%

### Specifications

ConSeal CS-55 complies with E.P.A. regulation 40CFR261.4 for solid waste management. CS-55 is made with environmentally safe ingredients; disposal of containers does not present environmental problems.

### Immersion Testing

**One Year Immersion Testing:** No visible deterioration when tested in 5% Caustic Potash, 5% Hydrochloric Acid, 5% Sulfuric Acid, and 5% Hydrogen Sulfide.

### Technical Data

#### Heavy Metals Testing

Parameter	EPA Limit	CS-55
Arsenic	5ppm	BDL
Barium	100ppm	1.12ppm
Cadmium	1ppm	BDL
Chromium	5ppm	BDL
Lead	5ppm	BDL
Mercury	0.2ppm	BDL
Selenium	1ppm	BDL
Silver	5ppm	BDL

*Don't Just Seal It, ConSeal It!*

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Concrete Sealants, Inc. 9325 State Route 201 ■ Tipp City, OH 45371 ■ Toll Free 800.332.7325

P. 937.845.8776 F. 937.845.3587 ■ [www.conseal.com](http://www.conseal.com)



# ConSeal™ CS-55

Water Based  
Acrylic Coating



Water Based Damp Proof Coating for Concrete

## Technical Data Continued

### Scrape Adhesion Performance

#### Film Millage

#### Force

500g  
1000g  
1500g  
2000g  
2500g

#### Asphalt Coating 0.071"

#### Result

Passed with minimal damage  
Failed 2/3rds of coating scraped off  
Failed, complete film removal  
Failed, complete film removal  
Failed, complete film removal

#### CS-55 0.0038"

#### Result

Passed with no damage  
Passed with no damage  
Passed with minimal damage  
Passed with minimal damage  
Passed with minimal damage

### Limited Warranty

This information is presented in good faith, but we cannot anticipate all conditions under which this information and our products, or the products of other manufactures in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety and suitability of our products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each such product or product combinations for their own purposes. It is the **users' responsibility** to satisfy himself as to the suitability and completeness of such information for this own particular use. We sell this product without warranty, and buyers and users assume all responsibility and liability for loss or damage arising from the handling and use of this product, whether used alone or in combination with other products.

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# **vaughn concrete products, inc.**

12650 Tucson Street Henderson, Colorado 80640-9443 (303) 659-3747 Fax (303) 659-1333  
2671 S. Greeley Hwy Cheyenne, Wyoming 82007-3681 (307) 634-0695 Fax (307) 634-0694  
10021 Amarillo Blvd E. Amarillo, Texas 79108-7542 (806) 374-3747 Fax (806) 335-3717  
Toll Free Phone (877) 827-8255 Toll Free Fax (877) 827-7363  
[www.vaughnconcreteproducts.com](http://www.vaughnconcreteproducts.com)

## **MIX DESIGN**

**General: Type III Portland Cement Will Be Used.  
(See Attached Mill Certification Sheet)**

### **Mix Design B:**

#### **Each Yard Of Concrete Contains:**

700 lbs. Type III Portland Cement  
1620 lbs. Coarse Aggregate  
1300 lbs. Fine Aggregate

#### **Water Based On Admixture**

24-28 gal. w/ 50 oz. ViscoCrete 2110 Admixture

**This Mix Design Is Used To Yield A Minimum 28 Day  
Compressive Strength Of 5000 PSI.**



Vaughn Concrete Products Gradation Report  
 July 2018



<b>Plant:Platte Valley</b>							
<b>#67</b>		1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 8
07/09/2018		100.0	90.0	39.8	20.0	5.6	1.8
07/10/2018		100.0	94.8	53.7	26.4	3.3	1.1
07/11/2018		100.0	93.7	50.2	27.9	3.1	1.0
07/13/2018		100.0	95.0	51.7	25.2	2.9	1.1
07/16/2018		100.0	94.7	52.3	26.9	2.6	0.9
07/17/2018		100.0	90.4	38.7	20.6	2.0	1.3
07/18/2018		100.0	91.0	40.4	21.9	2.3	0.8
07/19/2018		100.0	90.0	39.9	20.6	2.0	1.1
07/20/2018		100.0	92.0	38.0	22.0	1.9	1.0
07/23/2018		100.0	91.6	40.2	21.0	2.3	1.3
07/24/2018		100.0	91.6	38.4	22.9	2.1	1.0
07/25/2018		100.0	90.4	39.1	20.4	2.3	1.0
07/26/2018		100.0	92.3	40.4	21.9	2.6	1.1
07/27/2018		100.0	90.0	37.4	20.7	2.1	0.9
07/30/2018		100.0	91.0	39.9	22.0	2.0	0.9
07/31/2018		100.0	92.0	36.9	20.0	1.9	0.8
	<b>Average</b>	100.0	91.9	42.3	22.5	2.6	1.1
	<b>Std Dev For Avg</b>	0.0	1.8	5.9	2.6	0.9	0.2



P.O. Box 529  
 Lyons, CO 80540  
 Plant (303) 823-2100  
 Sales (303) 475-3988

**CEMENT  
 MILL  
 TEST  
 REPORT**

**Cement Identified as:**

**Plant: CEMEX Lyons Cement**  
**Location: Lyons, CO**  
**Production Dates:**

**TYPE III & HE CEMENT**

**Date: 9/14/2018**

**Beginning: August 1, 2018**  
**Ending: August 31, 2018**

STANDARD CHEMICAL REQUIREMENTS (ASTM C114)	TEST RESULTS	ASTM C150 SPEC.	TYPE III	ASTM C1157 SPEC.	TYPE HE	
Silicon Dioxide (SiO <sub>2</sub> ), %	20.4		----		----	
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> ), %	4.5		----		----	
Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ), %	3.0		----		----	
Calcium Oxide (CaO), %	63.4		----		----	
Magnesium Oxide (MgO), %	1.0	Maximum	6.0		----	
Sulfur Trioxide (SO <sub>3</sub> ), % **	3.9	Maximum	3.5**		----	
Loss on Ignition (LOI), %	2.8	Maximum	3.5		----	
Insoluble Residue, %	0.38	Maximum	1.5		----	
Alkalies (Na <sub>2</sub> O equivalent), %	18.62		----		----	
Tricalcium Silicate (C <sub>3</sub> S), % *	49		----		----	
Dicalcium Silicate (C <sub>2</sub> S), % *	20		----		----	
Tricalcium Aluminate (C <sub>3</sub> A), % *	7	Maximum	15		----	
Tetracalcium Aluminoferrite (C <sub>4</sub> AF), % *	9		----		----	
(C <sub>4</sub> AF + 2C <sub>3</sub> A) or (C <sub>4</sub> AF + C <sub>2</sub> F), %	22		----		----	
CO <sub>2</sub> , %	1.9		----		----	
Limestone, %	7.0	Maximum	5.0		----	
CaCO <sub>3</sub> in Limestone, %	93	Minimum	70		----	
<b>PHYSICAL REQUIREMENTS</b>						
(ASTM C 204) Blaine Fineness, cm <sup>2</sup> /gm	5260		----		----	
(ASTM C 430) -325 Mesh, %	99.1		----		----	
(ASTM C 191) Time of Setting (Vicat)						
Initial Set, minutes	95	Min. - Max.	45 - 375	Min. - Max.	45 - 420	
Final Set, minutes	190		----		----	
(ASTM C 451) False Set, %	73	Minimum	50	Minimum	50	
(ASTM C 185) Air Content, %	7	Maximum	12	Maximum	----	
(ASTM C 151) Autoclave Expansion, %	-0.04	Maximum	0.80	Maximum	0.80	
(ASTM C 187) Normal Consistency, %	28.2		----		----	
(ASTM C 1038) Expansion in Water, %	0.006	Maximum	0.020	Maximum	0.020	
(ASTM C 109) Compressive Strength, psi (MPa)						
1 Day	psi 3820	MPa 26.3	Minimum	1740 (12.0)	Minimum	1450 (10)
3 Day	5010	34.5	Minimum	3480 (24.0)	Minimum	2470 (17)
7 Day	6200	42.7		----	----	

\*\* Note D in Table 1 of ASTM C150-17 allows for additional sulfate, provided expansion as measured by ASTM C1038 does not exceed 0.020%.

\* Adjusted for Limestone Addition per ASTM C 150-17, A1.6

CEMEX hereby certifies that this cement meets or exceeds the chemical and physical Specifications of:

ASTM C150 - 17 for Type III Portland Cement  
 ASTM C1157 - 11 for Type HE Hydraulic Cement

By:  
 Timothy W. Rawlsky  
 Quality Control Manager  
 CEMEX - Lyons Cement Plant

# Sika® ViscoCrete® 2110

## High Range Water Reducing Admixture

<b>Description</b>	Sika ViscoCrete 2110 is a high range water reducer and superplasticizer utilizing Sika's ViscoCrete® polycarboxylate polymer technology. Sika ViscoCrete 2110 meets the requirements for ASTM C-494 Types A and F and AASHTO M-194 Types A and F.
<b>Applications</b>	Sika ViscoCrete 2110 may be used in both ready mix and precast applications, as a plant added high range water reducer to provide excellent plasticity while maintaining slump for up to 90 minutes. Controlled set times make Sika ViscoCrete 2110 ideal for horizontal and vertical applications. Sika ViscoCrete 2110 is ideal for production of Self Consolidating Concrete (SCC).
<b>Advantages</b>	<p>Sika ViscoCrete 2110 can be used for all levels of water reduction in various types of concrete ranging from dry cast applications, conventional concrete to SCC (Self Consolidating Concrete). Sika ViscoCrete 2110 will deliver water reduction up to 45%. The special formulation of Sika ViscoCrete 2110 increases compressive strength of concrete and helps maintain the plasticity of the concrete over prolonged period of time. Sika ViscoCrete 2110 extends concrete workability time during warmer months when slump loss and fast stiffening of the fresh concrete can be a concern. The superplasticizing action of Sika ViscoCrete 2110 provides high slump / flowing concrete that can be placed with minimal or no vibration even at very low water cement ratios as low as 0.25.</p> <p><b>Water Reduction:</b> Sika ViscoCrete 2110 can be dosed in small amounts to obtain water reduction from 10-15%, and will achieve water reduction up to 45% at high dosage rates. Sika ViscoCrete 2110 is suitable for all levels of water reduction.</p> <p><b>Plasticizing effect:</b> The superplasticizing action of Sika ViscoCrete 2110 provides high-slump, flowing concrete that maintains excellent workability and may be placed with minimal vibration even at very low water cement ratios as low as 0.25. Sika ViscoCrete 2110 plasticized concrete is highly fluid while maintaining complete cohesion within the concrete matrix to eliminate excessive bleeding or segregation.</p> <p><b>Extended Slump Life and Set Control:</b> Sika ViscoCrete 2110 has been formulated to provide controlled and predictable extended slump life for periods of 60 to 90 minutes with normal set times. The combined high range water reduction and superplasticizing action of Sika ViscoCrete 2110 provide the following benefits in hardened concrete:</p> <p>Higher ultimate strengths allow for greater engineering design flexibility and structural economy. Reduced water cement ratios produce more durable, dense concrete with reduced permeability. Highly effective plasticizer reduces surface defects in concrete elements and improves aesthetic appearance.</p> <p>Sika ViscoCrete 2110 has been formulated to provide maximum water reduction and extended slump retention throughout entire dosage range.</p> <ul style="list-style-type: none"><li>▪ Extended slump life</li><li>▪ Increased compressive strength when compared to reference concrete with same w/c ratio</li><li>▪ High early compressive strengths for earlier removal of forms and structural use of concrete.</li><li>▪ High ultimate strengths allow for greater engineering design flexibility and structural economies.</li><li>▪ Reduced water cement ratios produce more durable, dense concrete with reduced permeability.</li><li>▪ Highly effective plasticizer reduces surface defects in concrete elements and improves aesthetic appearance.</li><li>▪ Ideal for the production of Self Consolidating Concrete.</li></ul>
<b>How to Use</b>	
<b>Dosage</b>	Dosage rates will vary according to materials used, ambient conditions and the requirements of a specific project. Sika recommends dosage at 3-8 fl. oz. per 100 lbs. (195-520 ml/100 kg) of cementitious materials for general concrete applications. If maximum water reduction is required, dosage up to 12 fl. oz./100 lbs (780 ml/100 kg) of cementitious may be used. In this case, delayed setting times may occur. Dosage rates outside the recommended range may be used where specialized materials such as microsilica are specified, extreme ambient conditions are encountered or unusual project conditions require special consideration. In this case please contact your local regional office or technical service department at 1-800-933-7452 for further information.

Construction

**Sika®**

<b>Cure Mechanism</b>	Proper curing according to ACI guidelines should be always followed to achieve maximum possible quality of concrete.
<b>Mixing</b>	For best superplasticizing results, add Sika ViscoCrete 2110 directly to freshly mixed concrete in the concrete mixer at the end of the batching cycle. Sika ViscoCrete 2110 may also be dispensed as an integral material during the regular admixture batching cycle, or into freshly mixed concrete in a Ready Mix truck, at the concrete plant or at the job site. To optimize the superplasticizing effect after the addition of Sika ViscoCrete 2110, Sika recommends that the combined materials be mixed for 80-100 revolutions either in the concrete mixer or in the Ready Mix truck.  <b>Combination with other admixtures:</b> Sika ViscoCrete 2110 is highly effective as a single admixture or in combination with other Sika admixtures. If used in combination with certain Sikament high range water reducers it may affect the plastic properties of fresh concrete. Please contact your local regional office or technical service department at 1-800-933-7452 for further information.  <b>Combination with microsilica:</b> Sika ViscoCrete 2110 is particularly well suited for use with microsilica because of its water reduction capability. Do not introduce Sika ViscoCrete 2110 directly onto dry cementitious materials.
<b>Packaging</b>	Sika ViscoCrete 2110 is available in 55 gallon drum (208 liter), 275 gallon totes (1040 liters) drums and bulk delivery.
<b>Storage and Shelf-life</b>	Shelf life when stored in dry warehouse conditions between 50°F and 80°F (10°C - 27°C) is one year minimum.  Sika ViscoCrete 2110 should be stored at above 40°F (5°C). If frozen, thaw and agitate thoroughly to return to normal state.
<b>Typical Data</b>	
<b>Appearance</b>	Orange liquid
<b>Specific Gravity</b>	Approx. 1.1
<b>CAUTION: IRRITANT</b>	May cause eye/skin/respiratory irritation. May be harmful if swallowed.
<b>Handling and Storage</b>	Avoid direct contact. Wear personal protective equipment (chemical resistant goggles/gloves/clothing) to prevent direct contact with skin and eyes. Use only in well ventilated areas. Wash thoroughly with soap and water after use. Remove contaminated clothing and launder before reuse.
<b>First Aid</b>	<b>Eyes:</b> Hold eyelids apart and flush thoroughly with water for 15 minutes. <b>Skin:</b> Remove contaminated clothing. Wash skin thoroughly for 15 minutes with soap and water. <b>Inhalation:</b> Remove person to fresh air. <b>Ingestion:</b> Do not induce vomiting. Dilute with water. Contact physician. <b>In all cases contact a physician immediately if symptoms persist.</b>
<b>Clean Up</b>	Use personal protective equipment (chemical resistant goggles/gloves/clothing). Without direct contact, remove spilled or excess product and place in suitable sealed container. Dispose of excess product and container in accordance with applicable environmental regulations.

**KEEP CONTAINER TIGHTLY CLOSED • KEEP OUT OF REACH OF CHILDREN • NOT FOR INTERNAL CONSUMPTION • FOR INDUSTRIAL USE ONLY**

All information provided by Sika Corporation ("Sika") concerning Sika products, including but not limited to, any recommendations and advice relating to the application and use of Sika products, is given in good faith based on Sika's current experience and knowledge of its products when properly stored, handled and applied under normal conditions in accordance with Sika's instructions. In practice, the differences in materials, substrates, storage and handling conditions, actual site conditions and other factors outside of Sika's control are such that Sika assumes no liability for the provision of such information, advice, recommendations or instructions related to its products, nor shall any legal relationship be created by or arise from the provision of such information, advice, recommendations or instructions related to its products. The user of the Sika product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with the full application of the product(s).

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Prior to each use of any Sika product, the user must always read and follow the warnings and instructions on the product's most current Technical Data Sheet, product label and Material Safety Data Sheet which are available at [www.sikausa.com](http://www.sikausa.com) or 800-933-7452. Nothing contained in any Sika materials relieves the user of the obligation to read and follow the warnings and instruction for each Sika product as set forth in the current Technical Data Sheet, product label and Material Safety Data Sheet prior to product use.

Sika warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Technical Data Sheet if used as directed within shelf life. User determines suitability of product for intended use and assumes all risks. Buyer's sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

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1-800-933-SIKA



**Regional Information and Sales Centers.** For the location of your nearest Sika representative, contact your regional center.

**U.S. :** **North East Region:** Fairless Hills, PA, Phone: (215) 295-6600 **North Central Region:** Marion, OH, Phone: (800) 851-1545  
**South East Region:** Conyers, GA, Phone: (770) 760-1300 **South Central Region:** Mesquite, TX, Phone: (972) 289-6480  
**Western Region:** Santa Fe Springs, CA, Phone: (562) 903-3650

**Canada:** **Ontario:** Mississauga, ON, Phone: (905) 795-3177, **Alberta:** Edmonton, AB, Phone: (780) 486-6111

Quality Certification Numbers: Lyndhurst: FM 69711 (ISO 9000), FM 70421 (QS 9000), Marion: FM 69715, Kansas City: FM 69107, Santa Fe Springs: FM 69408



## Sika® Air

### Air Entraining Admixture

<b>Description</b>	Sika Air admixture is an aqueous solution of organic materials. Sika Air meets the requirements of ASTM C-260 for air entraining admixtures.
<b>Applications</b>	Sika Air is recommended for use whenever air entrained concrete is desired. Ready-mix, precast and block producers can achieve predictable and uniform entrained air contents in concrete, even where harsh lean mixes are used or fly-ash is added to the concrete.
<b>Advantages</b>	<b>Durability:</b> <ul style="list-style-type: none"><li>▪ Air entrainment is recognized as the most effective prevention against concrete scaling in exposed environments. Air entrained concrete delivers particular benefits in the form of increased concrete durability. This is important in colder climates where frost and freeze-thaw cycles can cause scaling and damage to the concrete surface.</li><li>▪ Air entraining agents help to prevent scaling by creating microscopic air voids that water trapped in the concrete can expand into when the concrete freezes, thus preventing cracks caused by the natural expansion. Entrained air voids in the concrete will also increase durability in harsh environments where concrete is exposed to deicing salts, marine salts and sulfates.</li></ul> <b>Workability and Placeability:</b> <ul style="list-style-type: none"><li>▪ Workability and placeability are also improved by the lubricating action of the microscopic bubbles in the concrete. Concrete will flow better, and bleeding and shrinkage will be reduced because less water is needed to obtain the desired workability.</li></ul>

### How to Use

#### Dosage

Dosage rates for Sika Air will typically fall between 0.5 and 3 fl. oz. per 100 lbs. (32 - 195 ml/100 kg) of cementitious to entrain between 4 and 6 percent air. Higher air contents may be obtained by increasing the dosage rate.

Dosage rates will vary depending on the air content required for a particular project. Typically air contents will be specified in the range of 4 to 8 percent by volume.

Other factors that may affect the amount of air entrained into the concrete including total cementitious content, type of pozzolanic materials, sand gradation, salt/clay in aggregates, temperature and water content. The use of fly ash, particularly high LOI fly ash, can result in a higher dosage of air entrainment. Sika recommends that trial mixes be performed whenever material or any other changes are made that may affect the amount of entrained air.

In mixes requiring a lower or higher amount dosage rate, please contact your local regional Sika office or Sika technical service department at 1-800-933-7452 for further information.

Construction



Sika®

<b>Mixing</b>	Measure the required quantity per batch manually or with automatic dispenser equipment. Add Sika Air to mixing water or sand. Do not mix with dry cement. When Sika Air is used in combination with other admixtures, care must be taken to dispense each admixture separately into the mix.  <b>Combination with Other Admixtures:</b> Combination with other admixtures, particularly water reducers and retarders, may increase the amount of entrained air in the mix. Air contents should be checked with an air-meter after batching and dosage adjustments made at the concrete plant.
<b>Packaging</b>	Sika Air is available in 55 gallon drum (208 liter), 275 gallon totes (1040 liters) drums and bulk delivery.
<b>Storage and Shelf life</b>	Sika Air should be stored at above 40°F (5°C). If frozen, thaw and agitate thoroughly to return to normal state.  Shelf life when stored in dry warehouse conditions between 50°F and 80°F (10°C - 27°C) is one year.
<b>Typical Data</b>	
<b>Appearance</b>	Dark Amber liquid.
<b>Specific Gravity</b>	Approx. 1.0
<b>CAUTION: IRRITANT</b>	Contains Aqueous Solution (CAS:Mixture). May cause eye/skin/respiratory irritaton. May be harmful if swallowed.
<b>Handling and Storage</b>	Avoid direct contact. Wear personal protective equipment (chemical resistant goggles/gloves/clothing) to prevent direct contact with skin and eyes. Use only in well ventilated areas. Wash thoroughly with soap and water after use. Remove contaminated clothing and launder before reuse.
<b>First Aid</b>	<b>Eyes:</b> Hold eyelids apart and flush thoroughly with water for 15 minutes. <b>Skin:</b> Remove contaminated clothing. Wash skin thoroughly for 15 minutes with soap and water. <b>Inhalation:</b> Remove person to fresh air. <b>Ingestion:</b> Do not induce vomiting. Dilute with water. Contact physician. <b>In all cases contact a physician immediately if symptoms persist.</b>
<b>Safety</b>	Tested and Certified by WQA according to NSF/ANSI 61 Section 5 for materials safety.
<b>Clean Up</b>	Use personal protective equipment (chemical resistant goggles/gloves/clothing). Without direct contact, remove spilled or excess product and place in suitable sealed container. Dispose of excess product and container in accordance with applicable environmental regulations.

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Prior to each use of any Sika product, the user must always read and follow the warnings and instructions on the product's most current Technical Data Sheet, product label and Material Safety Data Sheet which are available at [www.sikaconstruction.com](http://www.sikaconstruction.com) or 800-933-7452. Nothing contained in any Sika materials relieves the user of the obligation to read and follow the warnings and instruction for each Sika product as set forth in the current Technical Data Sheet, product label and Material Safety Data Sheet prior to product use.

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**1-800-933-SIKA**



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**Western Region:** Santa Fe Springs, CA, Phone: (562) 903-3650

**North Central Region:** Marion, OH, Phone: (800) 851-1545

**South Central Region:** Mesquite, TX, Phone: (972) 289-6480

**Canada: Ontario:** Mississauga, ON, Phone: (905) 795-3177,

**Alberta:** Edmonton, AB, Phone: (780) 486-6111

Quality Certification Numbers: Lyndhurst: FM 69711 (ISO 9000), FM 70421 (QS 9000), Marion: FM 69715, Kansas City: FM 69107, Santa Fe Springs: FM 69408

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**MILL TEST CERTIFICATE  
MANUFACTURER: BAYOU STEEL GROUP VINTON**

SOLD TO: VAUGHN CONCRETE PRODUCTS, INC.  
12650 TUCSON STREET  
HENDERSON CO 80640  
SHIP TO: VAUGHN CONCRETE - WY  
S. GREELEY HWY  
CHEYENNE WY 82007

PROGRAM NUMBER: 80650918

MATERIAL: RV13706D11PA #4 X 40' GRADE 60 (ASTM A706) (ASTM A706/A706M)  
DELIVERY LIST NUMBER:  
P.O. CUSTOMER NUMBER: MIKE81916

ISSUING DATE: 23.08.2016  
CERTIFICATE NUMBER: 44250  
PAGE: 1/1

**MECHANICAL PROPERTIES**

HEAT NUMBER	YIELD STRENGTH psi	TENSILE STRENGTH psi	PERCENT ELONGATION %	BEND	ACTUAL W. PER FOOT lb/ft
1611538	70100	93500	15	ACCEPTABLE	0.633
1621627	69575	94300	16	ACCEPTABLE	0.635

**CHEMICAL COMPOSITION**

HEAT NUMBER	C %	Mn %	P %	S %	Si %	Ni %	Cr %	Mo %	Cu %	V %	Cb %	CE %			
1611538	0.2311	1.1369	0.0242	0.0362	0.1908	0.1396	0.2365	0.0426	0.2863	0.0344	0.0010	0.4539			
1621627	0.2567	1.1653	0.0197	0.0224	0.1623	0.1070	0.1652	0.0299	0.2831	0.0364	-0.001	0.4758			

WE HEREBY CERTIFY THAT THE ABOVE FIGURES ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.  
MELTED AND MANUFACTURED IN THE U.S.A.

This reinforcing steel meets all the requirements of the Buy America Act requirements of 23 CFR 635.410

Approved by BSGV Quality Assurance

Manual REV-20 10/09/2014

*Hector Du Cigno*

CERTIFIED BY THE QUALITY DEPARTMENT - SIGNATURE ON FILE

**MAILING ADDRESS**

BAYOU STEEL GROUP VINTON P.O. BOX 12843  
EL PASO, TEXAS 79913-0843 915 886-2000

**STREET ADDRESS**

I-10 & VINTON ROAD  
VINTON, TEXAS 79835-9998

**BAYOU STEEL GROUP**

VINTON

**MILL TEST CERTIFICATE  
MANUFACTURER: BAYOU STEEL GROUP VINTON**

SOLD TO: VAUGHN CONCRETE PRODUCTS, INC.  
12650 TUCSON STREET  
HENDERSON CO 80640

SHIP TO: VAUGHN CONCRETE PRODUCTS, INC.  
12650 TUCSON STREET  
HENDERSON CO 80640

PROGRAM NUMBER: 80655321

MATERIAL: RV16706D14PA #5 X 40' GRADE 60 (ASTM A706) (ASTM A706/A706M)  
DELIVERY LIST NUMBER: 910039207  
P.O. CUSTOMER NUMBER: M29-2

ISSUING DATE: 12.04.2017  
CERTIFICATE NUMBER: 47716  
PAGE: 1/1

**MECHANICAL PROPERTIES**

HEAT NUMBER	YIELD STRENGTH psi	TENSILE STRENGTH psi	PERCENT ELONGATION %	BEND	ACTUAL W. PER FOOT lb/ft
1710721	71290	93226	18	ACCEPTABLE	0.993
1720786	69355	95645	17	ACCEPTABLE	0.991

**CHEMICAL COMPOSITION**

HEAT NUMBER	C %	Mn %	P %	S %	Si %	Ni %	Cr %	Mo %	Cu %	V %	Cb %	CE %			
1710721	0.2570	0.9620	0.0151	0.0266	0.1432	0.1013	0.2213	0.0184	0.2630	0.0319	-0.000	0.4476			
1720786	0.2808	0.9606	0.0171	0.0287	0.1778	0.1147	0.1906	0.0210	0.3027	0.0330	-0.000	0.4730			

WE HEREBY CERTIFY THAT THE ABOVE FIGURES ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

MELTED AND MANUFACTURED IN THE U.S.A.

This reinforcing steel meets all the requirements of the Buy America Act requirements of 23 CFR 635.410

Approved by BSGV Quality Assurance

Manual REV-20 10/09/2014

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**STREET ADDRESS**

I-10 & VINTON ROAD  
VINTON, TEXAS 79835-9998

**BAYOU STEEL GROUP**  
VINTON

**MILL TEST CERTIFICATE**  
**MANUFACTURER: BAYOU STEEL GROUP VINTON**

SOLD TO: VAUGHN CONCRETE PRODUCTS, INC.  
12650 TUCSON STREET  
HENDERSON CO 80640

SHIP TO: VAUGHN CONCRETE PRODUCTS, INC.  
12650 TUCSON STREET  
HENDERSON CO 80640

PROGRAM NUMBER: 0080655686

MATERIAL: RV19706D15PA #6 X 40' GRADE 60 (ASTM A706) (ASTM A706/A706M)  
DELIVERY LIST NUMBER:  
P.O. CUSTOMER NUMBER: M29-2

ISSUING DATE: 27.04.2017  
CERTIFICATE NUMBER: 47985  
PAGE: 1/1

**MECHANICAL PROPERTIES**

HEAT NUMBER	YIELD STRENGTH psi	TENSILE STRENGTH psi	PERCENT ELONGATION %	BEND	ACTUAL W. PER FOOT lb/ft
1720891	68182	92159	15	ACCEPTABLE	1.457

**CHEMICAL COMPOSITION**

HEAT NUMBER	C %	Mn %	P %	S %	Si %	Ni %	Cr %	Mo %	Cu %	V %	Cb %	CE %			
1720891	0.2644	1.1131	0.0107	0.0235	0.1664	0.0883	0.2195	0.0183	0.1690	0.0270	0.0013	0.4771			

WE HEREBY CERTIFY THAT THE ABOVE FIGURES ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.  
MELTED AND MANUFACTURED IN THE U.S.A.

This reinforcing steel meets all the requirements of the Buy America Act requirements of 23 CFR 635.410

Approved by BSGV Quality Assurance  
Manual REV-20 10/09/2014

*Hector De Aguiar*

CERTIFIED BY THE QUALITY DEPARTMENT - SIGNATURE ON FILE

MAILING ADDRESS  
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EL PASO, TEXAS 79913-0843 915 886-2000

STREET ADDRESS  
I-10 & VINTON ROAD  
VINTON, TEXAS 79835-9998

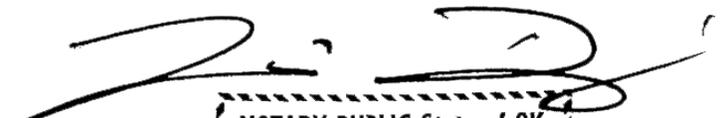
# Oklahoma Steel and Wire

*Highway 70 South*

*Madill, OK 73446*

*(580) 795-7311 (800) 654-4164 Fax (580) 795-7422*

## Physical Test Report

A handwritten signature in black ink, appearing to be a stylized name, possibly 'Tino Diaz', written across the left side of the page.A handwritten signature in black ink, appearing to be 'Tino Diaz', written across the right side of the page, overlapping the notary stamp.

NOTARY PUBLIC State of OK  
TINO DIAZ  
Comm. # 09004486  
Expires 05-27-2021

# ConSeal™ CS-50

Solvent Based  
Liquid Butyl Primer



## Surface Preparation Coating and Installation Aid for Concrete and Metal Surfaces

### Applications

For use on concrete or metal surfaces, CS-50 Solvent Based Surface Primer is a concrete surface preparation coating and installation aid for bonding preformed sealants. CS-50 Solvent Based Surface Primer can be applied in advance of product installation.

### Sealing Properties

When applied to concrete or metal, ConSeal CS-50 Liquid Butyl Primer creates a butyl rubber film that acts to both seal the structure and improve the bond of preformed sealants.

---

### Physical Properties

#### Description

Color:	Black
% Solids:	20% minimum
Solvent Type:	VMP Naptha
Flash Point:	76°F
Weight / Gallon:	7.6 Pounds
Dry Time @ 77°F (25°C):	15-20 minutes
Dry Time @ 40°F (4°C):	30-40 minutes
Clean Up:	Mineral Spirits
Coverage Per Gallon:	Approx. 300 sq ft on wet cast concrete.
Min. Storage Temperature:	32°F
Min. Application Temperature:	0°F
Surface When Dry:	Flat Black, non-tacky
Shelf Life:	6 months

---

### Limited Warranty

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*Don't Just Seal It, ConSeal It!*

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Concrete Sealants, Inc. 9325 State Route 201 ■ Tipp City, OH 45371 ■ Toll Free 800.332.7325

P. 937.845.8776 F. 937.845.3587 ■ [www.conseal.com](http://www.conseal.com)



**CONSEAL™**  
Concrete Sealants INC.**CS102****Butyl Rubber Sealant For All Precast Structures;  
Meets Specs.**

## APPLICATIONS

For self-sealing joints in: Manholes, Concrete Vaults, Septic Tanks, Concrete Pipe, Box Culverts, Utility Vaults, Burial Vaults, and Vertical Panel Structures.

## SEALING PROPERTIES

- Provides permanently flexible watertight joints.
- Low to high temperature workability: 30°F to 120°F (-1°C to 48°C)
- Rugged service temperature: -30°F to +200°F (-34°C to +93°C)
- Excellent chemical and mechanical adhesion to clean, dry surfaces.
- Sealed Joints will not shrink, harden or oxide upon aging.
- No priming normally necessary. When confronted with difficult installation conditions, such as wet concrete or temperatures below 40°F (4°C), priming the concrete will improve the bonding action. Consult Concrete Sealants for the proper primer to meet your application.

## HYDROSTATIC STRENGTH

ConSeal CS-102 meets the hydrostatic performance requirement as set forth in ASTM C-990 section 10.1 (Performance requirement: 10psi for 10 minutes in straight alignment – in plant, quality control test for joint materials.)

## SPECIFICATIONS

ConSeal CS-102 meets or exceeds the requirements of Federal Specification SS-S-210 (210-A), AASHTO M-198B, and ASTM C-990-91.



**CONSEAL™**  
Concrete Sealants INC.

**CS102**

**Butyl Rubber Sealant For All Precast Structures;  
Meets Specs.**

**PHYSICAL PROPERTIES**

	<b>Spec</b>	<b>Required*</b>	<b>CS 102</b>
Hydrocarbon blend content % by weight	ASTM D4 (mod.)	50% min.	51%
Inert mineral filler % by weight	AASHTO T111	30% min.	35%
Volatile Matter % by weight	ASTM D6	2% max.	1.2
Specific Gravity, 77°F	ASTM D71	1.15-1.50	1.25
Ductility, 77°F	ASTM D113	5.0 min.	10
Penetration, cone 77°F, 150 gm. 5 sec.	ASTM D217	50-100	55-60
Penetration, cone 32°F, 150 gm. 5 sec.	ASTM D217	40 mm	40-65
Flash Point, C.O.C., °F	ASTM D92	350°F min.	450°F
Fire point, C.O.C., °F	ASTM D92	375°F min.	475°F

**IMMERSION TESTING**

- 30-Day Immersion Testing: No visible deterioration when tested in 5% Caustic Potash, 5% Hydrochloric Acid, 5% Sulfuric Acid, and 5% saturated Hydrogen Sulfide. \*
- One Year Immersion Testing: No visible deterioration when tested in 5% Formaldehyde, 5% Formic Acid, 5% Sulfuric Acid, 5% Hydrochloric Acid, 5% Sodium Hydroxide, 5% Hydrogen Sulfide and 5% Potassium Hydroxide.
- Requirements of ASTM C-990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

**LIMITED WARRANTY**

This information is presented in good faith, but we cannot anticipate all conditions under which this information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety and suitability of our products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each such product or product combinations for their own purposes. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for this own particular use. We sell this product without warranty, and buyers and users assume all responsibility and liability for loss or damage arising from the handling and use of this product, whether used alone or in combination with other products.

# **MATERIAL SAFETY DATA SHEET (MSDS) FOR PORTLAND CEMENT**

(Complies with OSHA's Hazard Communication Standard, 29 CFR 1910.1200)



**CEMEX, INC.**

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**Section 1 - IDENTIFICATION**Supplier/Manufacturer

CEMEX, Inc.  
5134 Ute Highway  
Lyons, CO 80540

Emergency Contact Information

(303) 823-2100

Chemical name and synonyms

Portland Cement (CAS #65997-15-1)

Product name

"CEMEX Type I"  
"CEMEX Type I/II"  
"CEMEX Type I/II-Low Alkali"  
"CEMEX Product"  
"CEMEX Type III-Low Alkali"  
"CEMEX Type V-Low Alkali"

Chemical family

Calcium salts

Formula

3CaO.SiO<sub>2</sub> (CAS#12168-85-3)  
2CaO.SiO<sub>2</sub> (CAS#10034-77-2)  
3CaO.Al<sub>2</sub>O<sub>2</sub> (CAS#12042-78-3)  
4CaO..Al<sub>2</sub>O<sub>3</sub>Fe<sub>2</sub>O<sub>3</sub> (CAS#12068-35-8)  
CaSO<sub>2</sub>.2H<sub>2</sub>O (CAS#13397-24-5)

Other salts:

Small amounts of MgO, and trace amounts of K<sub>2</sub>SO<sub>4</sub> and Na<sub>2</sub>SO<sub>4</sub> may also be present.

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**Section 2 - COMPONENTS**Hazardous Ingredients

Portland cement clinker (CAS#65997-15-1) - approximately - 93.5-96.0% by weight  
ACGIH TLV-TWA (1996)=10 mg total dust/m<sup>3</sup>  
OSHA PEL (8-hour TWA)=50 million particles/ft<sup>3</sup>

Gypsum (CAS#7778-18-9) - approximately - 4.0-6.5% by weight  
ACGIH TLV-TWA (1996)=10 mg total dust/m<sup>3</sup>  
OSHA PEL (8-hour TWA)= 10 mg total dust/m<sup>3</sup>  
OSHA PEL (8-hour TWA)= 5 mg respirable dust/m<sup>3</sup>

Respirable quartz (CAS#14808-60-7) - approximately - 0.02-0.03% by weight  
ACGIH TLV-TWA (1996)=0.10 mg respirable quartz dust/m<sup>3</sup>  
OSHA PEL (8-hour TWA)=(10 mg respirable dust/m<sup>3</sup>)/(percent silica +2)  
NIOSH REL (8-hour TWA)=0.05 mg respirable dust/m<sup>3</sup>

Trace Ingredients

Trace amounts of naturally occurring chemicals might be detected during chemical analysis. Trace constituents may include up to 0.75% insoluble residue, some of which may be free crystalline silica, calcium oxide (Also known as lime or quick lime), magnesium oxide, potassium sulfate, sodium sulfate, chromium compounds, and nickel compounds.

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## Section 3 - HAZARD IDENTIFICATION

### Emergency Overview

Masonry cement is a light gray powder that poses little immediate hazard. A single short-term exposure to the dry powder is not likely to cause serious harm. However, exposure of sufficient duration to wet Masonry cement can cause serious, potentially irreversible tissue (skin or eye) destruction in the form of chemical (caustic) burns. The same type of tissue destruction can occur if wet or moist areas of the body are exposed for sufficient duration to dry Masonry cement.

### Potential Health Effects

#### **Relevant Routes of Exposure:**

Eye contact, skin contact, inhalation, and ingestion.

#### **Effects Resulting from Eye Contact:**

Exposure to airborne dust may cause immediate or delayed irritation or inflammation. Eye contact by large amounts of dry powder or splashes of wet Masonry cement may cause effects ranging from moderate eye irritation to chemical burns or blindness. Such exposures require immediate first aid (see Section 4) and medical attention to prevent significant damage to the eye.

#### **Effects Resulting from Skin Contact:**

Discomfort or pain cannot be relied upon to alert a person to hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly with wet cement. Exposed persons may not feel discomfort until hours after the exposure has ended and significant injury has occurred.

Dry Masonry cement contacting wet skin or exposure to moist or wet Masonry cement may cause more severe skin effects including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of (alkali) chemical burns.

Some individuals may exhibit an allergic response upon exposure to Masonry cement, possibly due to trace elements of chromium. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers. Persons already sensitized may react to their first contact with the product. Other persons may first experience this effect after years of contact with Masonry cement products.

#### **Effects Resulting from Inhalation:**

Masonry cement may contain trace amounts of free crystalline silica. Prolonged exposure to respirable free silica can aggravate other lung conditions and cause silicosis, a disabling and potentially fatal lung disease.

Exposure to Masonry cement may cause irritation to the moist mucous membranes of the nose, throat, and upper respiratory system. It may also leave unpleasant deposits in the nose.

#### **Effects Resulting from Ingestion:**

Although small quantities of dust are not known to be harmful, ill effects are possible if larger quantities are consumed. Masonry cement should not be eaten.

#### **Carcinogenic potential:**

Masonry cement is **not** listed as a carcinogen by NTP, OSHA, or IARC. It may however, contain trace amounts of substances listed as carcinogens by these organizations.

Crystalline silica, a contaminate in Masonry cement, is now classified by IARC as known human carcinogen (Group I). NTP has characterized respirable silica as "reasonably anticipated to be [a] carcinogen".

#### **Medical conditions which may be aggravated by, inhalation or dermal exposure:**

Pre-existing upper respiratory and lung diseases.

Unusual (hyper) sensitivity to hexavalent chromium (chromium<sup>+6</sup>) salts.

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**Section 4 - FIRST AID****Eyes**

Immediately flush eyes thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

**Skin**

Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment in all cases of prolonged exposure to wet cement, cement mixtures, liquids from fresh cement products, or prolonged wet skin exposure to dry cement.

**Inhalation of Airborne Dust**

Remove to fresh air. Seek medical help if coughing and other symptoms do not subside.

**Ingestion**

Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

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**Section 5 - FIRE AND EXPLOSION DATA**

Flash point .....	None	Lower Explosive Limit.....	None
Upper Explosive Limit.....	None	Auto ignition temperature.....	Not Combustible
Extinguishing media.....	Not Combustible	Special fire fighting Procedures.....	None
Hazardous combustion products..	None	Unusual fire and explosion hazards...	None

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**Section 6 - ACCIDENTAL RELEASE MEASURES**

Collect dry material using a scoop. Avoid actions that cause dust to become airborne. Avoid inhalation of dust and contact with skin.

Wear appropriate personal protective equipment as described in Section 8.

Scrape up wet material and place in an appropriate container. Allow the material to "dry" before disposal. Do not attempt to wash Masonry cement down drains.

Dispose of waste material according to local, state and federal regulations.

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**Section 7 - HANDLING AND STORAGE**

Keep Masonry cement dry until used. Normal temperatures and pressures do not affect the material.

Promptly remove dusty clothing or clothing which is wet with cement fluids and launder before reuse. Wash thoroughly after exposure to dust or wet cement mixtures or fluids.

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**Section 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION****Skin Protection**

Prevention is essential to avoiding potentially severe skin injury. Avoid contact with unhardened Masonry cement. If contact occurs, promptly wash affected area with soap and water. Where prolonged exposure to unhardened Masonry cement products might occur, wear impervious clothing and gloves to eliminate skin contact. Wear sturdy boots that are impervious to water to eliminate foot and ankle exposure.

Do not rely on barrier creams: barrier creams should not be used in place of gloves.

Periodically wash areas contacted by dry Masonry cement or by wet cement or concrete fluids with a pH neutral soap. Wash again at the end of work. If irritation occurs, immediately wash the affected area and seek treatment. If clothing becomes saturated with wet concrete, it should be removed and replaced with clean dry clothing.

**Respiratory Protection**

Avoid actions that cause dust to become airborne. Use local or general exhaust ventilation to control exposures below applicable exposure limits.

Use NIOSH/MSHA approved (under 30 CFR 11) or NIOSH approved (under 42 CFR 84) respirators in poorly ventilated areas, if an applicable exposure limit is exceeded, or when dust causes discomfort or irritation. (Advisory: Respirators and filters purchased after June 10, 1998 must be certified under 42 CFR 84.)

Ventilation

Use local exhaust or general dilution ventilation to control exposure within applicable limits.

Eye Protection

Where potentially subject to splashes or puffs of cement, wear safety glasses with side shields or goggles. In extremely dusty environments and unpredictable environments wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with Masonry cement or fresh cement products.

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**Section 9 - PHYSICAL AND CHEMICAL, PROPERTIES**

Appearance.....	Gray Powder	Odor.....	No distinct odor
Physical state.....	Solid (powder)	pH (in water).....	12 to 13
Solubility in water...	Slightly soluble (0.1 to 1.0%)	Vapor pressure.....	Not applicable
Vapor density.....	Not applicable	Boiling point.....	Not applicable (i.e., > 1000 C)
Melting point.....	Not applicable	Specific gravity (H2O = 1.0).....	2.87-3.00
Evaporation rate.....	Not applicable		

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**Section 10 - STABILITY AND REACTIVITY**

Stability

Stable.

Conditions to avoid

Unintentional contact with water.

Incompatibility

Wet Masonry cement is alkaline. As such it is incompatible with acids, ammonium salts and phosphorous.

Hazardous decomposition

Will not spontaneously occur. Adding water produces (caustic) calcium hydroxide

Hazardous Polymerization

Will not occur.

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**Section 11 - TOXICOLOGICAL INFORMATION**

For a description of available, more detailed toxicological information contact the supplier or manufacturer.

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**Section 12 - ECOLOGICAL INFORMATION**

Ecotoxicity

No recognized unusual toxicity to plants or animals

Relevant physical and chemical properties

(See Sections 9 and 10.)

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**Section 13 - DISPOSAL**

Dispose of waste material according to local, state and federal regulations. (Since Masonry cement is stable, uncontaminated material may be saved for future use).

Dispose of bags in an approved landfill or incinerator.

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**Section 14 - TRANSPORTATION DATA****Hazardous materials description/proper shipping name**

Masonry is cement is not hazardous under U.S. Department of Transportation (DOT) regulations.

**Hazard class**

Not applicable

**Identification number**

Not applicable.

**Required label text**

Not applicable.

**Hazardous substances/reportable quantities (RO)**

Not applicable.

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**Section 15 - OTHER REGULATORY INFORMATION****Status under USDOL-OSHA Hazard Communication Rule, 29 CFR 1910.1200**

Masonry cement is considered a "hazardous chemical" under this regulation, and should be part of any hazard communication program.

**Status under CERCLA/SUPERFUND 40 CFR 117 and 302**

Not listed.

**Hazard Category under SARA(Title III), Sections 311 and 312**

Masonry cement qualifies as a "hazardous substance" with delayed health effects.

**Status under SARA (Title III), Section 313**

Not subject to reporting requirements under Section 313.

**Status under TSCA (as of May 1997)**

Some substances in Masonry cement are on the TSCA inventory list.

**Status under the Federal Hazardous Substances Act**

Masonry cement is a "hazardous substance" subject to statutes promulgated under the subject act.

**Status under California Proposition 65**

This product contains up to 0.05 percent of chemicals (trace elements) known to the State of California to cause cancer, birth defects or other reproductive harm. California law requires the manufacturer to give the above warning in the absence of definitive testing to prove that the defined risks do not exist.

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**Section 16 - OTHER INFORMATION****Prepared by**

Kevin Keegan  
Director - Health and Safety  
CEMEX, Inc.  
Houston, Texas

**Approval date or Revision date**

Approved: July, 1997  
Revised: March, 2001

Other important information

Masonry cement should only be used by knowledgeable persons. A key to using the product safely requires the user to recognize that Masonry cement chemically reacts with water, and that some of the intermediate products of this reaction (that is those present while a Masonry cement product is "setting") pose a more severe hazard than does dry Masonry cement itself.

While the information provided in this material safety data sheet is believed to provide a useful summary of the hazards of Masonry cement as it is commonly used, the sheet cannot anticipate and provide the all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product.

SELLER MAKES NO WARRANTY, EXPRESSED OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY CEMEX, Inc. except that the product shall conform to contracted specifications. The information provided herein was believed by CEMEX, Inc. to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information to comply with all laws and procedures applicable to the safe handling and use of product and to determine the suitability of the product for its intended use. Buyer's exclusive remedy shall be for damages and no claim of any kind, whether as to product delivered or for non-delivery of product, and whether based on contract, breach of warranty, negligence, or otherwise shall be greater in amount than the purchase price of the quantity of product in respect of which damages are claimed. In no event shall Seller be liable for incidental or consequential damages, whether Buyer's claim is based on contract, breach of warranty, negligence or otherwise.

In particular, the data furnished in this sheet do not address hazards that may be posed by other materials mixed with Masonry cement to produce Masonry cement products. Users should review other relevant material safety data sheets before working with this Masonry cement or working on Masonry cement products, for example, Masonry cement concrete.



# Material Safety Data Sheet

Sika ViscoCrete 2110

## 1 . Product and company identification

<b>Product name</b>	: Sika ViscoCrete 2110
<b>Supplier</b>	: Sika Corporation, Construction 201 Polito Avenue Lyndhurst, NJ 07071 www.sikaconstruction.com
<b>Telephone no.</b>	: (201) 933 - 8800
<b>Fax no.</b>	: (201) 804 - 1076
<b>In case of emergency</b>	: CHEMTREC: 800-424-9300 INTERNATIONAL: 703-527-3887
<b>Manufacturer</b>	: Sika Corporation, Operations 201 Polito Avenue Lyndhurst, NJ 07071 www.sikacorp.com
<b>Telephone no.</b>	: (201) 933 - 8800
<b>Validation date</b>	: <b>23. February 2011.</b>
<b>Print date</b>	: 23. February 2011.
<b>Product type</b>	: Liquid.

## 2 . Composition/information on ingredients

There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

## 3 . Hazards identification

**OSHA/HCS status** : This material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

### Potential acute health effects

<b>Inhalation</b>	: May cause respiratory irritation.
<b>Ingestion</b>	: May be harmful if swallowed.
<b>Skin</b>	: May cause skin irritation.
<b>Eyes</b>	: May cause eye irritation.

See toxicological information (section 11)

## 4 . First aid measures

<b>Eye contact</b>	: Check for and remove any contact lenses. Get medical attention if irritation occurs. Immediately flush eyes with plenty of water for at least 15 minutes.
<b>Skin contact</b>	: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse.
<b>Inhalation</b>	: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. Maintain an open airway.
<b>Ingestion</b>	: Wash out mouth with water. Move exposed person to fresh air. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person.

## 4 . First aid measures

**Notes to physician** : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

## 5 . Fire-fighting measures

**Flammability of the product** : In a fire or if heated, a pressure increase will occur and the container may burst.

### Extinguishing media

**Suitable** : Use an extinguishing agent suitable for the surrounding fire.

**Not suitable** : None known.

**Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

**Hazardous combustion products** : No specific data.

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## 6 . Accidental release measures

**Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

**Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

**Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

**Small spill** : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

## 7 . Handling and storage

**Handling** : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

**Storage** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## 8 . Exposure controls/personal protection

Consult local authorities for acceptable exposure limits.

- Engineering measures** : No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Personal protection**
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

## 9 . Physical and chemical properties

- Flash point** : Closed cup: Not applicable.
- Odor** : Characteristic.
- pH** : 5.5
- Density** : ~1.094 g/cm<sup>3</sup> [20°C (68°F)]

## 10 . Stability and reactivity

- Stability** : The product is stable.
- Conditions to avoid** : No specific data.
- Materials to avoid** : No specific data.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

## 11 . Toxicological information

### Acute toxicity

- Conclusion/Summary** : Not available.

## 12 . Ecological information

**Environmental effects** : No known significant effects or critical hazards.

## 13 . Disposal considerations

**Waste disposal** : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

## 14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Additional information
<b>DOT Classification</b>	Not regulated.		-	-	-
<b>TDG Classification</b>	Not regulated.		-	-	-
<b>ADR/RID Class</b>	Not regulated.		-	-	-
<b>IMDG Class</b>	Not regulated.		-	-	-
<b>IATA-DGR Class</b>	Not regulated.		-	-	-

PG\* : Packing group

## 15 . Regulatory information

**U.S. Federal regulations** : **United States inventory (TSCA 8b)**: All components are listed or exempted.  
**SARA 302/304/311/312 extremely hazardous substances**: No products were found.  
**SARA 302/304 emergency planning and notification**: No products were found.  
**SARA 302/304/311/312 hazardous chemicals**: No products were found.  
**SARA 311/312 MSDS distribution - chemical inventory - hazard identification**: No products were found.

**United States inventory (TSCA 8b)** : All components are listed or exempted.

## 16 . Other information

**Hazardous Material Information System (U.S.A.)** :

Health	1
Flammability	0
Physical hazards	0
	B

## 16 . Other information

<b>Personal Protection Equipment</b>
--

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

**Date of printing** : 23.02.2011.  
**Date of issue** : 23.02.2011.  
**Date of previous issue** : No previous validation.  
**Version** : 1.01

✔ Indicates information that has changed from previously issued version.

### Notice to reader

The information contained in this Material Safety Data Sheet applies only to the actual Sika Corporation ("Sika") product identified and described herein. This information is not intended to address, nor does it address the use or application of the identified Sika product in combination with any other material, product or process. All of the information set forth herein is based on technical data regarding the identified product that Sika believes to be reliable as of the date hereof. Prior to each use of any Sika product, the user must always read and follow the warnings and instructions on the product's current Technical Data Sheet, product label and Material Safety Data Sheet for each Sika product, which are available at web site and/or telephone number listed in Section 1 of this MSDS.

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All sales of Sika products are subject to its current terms and conditions of sale available at [www.sikacorp.com](http://www.sikacorp.com) or 201-933-8800.



# Material Safety Data Sheet

Sika Air

## 1 . Product and company identification

**Product name** : Sika Air  
**Supplier** : Sika Corporation, Operations  
201 Polito Avenue  
Lyndhurst, NJ 07071  
www.sikacorp.com  
**Telephone no.** : (201) 933 - 8800  
**Fax no.** : (201) 804 - 1076  
**In case of emergency** : CHEMTREC: 800-424-9300  
INTERNATIONAL: 703-527-3887  
**Manufacturer** : Sika Corporation, Operations  
201 Polito Avenue  
Lyndhurst, NJ 07071  
www.sikacorp.com  
**Telephone no.** : (201) 933 - 8800  
**Validation date** : **10. April 2008.**  
**Print date** : 10. April 2008.  
**Product type** : Liquid.

## 2 . Hazards identification

**OSHA/HCS status** : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

### Potential acute health effects

**Inhalation** : No known significant effects or critical hazards.  
**Ingestion** : No known significant effects or critical hazards.  
**Skin** : No known significant effects or critical hazards.  
**Eyes** : No known significant effects or critical hazards.

See toxicological information (section 11)

## 3 . Composition/information on ingredients

There are no ingredients or additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

## 4 . First aid measures

**Notes to physician** : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

## 5 . Fire-fighting measures

**Flammability of the product** : In a fire or if heated, a pressure increase will occur and the container may burst.

### Extinguishing media

**Suitable** : Use an extinguishing agent suitable for the surrounding fire.  
**Not suitable** : None known.

**Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

## 5 . Fire-fighting measures

- Hazardous combustion products** : No specific data.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## 6 . Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.
- Small spill** : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

## 7 . Handling and storage

- Handling** : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Storage** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## 8 . Expose controls/personal protection

Consult local authorities for acceptable exposure limits.

- Engineering measures** : No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

## 8 . Expose controls/personal protection

### Personal protection

- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

## 9 . Physical and chemical properties

- Physical state** : Liquid.

## 10 . Stability and reactivity

- Stability** : The product is stable. Under normal conditions of storage and use, hazardous polymerization will not occur.
- Conditions to avoid** : No specific data.
- Materials to avoid** : No specific data.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## 11 . Toxicological information

### Acute toxicity

- Conclusion/Summary** : Not available.

## 12 . Ecological information

- Environmental effects** : No known significant effects or critical hazards.

## 13 . Disposal considerations

- Waste disposal** : The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

## 14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Additional information
DOT Classification	Not regulated.		-	-	-
TDG Classification	Not regulated.		-	-	-
ADR/RID Class	Not regulated.		-	-	-
IMDG Class	Not regulated.		-	-	-
IATA-DGR Class	Not regulated.		-	-	-

PG\* : Packing group

## 15 . Regulatory information

- U.S. Federal regulations** : **United States inventory (TSCA 8b):** Not determined.  
**SARA 302/304/311/312 extremely hazardous substances:** No products were found.  
**SARA 302/304 emergency planning and notification:** No products were found.  
**SARA 302/304/311/312 hazardous chemicals:** No products were found.  
**SARA 311/312 MSDS distribution - chemical inventory - hazard identification:** No products were found.  
**Clean Water Act (CWA) 311:** sodium hydroxide  
**Clean Air Act (CAA) 112 accidental release prevention:** No products were found.  
**Clean Air Act (CAA) 112 regulated flammable substances:** No products were found.  
**Clean Air Act (CAA) 112 regulated toxic substances:** No products were found.
- State regulations** : **Connecticut Carcinogen Reporting:** None of the components are listed.  
**Connecticut Hazardous Material Survey:** None of the components are listed.  
**Florida substances:** None of the components are listed.  
**Illinois Chemical Safety Act:** None of the components are listed.  
**Illinois Toxic Substances Disclosure to Employee Act:** None of the components are listed.  
**Louisiana Reporting:** None of the components are listed.  
**Louisiana Spill:** None of the components are listed.  
**Massachusetts Spill:** None of the components are listed.  
**Massachusetts Substances:** None of the components are listed.  
**Michigan Critical Material:** None of the components are listed.  
**Minnesota Hazardous Substances:** None of the components are listed.  
**New Jersey Hazardous Substances:** None of the components are listed.  
**New Jersey Spill:** None of the components are listed.  
**New Jersey Toxic Catastrophe Prevention Act:** None of the components are listed.  
**New York Acutely Hazardous Substances:** None of the components are listed.  
**New York Toxic Chemical Release Reporting:** None of the components are listed.  
**Pennsylvania RTK Hazardous Substances:** None of the components are listed.  
**Rhode Island Hazardous Substances:** None of the components are listed.

- United States inventory (TSCA 8b)** : **United States inventory (TSCA 8b):** Not determined.

## 16 . Other information

**Hazardous Material Information System (U.S.A.) :**

Health	0
Flammability	0
Physical hazards	0
Personal protection	D

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

**Date of printing** : 10.04.2008.  
**Date of issue** : 10.04.2008.  
**Date of previous issue** : No previous validation.  
**Version** : 1

☑ Indicates information that has changed from previously issued version.

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**MATERIAL SAFETY DATA SHEET**



**CONSEAL™**  
Concrete Sealants INC.

**CS-50**  
Liquid Butyl Primer

**COMPOSITION/ INFORMATION ON INGREDIENTS**

<b><u>HAZARDOUS COMPONENTS</u></b>	<b><u>CAS NO.</u></b>	<b><u>% COMPOSITION</u></b>	<b><u>OSHA PEL</u></b>	<b><u>AGGIH TLV</u></b>
VM & P Naptha	64742-89-8	50 - 60	300 ppm	300 ppm
Toluene	108-88-3	< 0.5	100 ppm	100 ppm
Xylene	1330-20-7	6 - 7	100 ppm	100 ppm
Ethyl Benzene	100-41-4	10 - 15	100 ppm	100 ppm
Hydrocarbon Resin	62258-49-5	7 - 10	NE	NE
Butyl Rubber	9010-85-9	6 - 7.5	NE	NE

**HAZARDS IDENTIFICATION**

**POTENTIAL HEALTH EFFECTS**

**EYE CONTACT:** Can cause severe eye irritation, redness, tearing and blurred vision.

**SKIN CONTACT:** Prolonged an repeated contact can cause moderate irritation, defatting and dermatitis.

**INHALATION:** Excessive inhalation of vapors can cause nausea, respiratory irritation, central nervous system effects, including dizziness, weakness, fatigue, nausea, headache, and possible unconsciousness and even death.

**INGESTION:** Swallowing can cause gastrointestinal irritation, nausea, vomiting, and diarrhea. Aspiration of material into lungs can cause chemical pneumitis, which is fatal.

**CHRONIC EFFECTS:** Overexposure in laboratory animals has been found to cause the following effects: Liver abnormalities, Kidney damage, Lung damage, and Spleen damage. Overexposure of this material has been suggested as a cause of Liver abnormalities in humans.

**FIRST AID MEASURES**

**EYES:** Flush eyes with large amounts of water, lifting both the upper and lower lids. SEEK MEDICAL ATTENTION IMMEDIATELY.

**SKIN:** Wash exposed area with waterless hand cleaner, soap and water, or a mild detergent. Do not use solvents on skin as they promote absorption of this material. Remove contaminated clothing. Launder contaminated clothing thoroughly before reuse. The area should be examined by a medical person if irritation or pain persists after washing.

**INHALATION:** Remove from exposed area to fresh air immediately. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm, quiet, and SEEK MEDICAL ATTENTION IMMEDIATELY.

**INGESTION:** Do not induce vomiting. Keep warm, quiet, and SEEK MEDICAL ATTENTION IMMEDIATELY. Aspiration of this material into lungs due to vomiting can cause chemical pneumitis, which can be fatal. Give oxygen if respiratory is shallow.

## MATERIAL SAFETY DATA SHEET



**CONSEAL™**  
Concrete Sealants INC.

**CS-50**  
Liquid Butyl Primer

### FIRE FIGHTING MEASURES

**FLASH POINT:** 36 °F

**METHOD USED:** TCC

**FLAMMABLE LIMITS IN AIR, % BY VOLUME: UEL UPPER:** 7.1

**LEL LOWER:** 1.0

**FLAMMABILITY CLASSIFICATION:** OSHA: 1B

DOT: Flammable Liquid

**Extinguishing Media:** Dry chemical, carbon dioxide, foam

**Unusual Fire and Explosion Hazards:** This product is flammable. Store away from sources of heat and open flames. Vapor accumulation will flash or explode if ignited by spark or flame. Do not mix with strong oxidants. Use non-sparking tools in confined spaces.

**Special Fire fighting Procedures:** DO NOT USE WATER, which may spread fire. Water may be used to cool exposed containers to prevent pressure build up. Respiratory protection is required for fire fighting personal.

**DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS:** fumes, smoke, carbon monoxide, carbon dioxide, hydrocarbon vapors, hydrogen chloride, phosgene, chlorine, and various complex hydrocarbons during combustion.

### ACCIDENTAL RELEASE MEASURES

**Procedures:** Eliminate all ignition sources such as flames, flares, including pilot lights and electrical sparks. Persons not wearing protective equipment should be excluded from the area of spill until clean up has been completed. Stop spill at source, dike area of spill to prevent spreading. Pump liquids into salvage tank. Remaining material should be taken up using sand, clay, earth, floor absorbent, or other absorbent material and shoveled into containers.

**Waste Disposal:** Dispose of in accordance with local, state and federal regulations. Before attempting clean up, refer to hazardous information listed on this sheet.

### STORAGE AND HANDLING

Precautions to be taken in handling and storage. Keep away from heat, sparks, and open flames. Keep containers closed when not in use. Use adequate ventilation. Avoid prolonged or repeated inhalation of vapor and skin contact. Store in accordance with NFPA, State and local regulation. Use non-sparking type tools in confined areas.

## MATERIAL SAFETY DATA SHEET



**CONSEAL™**  
Concrete Sealants INC.

**CS-50**  
Liquid Butyl Primer

### EXPOSURE CONTROLS/ PERSONAL PROTECTION

**Respiratory Protection:** Avoid breathing of vapor or spray mist. Use a NIOSH/OSHA approved respirator as required to prevent overexposure. In accordance with 29 CFR 1910.134, use either atmosphere supplied respiratory or an air purifying respirator for organic vapors.

**Eye Protection:** Safety goggles or glasses with side shields.

**Protective Gloves/ Clothing:** Wear chemical gloves or other protective clothing as required to minimize skin contact.

**Ventilation:** Provide local exhaust ventilation in volume and pattern to keep TLV of all hazardous ingredients below acceptable limit. (Use of explosion-proof ventilation as requires to control vapor concentrations.)

### PHYSICAL AND CHEMICAL PROPERTIES

**SPECIFIC GRAVITY (H<sub>2</sub>O=1) :** 0.80

**VOLATILE (% VOLUME) :** 88.00 %

**SOLUBILITY IN WATER :** Nil

**EVAPORATION RATE (BuAc=1) :** >1

**PERCENT VOLATILE BY VOLUME(%) :** 77.3

**APPEARANCE / ODOR :** Black liquid with petroleum solvent odor.

**BOILING POINT :** 200 -216 °F

**MELT / FREEZE PT. :** N/A

**VAPOR DENSITY (Air = 1):** <1

**VAPOR PRESURE (mm of Mercury):** 23 @ 25 °C

### STABILITY AND REACTIVITY

**STABILITY:** Stable. Hazardous polymerization will not occur.

**CONDICTIONS TO AVOID:** Stored away from heat and open flames.

**MATERIALS TO AVOID:** Material is not compatible with strong oxidizers, strong acids, or bases.

**HAZARDOUS DECOMPOSITION OR BY-PRODUCTS:** Hazardous decomposition produce fumes, smoke, carbon monoxide, carbon dioxide, hydrocarbon vapors, hydrogen chloride, phosgene, chlorine, and various complex hydrocarbons during combustion.

### TOXICOLOGICAL INFORMATION

Please refer to Section 3 for available information on potential health effects.

### ECOLOGICAL INFORMATION

No specific ecological data are available for this product. Please refer to section 6 for information regarding accidental releases and Section 15 for regulatory reporting information.

**MATERIAL SAFETY DATA SHEET**



**CONSEAL™**  
Concrete Sealants INC.

**CS-50**  
Liquid Butyl Primer

**DISPOSAL CONSIDERSTIONS**

Please refer to Sections 5, 6, and 15 for disposal and regulatory information.

**TRANSPORT INFORMATION DEPARTMENT OF TRANSPORTATION (DOT)**

DOT Shipping Description: FLAMMABLE LIQUID, CLASS 3, UN1133, GROUP II

**REGULATORY INFORMATION**

This product contains the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to Know Act of 1986 and of 40 CFR 372.

<u>CAS #</u>	<u>Chemical Name</u>	<u>% by Weight</u>
108-88-3	Toluene	<0.5
1330-20-7	Xylene	6 - 7
100-41-4	Ethyl Benzene	10 - 15

This information must be included in all MSDS that are copied and distributed for this material.

**OTHER INFORMATION**

**HAZARD RATING SYSTEM:**

Hazardous Materials Identification System (HMIS)

	H.M.I.S	KEY
HEALTH	2	4 = Severe
FIRE	3	3 = Serious
REACTIVITY	0	2 = Moderate
		1 = Slight
		0 = Minimal

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**MATERIAL SAFETY DATA SHEET**



# CS-102

**Butyl Sealant For All Precast Structures: Meets Specs.**

## PRODUCT IDENTIFICATION

**PRODUCT NAME:** CS-102  
**PRODUCT DESCRIPTION:** Butyl Sealant

### H.M.I.S RATING

**HEALTH :** 0  
**FIRE :** 1  
**REACTIVITY :** 0

### NFPA RATING

**HEALTH :** 0  
**FIRE :** 1  
**REACTIVITY :** 0

## HAZARDOUS INGREDIENTS

Not applicable for this product.

## HAZARDOUS COMPONENTS

Not applicable for this product.

## PHYSICAL DATA

**SPECIFIC GRAVITY (H<sub>2</sub>O=1) :** 1.25  
**VOLATILE (% VOLUME) :** 0.00 %  
**SOLUBILITY IN WATER :** Insoluble  
**EVAPORATION RATE (BuAc=1) :** N/A  
**VOLATILE ORGANIC CONTENT :** N/A  
**APPEARANCE / ODOR :** Black tacky solid, slight petroleum odor

**BOILING POINT :** N/A  
**MELT / FREEZE PT. :** N/A  
**VAPOR DENSITY :** N/A  
**VAPOR PRESURE :** N/A

## FIRE AND EXPLOSION HAZARD DATA

**FLASH POINT:** 450 °F

**METHOD USED:** COC

**FLAMMABLE LIMINTS IN AIR, % BY VOLUME: UEL UPPER:** N/D

**LEL LOWER:** N/D

**Extinguishing Media:** Dry chemical, carbon dioxide, foam, water

**Unusual Fire and Explosion Hazards:** None known

**Special Fire fighting Procedures:** None Known

**MATERIAL SAFETY DATA SHEET**



**CONSEAL™**  
Concrete Sealants INC.

**CS-102**

**Butyl Sealant For All Precast Structures: Meets Specs.**

**REACTIVITY DATA**

**STABILITY:** Stable

**MATERIALS TO AVOID:** Strong oxidizing agents

**CONDICTIONS TO AVOID:** None known

**HAZARDOUS POLYMERIZATION:** Will not occur

**HAZARDOUS DECOMPOSITION OR BY-PRODUCTS:** Upon ignition may form CO<sub>2</sub>, CO, and various hydrocarbon fumes.

**HEALTH HAZARDS**

**ACUTE:** None known

**CHRONIC:** None known

**SIGNS AND SYMPTOMS OF EXPOSURE:** None known

**MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:** None known

**TOXICITY DATA:** National Toxicology Program: No  
I.A.R.C. Monographs: No  
OSHA: No

**EMERGENCY AND FIRST AID PROCEDURES:**

**Eye contact:** Flush with warm water for 15 minutes. If irritation persists, contact physician.

**Skin contact:** wash contaminated area with soap and water .

**Ingestion:** DO NOT INDUCE VOMITING, Contact a physician.

**ROUTES OF ENTRY:**

**Inhalation:** No

**Eyes:** No

**Skin:** No

**Ingestion:** Not likely

MATERIAL SAFETY DATA SHEET



**CONSEAL™**  
Concrete Sealants INC.

**CS-102**

**Butyl Sealant For All Precast Structures: Meets Specs.**

**PRECAUTIONS FOR SAFE HANDLING AND USE**

**Steps To Be Taken In Case Material Is Released Or Spilled:** Remove sources of ignition.

**Waste Disposal:** Dispose of in accordance with local, state and federal regulations.

**Precautions to be taken in handling and storage:** Rotate stock. Do not stack cartons on end.

**CONTROL MEASURES**

**Respiratory Protection:** Not required under normal applications.

**Ventilation:**

**Local exhaust :** N/A

**Special :** N/A

**Mechanical :** N/A

**Other :** N/A

**Protective Gloves:** Chemical resistant, Imperious

**Eye Protection:** Safety goggles or glasses

**Other protective clothing or equipment:** N/A

**Hygienic Practices:** Wash hands with soap and water after working with this material. Practice good personal hygiene.

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**CONSEAL™**  
Concrete Sealants INC.

# CS-55 Black

Water-Based Acrylic Coating

REVISION DATE: 10/15/2009

## PRODUCT IDENTIFICATION

**PRODUCT NAME:** CS-55 Black  
**PRODUCT CLASS:** Waterbased Acrylic Damproofing Coating

## HAZARDOUS INGREDIENTS

Occupational

Component	CAS No.	% by weight	Exposure Limits		Vapor Pressure
			TLV	PEL	
Butoxy dipropanol	29911-28-2	1.37	N.E.	N.E.	
2-butoxyethanol	111-76-2	2.6	25 ppm	50 ppm	
Ammonia	7664-41-7	0.2	25ppm	50ppm	760mm Hg@ 20°C

N.E. = Not Established

N.A. = Not Applicable

## PHYSICAL DATA

BOILING RANGE: 212 -344°F

EVAPORATION RATE: Slower than butyl acetate

VAPOR DENSITY: Heavier than air  
% VOLATILE WEIGHT: 65.63

APPEARANCE: Black Liquid  
WT/GAL: 8.65 LBS.

## FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION:

OSHA Combustible Liquid Class IIIB  
DOT not regulated

Flash Point: over 201°F TCC

LEL: 0.6%

**Extinguishing Media:** Foam, carbon dioxide, dry chemical, water fog.

**Unusual Fire and Explosion Hazards:** The material will not support combustion unless the water has evaporated.

**Special Firefighting Procedures:** Water may be used to cool closed containers, to prevent pressure build-up.

## HEALTH HAZARD DATA

**CONSEAL™**  
Concrete Sealants INC.**CS-55 Black**  
Water-Based Acrylic Coating**Effects of Overexposure:**

- Eye Contact:** May cause irritation.  
**Skin:** May cause irritation and drying of the skin.  
**Ingestion:** May be harmful if swallowed. Ingestion may cause gastrointestinal irritation.  
**Inhalation:** Concentrated vapors may be harmful. May cause dizziness, headache and nausea. May cause irritation to lungs, nose and throat.

**Medical Conditions Prone to Aggravation by Exposure:** None known.

**Primary Routes of Entry:** Dermal, eye contact, inhalation, ingestion.

**TOXICITY:****Ammonia**

Toxic by ingestion. LD50, Oral-rat: 350 mg/kg. LCLo, Inhalation-rat: 2000ppm/4Hr.

Although the concentration in this product is low, the vapor pressure of ammonia makes it possible to exceed the TLV or PEL in container head space or other confined areas. The liberation of ammonia may be retarded by chemical neutralization in this product.

**BUTOXY DIPROPANOL**

Moderately toxic by ingestion. LD50, Oral-rat: 2.68 ml/kg. LC50, Inhalation-rat: 486ppm/4 Hr.

High concentrations of vapor, absorption through the skin and or ingestion of butoxy dipropanol may cause irritation of the respiratory tract, experienced as nasal discomfort and discharge, with possible chest pain and coughing. Headache, nausea, vomiting, dizziness and drowsiness may occur.

**2-BUTOXYETHANOL**

LD-50, Oral-rat: 7,282 mg/kg

**EMERGENCY AND FIRST AID MEASURES:**

**Splash (eyes):** Flush immediately with copious quantities of running water for at least 15 minutes. Consult physician. **Splash (skin):** Wash effected area with soap and water. Consult physician if irritation persists. **Ingestion:** Consult physician. **Inhalation:** Remove to fresh air.

**REACTIVITY DATA**

STABILITY: Stable.



# CS-55 Black

Water-Based Acrylic Coating

HAZARDOUS POLYMERIZATION: Will Not Occur.

HAZARDOUS DECOMPOSITION PRODUCTS: Normal combustion products including carbon dioxide, carbon monoxide, metal oxide fumes and oxides of nitrogen.

CONDITIONS TO AVOID: None known.

INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizers.

## **SPILL OR LEAK PROCEDURE**

**Steps To Be Taken In Case Material Is Released Or Spilled:** Remove sources of ignition. Ventilate area. Cover with inert material and remove. Use non-sparking tools.

**Waste Disposal:** Dispose of in accordance with local, state and federal regulations.

## **SAFE HANDLING AND USE INFORMATION**

**Respiratory Protection:** If spray mists are generated, wear NIOSH/MSHA approved particulate respirator. Wear approved organic vapor respirator if vapor level is above exposure limits in Section 5.

**Ventilation:** Use mechanical ventilation to keep vapor levels below limits in Section 2 and LEL in Section 4.

**Protective Gloves:** Solvent resistant gloves recommended for direct contact.

**Eye Protection:** Safety goggles or glasses recommended during pouring, dispensing, paint application, or other situations where eye hazards exist.

**Hygienic Practices:** Remove and wash contaminated clothing before re-use. Wash hands with soap and water.

## **SPECIAL PRECAUTIONS**

**Precautions To Be Taken In Handling:** Avoid contact with skin or breathing concentrated vapors. Do not open containers in unventilated areas. Keep ignition sources away. Protect from freezing.

**Other Precautions:** Do not take internally. Do not get in eyes. Avoid prolonged or repeated contact with skin. Use under well ventilated conditions. For personal hygiene protection always wash thoroughly after handling product. Always wash up before eating, smoking, or using toilet facilities.

## **REGULATORY INFORMATION**

TSCA (Toxic Substances Control Act): All ingredients are on the TSCA Chemical Substances Inventory.

Canadian Regulations:

CEPA (Canadian Environmental Protection Act): All ingredients are on the DSL (Domestic Substances List).



# CS-55 Black

Water-Based Acrylic Coating

WHMIS Classifications:  
Class B, Division 2B, Toxic.

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# Submittal Data Cover Sheet

Date: 4/17/2019



**Model No.:** 49G-03BCPSVYKCKD

**Description:** Combination Rate of Flow, Pressure Reducing, and Solenoid Shutoff

**Job/Project Name:** Navajo Gallup Reach 26.1 26.1  
PRV Vault

**Company:** Pipestone Equipment

**Contact:** Kira Witwer

**Engineering Firm:** Souder, Miller and Associates

**Address:** 676 Moss Street

**Project Engineer:** Andrew Robertson

**City:** Golden

**State:** CO

**Zip:** 80401

**Fluid To Be Handled:** Water

**Specific Gravity:** 1

**Temperature:** Ambient

**Max. Flow Rate:** 800 GPM

**Min. Flow Rate:** 300 GPM

## Main Valve

**Valve Size:**

6"

**Main Valve Body & Cover:**

Ductile Iron ASTM A-536

**End Details:**

Flanged Ductile Iron ANSI B16.42 Class 300

**Base Valve:**

100-01 Hytrol

**Main Valve Trim:**

(Disc Guide, Seat & Cover Bearings)

316 Stainless Steel

**Pressure Rating:**

250/350 Class @ 400 psi Max.

**Quantity:**

1

**Valve Pattern:**

Globe

**Elastomers:** (Max Temperature 180°F)

Buna-N® Synthetic Rubber

## Pilot System

**Hydraulic Pilot System Adjustment Range(s)**

**Electronic Pilot Spring Ranges**

**Tubing & Fittings**

Stainless Steel Braided Flex Hose

CDHS18 30-480 INCHES

based on 690gpm

CRD 30-300 PSI

170psi

**Pilot System Configuration**

316 SST with 316 SST Trim

R.H. Pilot System Mount (standard)

## Electrical

**Electrical - Voltages & Accessories**

24 VDC

**VC-22D Electronic Valve Controller**

IP68 DC Power

**VC-22D Power Converter**

## Features & Options

**Strainer:** Y-Pattern

Pilot System Isolation Valves

Closing Speed Control

Opening Speed Control

Pilot System Check Feature

Independent Operating Pressure

Atmospheric Drain

Fusion Bonded Epoxy Coating 12 mil

X144D e-FlowMeter

Reservoir Gauge with Tester

X145 External Display

**Pressure Gauges:**

Inlet: 2-1/2" 0 - 300 psi

Outlet: 2-1/2" 0 - 300 psi

Cover:

**Valve Position Transmitter:**

N/A

**Valve Position Indicator:**

X101

**Stem Option:**

Dura-Kleen® Stem

**Limit Switch (SPDT):**

N/A

**Differential Pressure Transmitter:**

N/A

**Pressure Transmitter:**

Inlet: N/A

Outlet: N/A

**Orifice Plate:**

X52D Bore: 3.80

**Power Generator:**

N/A

**X43 H-Style Strainer:**

Supplied Separately

**X43 H-Style Strainer Flange:**

(Ductile Iron ASME B16.42)

CL300 Flanged Epoxy Coated

### Notes:

Also L.H. Pilot System Mount (mirror image)

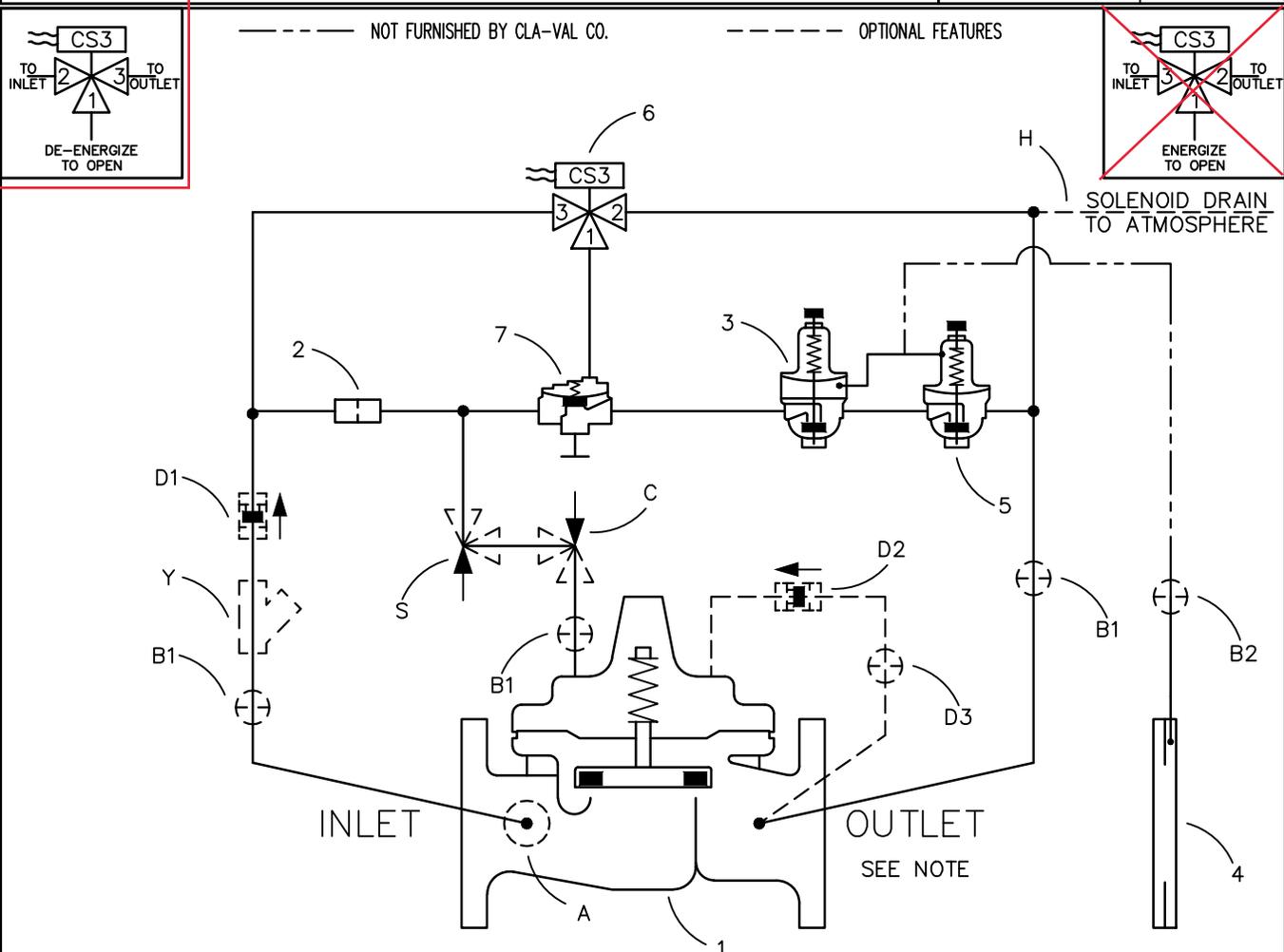
**Cla-Val Contact:**

**Phone:**

**E-Mail:**

TYPE OF VALVE AND MAIN FEATURES  
**COMBINATION RATE OF FLOW, PRESSURE REDUCING AND SOLENOID SHUTOFF VALVE**

DESIGN		
DRAWN	CFV	9-14-81
CHK'D	KD	11-5-81
APV'D	CH	11-13-81



NOTE: ORIFICE PLATE ASSEMBLY MAY BE ATTACHED TO THE MAIN VALVE OUTLET FLANGE, HOWEVER, BETTER CONTROL IS OBTAINED IF LOCATED 1 TO 5 PIPE DIAMETERS DOWNSTREAM.

ITEM NO.	BASIC COMPONENTS	QTY	OPTIONAL FEATURE SUFFIX ADDED TO CATALOG NUMBER	
1	100-01 HYTROL (49-03) MAIN VALVE	1		
	<del>100-20 HYTROL (649-03) MAIN VALVE</del>			
2	X58C RESTRICTION ASSEMBLY	1		
3	CRA PRESSURE REDUCING CONTROL	1		
4	X52A-1 ORIFICE PLATE ASSEMBLY	1		
5	CDHS18 PRESSURE DIFFERENTIAL CONTROL	1		
6	CS3 SOLENOID CONTROL	1		
7	100-01 HYTROL (REVERSE FLOW)	1		
A	<del>X46A FLOW CLEAN STRAINER</del>	1	Y	X43 "Y" STRAINER 1
B	CK2 COCK (ISOLATION VALVE)	4		
C	CV FLOW CONTROL (CLOSING)	1		
D	<del>CHECK VALVE WITH COCK</del>	1		
H	<del>SOLENOID DRAIN TO ATMOSPHERE</del>			
S	CV FLOW CONTROL (OPENING)	1		

1-31-18  
AV  
G ADDED OPTIONAL FEATURE (H) (ECO 26619)

CAD REVISION RECORD - DO NOT REVISE MANUALLY  
DESCRIPTION  
BY DATE  
AK 5-1-03  
A-E SEE REVISION FILE  
F REVISED LOCATION OF CK2 (B1) (ECO 19381)

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<b>CLA-VAL CO.</b> NEWPORT BEACH, CALIFORNIA	CATALOG NO. 49-03/649-03	DRAWING NO. 90481	REV G
	TYPE OF VALVE AND MAIN FEATURES  COMBINATION RATE OF FLOW, PRESSURE REDUCING AND SOLENOID SHUTOFF VALVE		DESIGN DRAWN CFV 9-14-81 CHK'D KD 11-5-81 APV'D CH 11-13-81

OPERATING DATA

I. SOLENOID CONTROL FEATURE:

SOLENOID CONTROL (6) IS A DIRECT-ACTING, 3-WAY SOLENOID CONTROL THAT CHANGES POSITION WHEN THE COIL IS DE-ENERGIZED OR ENERGIZED. THIS APPLIES OR RELIEVES PRESSURE IN THE COVER CHAMBER OF AUXILIARY HYTROL (7), PROVIDING THE OPERATION SHOWN IN THE FOLLOWING TABLE:

SOLENOID CONTROL (6)		49E-03/649E-03 SERIES		49D-03/649D-03 SERIES	
POSITION	PORTS CONNECTED	AUXILIARY HYTROL (7) POSITION	MAIN VALVE (1) POSITION	AUXILIARY HYTROL (7) POSITION	MAIN VALVE (1) POSITION
ENERGIZED	1 & 2	OPEN	OPEN UNDER COMMAND OF CONTROLS (3) & (5)	CLOSED	CLOSED
DE-ENERGIZED	1 & 3	CLOSED	CLOSED	OPEN	OPEN UNDER COMMAND OF CONTROLS (3) & (5)

II. RATE OF FLOW FEATURE:

PRESSURE DIFFERENTIAL CONTROL (5) IS NORMALLY OPEN AND RESPONDS TO DIFFERENTIAL PRESSURE CHANGES SENSED ACROSS ORIFICE PLATE ASSEMBLY (4). AN INCREASE IN DIFFERENTIAL PRESSURE TENDS TO CLOSE CONTROL (5) AND A DECREASE IN DIFFERENTIAL PRESSURE TENDS TO OPEN CONTROL (5). THIS CAUSES MAIN VALVE COVER PRESSURE TO VARY AND THE MAIN VALVE MODULATES (OPENS AND CLOSES) MAINTAINING A RELATIVELY CONSTANT RATE OF FLOW. PRESSURE DIFFERENTIAL CONTROL (5) ADJUSTMENT: TURN THE ADJUSTING SCREW CLOCKWISE TO INCREASE THE RATE OF FLOW.

III. PRESSURE REDUCING FEATURE:

PRESSURE REDUCING CONTROL (3) IS A NORMALLY OPEN CONTROL THAT SENSES MAIN VALVE OUTLET PRESSURE CHANGES. AN INCREASE IN OUTLET PRESSURE TENDS TO CLOSE CONTROL (3) AND A DECREASE IN OUTLET PRESSURE TENDS TO OPEN CONTROL (3). THIS CAUSES MAIN VALVE COVER TO VARY AND THE MAIN VALVE MODULATES (OPENS AND CLOSES) MAINTAINING A RELATIVELY CONSTANT OUTLET PRESSURE. PRESSURE REDUCING CONTROL (3) ADJUSTMENT: TURN THE ADJUSTING SCREW CLOCKWISE TO INCREASE THE SETTING.

LTR	DATE	
	BY	DATE
DESCRIPTION		
SEE SHEET 1		

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 <b>CLA-VAL CO.</b> NEWPORT BEACH, CALIFORNIA	CATALOG NO. 49-03/649-03	DRAWING NO. 90481	REV G
	TYPE OF VALVE AND MAIN FEATURES COMBINATION RATE OF FLOW, PRESSURE REDUCING AND SOLENOID SHUTOFF VALVE		DESIGN DRAWN CFV 9-14-81 CHK'D KD 11-5-81 APV'D CH 11-13-81

OPERATING DATA-CONTINUED

IV. OPTIONAL FEATURE OPERATING DATA:

~~SUFFIX A (FLOW CLEAN STRAINER):~~

~~A SELF-CLEANING STRAINER IS INSTALLED IN THE MAIN VALVE INLET BODY BOSS WHICH PROTECTS THE PILOT SYSTEM FROM FOREIGN PARTICLES.~~

SUFFIX B (ISOLATION VALVES):

CK2 COCKS (B1) AND (B2) ARE USED TO ISOLATE THE PILOT SYSTEM FROM MAIN LINE PRESSURE. THESE VALVES MUST BE OPEN DURING NORMAL OPERATION.

SUFFIX C (CLOSING SPEED CONTROL):

FLOW CONTROL (C) CONTROLS THE CLOSING SPEED OF THE MAIN VALVE. TURN THE ADJUSTING STEM CLOCKWISE TO MAKE THE MAIN VALVE CLOSE SLOWER.

~~SUFFIX D (CHECK VALVES WITH COCK):~~

~~WHEN OUTLET PRESSURE IS HIGHER THAN INLET PRESSURE, CHECK VALVE (D2) OPENS AND CHECK VALVE (D1) CLOSSES. THIS DIRECTS THE HIGHER OUTLET PRESSURE INTO THE MAIN VALVE COVER AND THE MAIN VALVE CLOSSES.~~

~~SUFFIX H (SOLENOID DRAIN TO ATMOSPHERE):~~

~~SOLENOID DRAIN LINE IS DISCHARGED TO ATMOSPHERE. [SOLENOID DRAIN LINE IS CONNECTED TO THE MAIN VALVE OUTLET BOSS IF SUFFIX (H) IS NOT SPECIFIED.]~~

SUFFIX S (OPENING SPEED CONTROL):

FLOW CONTROL (S) CONTROLS THE OPENING SPEED OF THE MAIN VALVE. TURN THE ADJUSTING STEM CLOCKWISE TO MAKE THE MAIN VALVE OPEN SLOWER.

SUFFIX Y (Y-STRAINER):

A Y-PATTERN STRAINER IS INSTALLED IN THE PILOT SUPPLY LINE TO PROTECT THE PILOT SYSTEM FROM FOREIGN PARTICLES. THE STRAINER SCREEN MUST BE CLEANED PERIODICALLY.

CAD REVISION RECORD - DO NOT REVISE MANUALLY	DATE	
	BY	
DESCRIPTION	SEE SHEET 1	
LTR		



**CLA-VAL CO.**

NEWPORT BEACH, CALIFORNIA

CATALOG NO.  
49-03/649-03

DRAWING NO.  
90481

REV  
G

TYPE OF VALVE AND MAIN FEATURES

COMBINATION RATE OF FLOW, PRESSURE REDUCING  
AND SOLENOID SHUTOFF VALVE

DESIGN

DRAWN	CFV	9-14-81
CHK'D	KD	11-5-81
APV'D	CH	11-13-81

OPERATING DATA-CONTINUED

V. CHECK LIST FOR PROPER OPERATION:

- ( ) SYSTEM VALVES OPEN UPSTREAM AND DOWNSTREAM.
- ( ) AIR REMOVED FROM THE MAIN VALVE COVER AND PILOT SYSTEM AT ALL HIGH POINTS.
- ( ) PERIODIC CLEANING OF STRAINER (Y) IS RECOMMENDED (OPTIONAL FEATURE).
- ( ) ORIFICE PLATE ASSEMBLY (4) ASSEMBLED DOWNSTREAM OF THE MAIN VALVE, BETWEEN 1 AND 5 PIPE DIAMETERS IN DISTANCE (SEE NOTE).  
NOTE: ORIFICE PLATE ASSEMBLY MAY BE ATTACHED TO THE MAIN VALVE OUTLET FLANGE, HOWEVER, BETTER CONTROL IS OBTAINED IF LOCATED 1 TO 5 PIPE DIAMETERS DOWNSTREAM.
- ( ) CV FLOW CONTROLS (C) AND (S) OPEN AT LEAST 4 TURNS (OPTIONAL FEATURE).
- ( ) CORRECT VOLTAGE TO SOLENOID CONTROL (6).
- ( ) CK2 COCKS (B1), (B2), AND (D3) OPEN (OPTIONAL FEATURE).

LTR	DESCRIPTION	BY	DATE
		SEE SHEET 1	

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# CLA-VAL 100-01

## Main Valve

### ▶ PRODUCT FEATURES

Cla-Val Model 100-01 Hytrol Valve is a hydraulically operated, diaphragm actuated, valve. It consists of three major components: body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part.

The diaphragm assembly is guided top and bottom by a precision machined stem. It utilizes a non-wicking diaphragm of nylon fabric bonded with synthetic rubber.

Model 100-01 is used in system applications, such as, remote control, pressure regulation, solenoid operation, rate of flow control, liquid level control or check valve operation. Applications are unlimited.



### ▶ SPECIFICATIONS

#### Available Sizes

Pattern	Threaded	Flanged	Grooved End
Globe	3/8" - 3"	1 1/2" - 36"	1 1/2"-2"- 2 1/2"- 3"- 4"- 6"- 8"
Angle	1" - 3"	1 1/2" - 16" & 24"	2" - 3" - 4"

#### Operating Temp. Range

Fluids
-40° to 180° F

#### Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class				
		Flanged		Grooved	Threaded	
Grade	Material	ANSI Standards*	150 Class	300 Class	300 Class	End‡ Details
ASTM A536	Ductile Iron	B16.42	250	400	400	400
ASTM A216-WCB	Cast Steel	B16.5	285	400	400	400
UNS 87850	Bronze	B16.24	225	400	400	400

Note: \* ANSI standards are for flange dimensions only.  
 Flanged valves are available faced but not drilled.  
 ‡ End Details machined to ANSI B2.1 specifications.

**Valves for higher pressure are available; consult factory for details**

#### Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	3/8" - 36"	1" - 16"	1" - 16"
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Bronze is Standard Stainless Steel is optional		
Disc	Buna-N® Rubber		
Diaphragm	Nylon Reinforced Buna-N® Rubber		
Stem, Nut & Spring	Stainless Steel		

For material options not listed, consult factory.  
 Cla-Val manufactures valves in more than 50 different alloys.



# CLA-VAL 100-01

## Main Valve

### FUNCTIONAL DATA

† Non Guided Stem

Valve Size		Inches	3/8†	1/2†	3/4†	1†	1	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36
		mm	10	15	20	25	25	32	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750	900
C <sub>v</sub> Factor	Globe Pattern	Gal./Min. (gpm)	1.8	6	8.5	13.3	20	30	32	54	85	115	200	440	770	1245	1725	2300	3130	4463	5345	7655	10150	14020
		Litres/Sec. (l/s)	.11	.38	.54	.84	1.26	1.89	2	3.4	5.4	7.3	13	28	49	79	109	145	198	282	337	483	640	885
	Angle Pattern	Gal./Min. (gpm)	—	—	—	—	21	27	29	61	101	139	240	541	990	1575	2500*	3060*	4200*	—	—	9950*	—	—
		Litres/Sec. (l/s)	—	—	—	—	1.32	1.70	1.83	3.8	6.4	8.8	15	34	62	99	158	193	265	—	—	628	—	—
Equivalent Length of Pipe	Globe Pattern	Feet (ft)	25	7	16	23	10	19	37	51	53	85	116	211	291	347	467	422	503	612	595	628	1181	2285
		Meters (m)	7.6	2.2	4.8	7.1	3.1	5.7	12	15.5	16	26	35	64	89	106	142	129	154	187	181	192	360	696
	Angle Pattern	Feet (ft)	—	—	—	—	9.0	28	46	40	37	58	80	139	176	217	222*	238*	247*	—	—	372*	—	—
		Meters (m)	—	—	—	—	2.8	8.7	14	12	11	18	25	43	54	66	68	73	75	—	—	113	—	—
K Factor	Globe Pattern	16.3	3.7	5.7	6.1	2.7	3.6	5.9	5.6	4.6	6.0	5.9	6.2	6.1	5.8	6.1	5.0	4.6	5.2	3.9	4.0	6.4	6.4	
	Angle Pattern	—	—	—	—	2.5	4.4	7.1	4.4	3.3	4.1	4.1	4.1	3.7	3.6	2.9	2.8	2.6	—	—	2.4	—	—	
Suggested Flow (gpm)	Minimum		0.3	0.5	1	1	1	1	1	2	2	4	10	15	35	50	70	95	120	150	275	450	650	
	Maximum		19.0	33.0	55	55	93	125	210	300	460	800	1800	3100	4500	7000	8400	11000	14000	17000	25000	42000	50000	
	Max. Surge		42.0	75.0	120	120	210	280	470	670	1000	1800	4000	7000	11000	16000	19000	25000	31000	35000	56500	63000	85000	
Suggested Flow (l/s)	Minimum		0.02	0.03	0.03	0.03	0.03	0.03	0.06	0.09	0.13	0.25	0.63	0.95	2.2	3.2	4.4	6.0	7.6	9.5	17.4	28.4	41.0	
	Maximum		1.2	2.1	3.5	3.5	6	8	13	19	29	50	113	195	309	442	530	694	883	1073	1577	2650	3150	
	Max. Surge		2.7	4.7	7.6	7.6	13	18	30	42	63	113	252	441	693	1008	1199	1577	1956	2461	3560	3975	5360	
Liquid Displaced from Cover Chamber When Valve Opens	Fl. Oz.	.12	.34	.34	.70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	U.S. Gal.	—	—	—	—	.02	.02	.02	.03	.04	.08	.17	.53	1.26	2.51	4.0	6.5	9.6	11	12	29	42	90	
	ml	3.5	10.1	10.1	20.7	75.7	75.7	75.7	121	163	303	643	—	—	—	—	—	—	—	—	—	—	—	
	Litres	—	—	—	—	—	—	—	—	—	—	—	2.0	4.8	9.5	15.1	24.6	36.2	41.6	45.4	109.8	159	340	

\*Estimated

#### C<sub>v</sub> Factor

Formulas for computing C<sub>v</sub> Factor, Flow (Q) and Pressure Drop (ΔP):

$$C_v = \frac{Q}{\sqrt{\Delta P}} \quad Q = C_v \sqrt{\Delta P} \quad \Delta P = \left( \frac{Q}{C_v} \right)^2$$

#### K Factor (Resistance Coefficient)

The Value of K is calculated from the formula:  $K = \frac{894d^4}{C_v^2}$  (U.S. system units)

#### Equivalent Length of Pipe

Equivalent lengths of pipe (L) are determined from the formula:  $L = \frac{Kd}{12f}$  (U.S. system units)

#### Fluid Velocity

Fluid velocity can be calculated from the following formula:  $V = \frac{.4085 Q}{d^2}$  (U.S. system units)

#### Where:

C<sub>v</sub> = U.S. (gpm) @ 1 psi differential at 60° F water  
or

= (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

d = inside pipe diameter of Schedule 40 Steel Pipe (inches)

f = friction factor for clean, new Schedule 40 pipe (dimensionless) (from Cameron Hydraulic Data, 18th Edition, P 3-119)

K = Resistance Coefficient (calculated)

L = Equivalent Length of Pipe (feet)

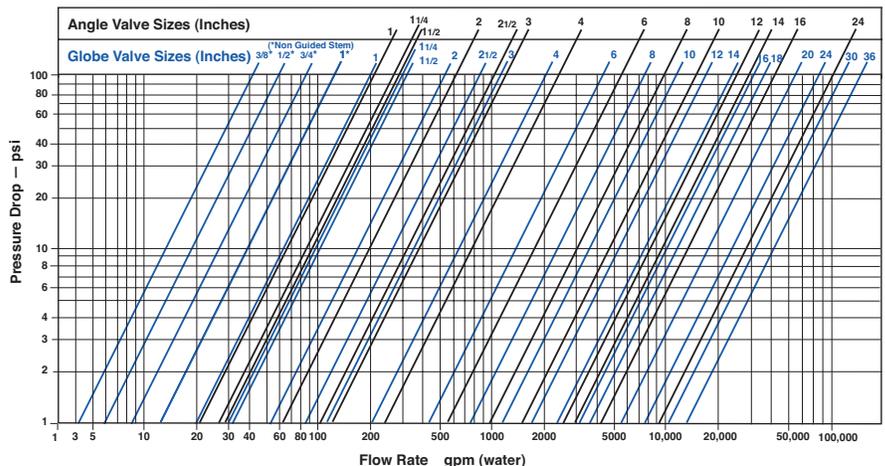
Q = Flow Rate in U.S. (gpm) or (l/s)

V = Fluid Velocity (feet per second) or (meters per second)

ΔP = Pressure Drop in (psi) or (bar)

### FLOW CHART

(Based on normal flow through a wide open valve)



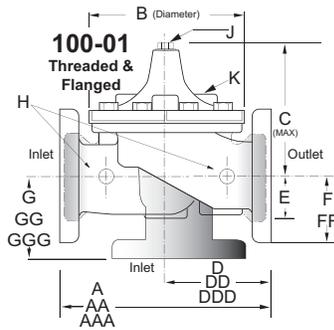
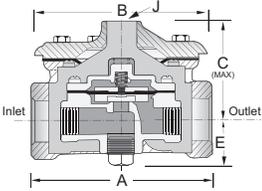


# CLA-VAL 100-01

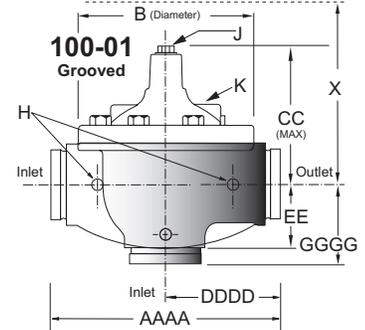
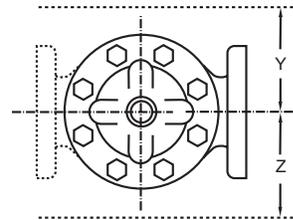
## Main Valve

### ► DIMENSIONS (inches)

**100-01**  
3/8", 1/2", 3/4", 1"  
Auxiliary Hytrol Valves  
with non Guided Stems



**Model 100-01**



Valve Size (Inches)	3/8*	1/2*	3/4*	1*	1	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18†	20†	24†	30†	36†
A Threaded	2.75	3.50	3.50	5.12	7.25	7.25	7.25	9.38	11.00	12.50	—	—	—	—	—	—	—	—	—	—	—	—
AA 150 ANSI	—	—	—	—	—	—	8.50	9.38	11.00	12.00	15.00	<del>20.00</del>	25.38	29.75	34.00	39.00	41.38	46.00	52.00	61.50	63.00	72.75
AAA 300 ANSI	—	—	—	—	—	—	9.00	10.00	11.62	13.25	15.62	21.00	26.38	31.12	35.50	40.50	43.50	47.64	53.62	63.24	64.50	74.75
AAAA Grooved End	—	—	—	—	—	—	8.50	9.00	11.00	12.50	15.00	<del>20.00</del>	25.38	—	—	—	—	—	—	—	—	—
B Diameter	2.50	3.12	3.12	4.38	5.62	5.62	5.62	6.62	8.00	9.12	11.50	15.75	20.00	23.62	28.00	32.75	35.50	41.50	45.00	53.16	56.00	66.00
C Maximum	2.33	5.88	5.88	6.25	5.50	5.50	5.50	6.50	7.56	8.19	10.62	13.38	16.00	17.12	20.88	24.19	25.00	39.06	41.90	43.93	54.60	59.00
CC Maximum Grooved End	—	—	—	—	—	—	4.75	5.75	6.88	7.25	9.31	<del>12.42</del>	14.62	—	—	—	—	—	—	—	—	—
D Threaded	—	—	—	—	3.25	3.25	3.25	4.75	5.50	6.25	—	—	—	—	—	—	—	—	—	—	—	—
DD 150 ANSI	—	—	—	—	—	—	4.00	4.75	5.50	6.00	7.50	<del>10.00</del>	12.69	14.88	17.00	19.50	20.81	—	—	30.75	—	—
DDD 300 ANSI	—	—	—	—	—	—	4.25	5.00	5.88	6.38	7.88	10.50	13.25	15.56	17.75	20.25	21.62	—	—	31.62	—	—
DDDD Grooved End	—	—	—	—	—	—	4.75	—	6.00	7.50	—	—	—	—	—	—	—	—	—	—	—	—
E	1.25	0.88	0.88	1.63	1.12	1.12	1.12	1.50	1.69	2.06	3.19	<del>4.34</del>	5.31	9.25	10.75	12.62	15.50	12.95	15.00	17.75	21.31	24.56
EE Grooved End	—	—	—	—	—	—	2.00	2.50	2.88	3.12	4.25	<del>6.00</del>	7.56	—	—	—	—	—	—	—	—	—
F 150 ANSI	—	—	—	—	—	—	2.50	3.00	3.50	3.75	4.50	<del>5.50</del>	6.75	8.00	9.50	10.50	11.75	15.00	16.50	19.25	22.50	28.50
FF 300 ANSI	—	—	—	—	—	—	3.06	3.25	3.75	4.13	5.00	6.25	7.50	8.75	10.25	11.50	12.75	15.00	16.50	19.25	24.00	30.00
G Threaded	—	—	—	1.88	1.88	1.88	3.25	4.00	4.50	—	—	—	—	—	—	—	—	—	—	—	—	—
GG 150 ANSI	—	—	—	—	—	—	4.00	3.25	4.00	4.00	5.00	<del>6.00</del>	8.00	8.62	13.75	14.88	15.69	—	—	22.06	—	—
GGG 300 ANSI	—	—	—	—	—	—	4.25	3.50	4.31	4.38	5.31	6.50	8.50	9.31	14.50	15.62	16.50	—	—	22.90	—	—
GGGG Grooved End	—	—	—	—	—	—	3.25	—	4.25	5.00	—	—	—	—	—	—	—	—	—	—	—	—
H NPT Body Tapping	—	0.125	0.125	0.25	0.375	0.375	0.375	0.375	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
J NPT Cover Center Plug	0.125	0.125	0.125	0.25	0.25	0.25	0.25	0.50	0.50	0.50	0.75	0.75	1.00	1.00	1.25	1.50	2.00	1.00	1.00	1.00	2.00	2.00
K NPT Cover Tapping	—	0.125	0.125	0.25	0.375	0.375	0.375	0.375	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
Stem Travel	—	—	—	0.40	0.40	0.40	0.60	0.70	0.80	1.10	1.70	2.30	2.80	3.40	4.00	4.50	5.10	5.63	6.75	7.50	8.50	—
Approx. Ship Weight (lbs)	3	3	8	8	15	15	15	35	50	70	140	285	500	780	1165	1600	2265	2982	3900	6200	7703	11720
Approx. X Pilot System	—	—	—	—	11	11	11	13	14	15	17	29	31	33	36	40	40	43	47	68	79	85
Approx. Y Pilot System	—	—	—	—	9	9	9	9	10	11	12	20	22	24	26	29	30	32	34	39	40	45
Approx. Z Pilot System	—	—	—	—	9	9	9	9	10	11	12	20	22	24	26	29	30	32	34	39	42	47

Note: The top two flange holes on valve size 36 are threaded to 1 1/2"-6 UNC.

\*Non Guided Stem Auxiliary Hytrol Controls

†18 inch and larger 100-01 series Hytrol valves are equipped with flange feet for safety and convenience. Consult Cla-Val representative for details.

Cla-Val Control Valves operate with maximum efficiency when mounted in horizontal piping with the main valve cover UP, however, other positions are acceptable. Due to component size and weight of 8 inch and larger valves, installation with cover UP is advisable. We recommend isolation valves be installed on inlet and outlet for maintenance. Adequate space above and around the valve for service personnel should be considered essential. A regular maintenance program should be established based on the specific application data. However, we recommend a thorough inspection be done at least once a year. Consult factory for specific recommendations.



## **EPOXY PROTECTIVE COATING** (Blue Epoxy and Red Epoxy)

Epoxy resin powders were created and developed specifically for the application of thin film corrosion protection to metal or other substrates. Epoxy resin coatings are suitable for continuous exposure to a wide range of corrosive elements. Of particular interest for control valves is the high resistance to various water conditions. They also provide resistance to certain acids, chemicals, solvents and alkalis. They have excellent adhesion to almost any prepared surface. They are sufficiently flexible to be used to protect steel springs from corrosion and have an impact strength that allows retainability and restoration of surface coating under normal drop conditions.

Since the early 1970's the application process used by Cla-Val is the fusion method. This method of applying epoxy resins utilizes the principal of covering a suitably cleaned and preheated part with a one-part dry powdered resin. The dry powdered resin fuses itself to the heated part. A curing period in an oven at 400 degrees F completes the process. No volatile solvents are required and thus there are no pinholes left by evaporation of such materials. The coating is applied by electrostatic spray or flock spray to a nominal thickness recommended by the coating manufacturer.

Cla-Val valves specified with epoxy coating applied at the factory fully conform to the standards below. Applied to the inside and outside of all ferrous parts, this coating option is indicated with "KC" as a suffix to the valve catalog number.

### **CERTIFICATION**

This is to confirm that Cla-Val uses AKZO Nobel R4-HJF42R (**Blue**) epoxy powder coating material for our factory applied protective coating. Our coating application process conforms to all applicable requirements of the American Water Works Association Standard C550 entitled "Protective Interior Coatings for Valves and Hydrants."

The AKZO Nobel R4-HJF42R (**Blue**) epoxy powder coating material is certified as a protective barrier material and approved by NSF Standard 61 - Drinking Water System Components - Health Effects (Nov. 16, 1995).

The AKZO Nobel R4-HJF42R (**Blue**) epoxy powder coating material is formulated with ingredients which are listed in or cited by the suppliers as in compliance with Federal Drug Administration Document, Title 21 of the Federal Regulations on Food Additives, Section 175.300, "Resinous and Polymeric Coatings."

This is to certify that Cla-Val uses H.B. Fuller Co. IF-1947 (**Red Oxide color**) epoxy powder coating material for our factory applied protective coating on Fire Protection main valves. Our coating application process conforms to all applicable requirements of the American WaterWorks Association Standard C550-90 entitled "Protective Interior Coatings for Valves and Hydrants."

This also certifies that H. B. Fuller Co. IF-1947 epoxy powder coating material (**Red Oxide color**) is applied and inspected according to Cla-Val procedures no. 97165 to interior and exterior of all ferrous parts.

## ▶ PRODUCT FEATURES

The Dura-Kleen Stem is a minimal maintenance stem designed to keep the valve operating when valve stem build-up occurs under conditions such as high lime content, hard water (high calcium), or secondary and tertiary effluent discharge. The Dura-Kleen Stem is ideally suited to those valve applications with high-pressure differentials.

## ▶ SPECIFICATIONS

### MATERIAL

- 316 Stainless Steel
- ~~303 Stainless Steel~~
- ~~Monel~~



### ▶ PRODUCT FEATURES

Cla-Val Model X101 Visual Position Indicator is designed to display Cla-Val valve position quickly and easily. A solid brass indicator rod fastened directly to the valve stem moves up and down inside a pyrex tube. The tube is contained within a brass housing which is open on two opposite sides to permit clear vision of the indicator rod.

To purge air that may be trapped in the valve cover, a vent valve in the top of the housing is provided. Model X101 valve position indicator is furnished complete for installation on specified size Cla-Val Automatic Control Valve.

### ▶ SPECIFICATIONS

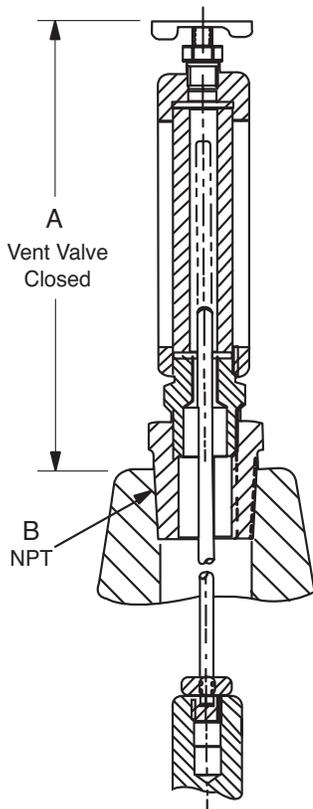
**Sizes:** 1" thru 24"

**Standard Materials\*:** ~~Brass~~, Pyrex Tube ;Stainless Steel

**Pressure Rating:** 400 psi

*\*Optional Materials Available*

### ▶ DIMENSIONS



VALVE SIZE	A INCHES	B NPT
1"	5.88	1/4"
1 1/4"	3.21	1/4"
1 1/2"	3.21	1/4"
2"	3.33	1/2"
2 1/2"	3.33	1/2"
3"	3.33	1/2"
4"	4.52	3/4"
6"	4.52	3/4"
8"	5.83	1"
10"	7.70	1"
12"	8.20	1 1/4"
14"	8.20	1 1/2"
16"	10.81	2"
18"	12.04	1"
20"	12.04	1"
24"	12.04	1"



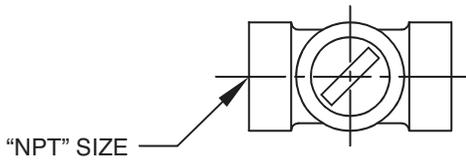
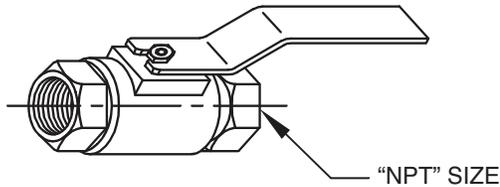
Dimension "A" is height added to valve by indicator assembly

### ▶ PRODUCT FEATURES

Model CK2 is a ball valve used for isolating components within the pilot system.



### ▶ DIMENSIONS



"NPT" SIZE									
1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	

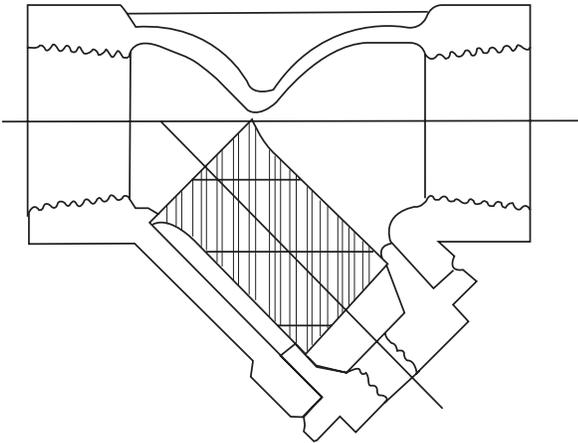
### ▶ SPECIFICATIONS

PART	MATERIAL
Body:	316 Stainless Steel
Handle and Nut:	316 Stainless Steel
Maximum working pressure:	600 psi
Temperature range:	33°F to 180°F

### ► PRODUCT FEATURES

- Stainless Steel Body
- Blow-off Standard
- Stainless Steel Mesh Screen

Model X43A 'Y' Strainers are in-line strainers intended to be installed for protection of pilot systems. These strainers are constructed of corrosion resistant materials. All sizes have blow-off standard.



### ► SPECIFICATIONS

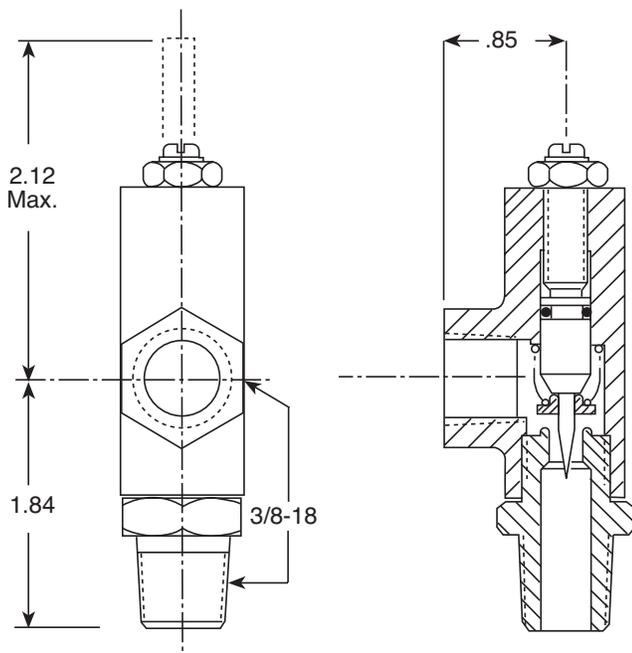
PART	MATERIAL
Body:	316 Stainless Steel
Screen:	304 Stainless Steel
Gasket:	Non-Asbestos Fiber
Ends:	Threaded ANSI/ASME B1.20 1
Maximum working pressure:	800 psi
Temperature range:	33°F to 180°F
Screen:	Standard screen size is 40 mesh perforated stainless steel
Standard:	Blowdown Ball Valve

► **PRODUCT FEATURES**

Cla-Val CV Control is an adjustable restriction which acts as a needle valve when flow is in the direction of the stem. When flow is in the reverse direction, the port area opens fully to allow unrestricted flow. When installed in the control system of a Cla-Val automatic valve, it can be arranged to function as either an opening or closing speed control.



► **DIMENSIONS**



► **SPECIFICATIONS**

**Sizes:** 3/8" NPT

**Temperature Range:** 250°F Max.

**Standard Materials\*:**

Housing: ~~Bronze ASTM B61~~ **Stainless Steel**

Trim: ~~Stainless Steel 303~~ **316**

**Pressure Rating:** 400 psi Max.

*\*Optional Materials Available*



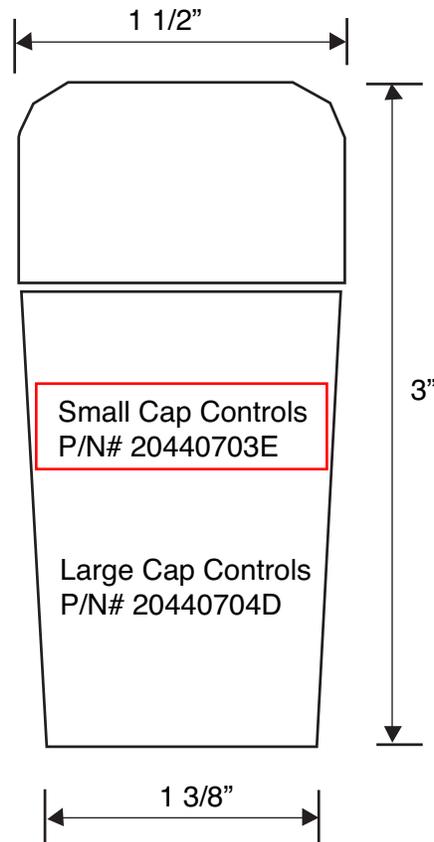
# Model X140-1 Locking Security Cap

## ▶ PRODUCT FEATURES

The Cla-Val Model X140-1 Locking Security Cap is designed to completely encapsulate the pilot control adjustment screw with Stainless Steel. Even in the harshest environment, the X140-1 offers an extra level of protection, security and peace of mind for the system operator that pilot control settings will not change until appropriate personnel are present.



## ▶ DIMENSIONS



## WATER FLOW

### Description

The fixed flow rate orifices contain a deformable opening which decreases in size as the pressure differential increases. The design of the unit compensates for pressure differential increase by reducing the area of the orifice resulting in constant flow over the differential pressure range 15-150 psig.

### Specifications

- Maximum Pressure** 150 psig
- Constant Flow Pressure Range** 15 - 150 psig
- Temperature Range** 32 to 160° F
- Accuracy** ± 10%
- Materials** Body - Brass • Diaphragm - Buna-N

### Applications

- Water Flow Rate Control
- Heating and Cooling Systems
- Water Spray
- Film Process and Rinse
- Water Conservation
- Flow Rate Limitation

### Ordering Information

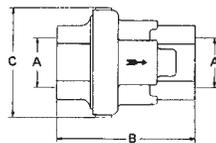
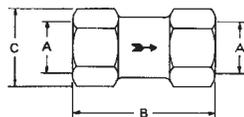
- Select the flow rate
- Select the pipe size
- Obtain part number from charts at right

### Dimensions

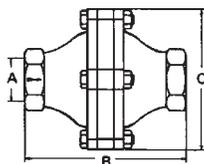
Series 2305		
A. Pipe Size - NPT	B. Overall Length	C. Height
1/4"	2"	1-1/6"
3/8"	1-3/4"	1-1/16"
1/2"	2-7/32"	1-1/4"
3/4"	2-9/16"	1-17/32"

Series 2307		
A. Pipe Size - NPT	B. Overall Length	C. Height
3/4"	3-19/32"	2-7/8"
1"	3-19/32"	2-7/8"
1-1/4"	6-3/16"	5-1/4"
1-1/2"	8-7/8"	7-3/8"



3/4", 1" NPT



1-1/4", 1-1/2" NPT

### Part Numbers - Series 2305 0.2 to 10 GPM

FLOW RATE GPM-H <sub>2</sub> O	PIPE SIZE			
	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT
0.20	2305-0011-1/4			
0.25	2305-1011-1/4			
0.30	2305-0031-1/4	2305-0031-3/8		
0.40	2305-0041-1/4	2305-0041-3/8		
0.50	2305-1021-1/4	2305-1021-3/8	2305-1021-1/2	
0.60	2305-0061-1/4	2305-0061-3/8	2305-0061-1/2	
0.75	2305-1031-1/4	2305-1031-3/8	2305-1031-1/2	
1.00	2305-1041-1/4	2305-1041-3/8	2305-1041-1/2	2305-1041-3/4
1.25	2305-1051-1/4	2305-1051-3/8	2305-1051-1/2	2305-1051-3/4
1.50	2305-1061-1/4	2305-1061-3/8	2305-1061-1/2	2305-1061-3/4
1.75	2305-1071-1/4	2305-1071-3/8	2305-1071-1/2	2305-1071-3/4
2.00	2305-1081-1/4	2305-1081-3/8	2305-1081-1/2	2305-1081-3/4
2.50			2305-1091-1/2	2305-1091-3/4
3.00			2305-1101-1/2	2305-1101-3/4
3.50			2305-1111-1/2	2305-1111-3/4
4.0			2305-1121-1/2	2305-1121-3/4
4.5				2305-1131-3/4
5				2305-1141-3/4
6				2305-1151-3/4
7				2305-1161-3/4
8				2305-1171-3/4
9				2305-1181-3/4
10				2305-1191-3/4

### Part Numbers - Series 2307 8 to 100 GPM

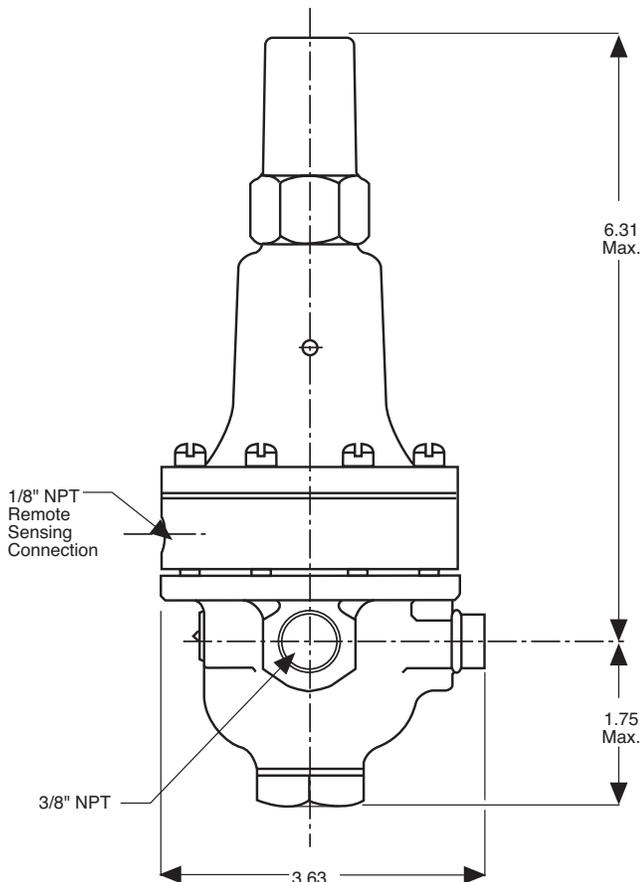
FLOW RATE GPM-H <sub>2</sub> O	PIPE SIZE			
	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT
8	2307-1171-3/4	2307-1171-1		
9	2307-1181-3/4	2307-1181-1		
10	2307-1191-3/4	2307-1191-1		
11	2307-1201-3/4	2307-1201-1		
12	2307-1211-3/4	2307-1211-1		
13	2307-1221-3/4	2307-1221-1		
14	2307-1231-3/4	2307-1231-1		
15	2307-1241-3/4	2307-1241-1		
16	2307-1251-3/4	2307-1251-1		
17	2307-1261-3/4	2307-1261-1		
18	2307-1271-3/4	2307-1271-1	2307-1271-1-1/4	
19		2307-1281-1	2307-1281-1-1/4	
20		2307-1291-1	2307-1291-1-1/4	
21		2307-1301-1	2307-1301-1-1/4	
22		2307-1311-1	2307-1311-1-1/4	
24			2307-1321-1-1/4	
26			2307-1331-1-1/4	
28			2307-1341-1-1/4	
30			2307-1351-1-1/4	
32			2307-1361-1-1/4	
34			2307-1371-1-1/4	
36			2307-1381-1-1/4	
38			2307-1391-1-1/4	
40			2307-1401-1-1/4	
42			2307-1411-1-1/4	
44			2307-1421-1-1/4	
46			2307-1431-1-1/4	
48			2307-1441-1-1/4	
50				2307-1451-1-1/2
55				2307-1461-1-1/2
60				2307-1471-1-1/2
65				2307-1481-1-1/2
70				2307-1491-1-1/2
75				2307-1501-1-1/2
80				2307-1511-1-1/2
85				2307-1521-1-1/2
90				2307-1531-1-1/2
95				2307-1541-1-1/2
100				2307-1551-1-1/2

### ▶ PRODUCT FEATURES

Cla-Val Model CRA Pressure Reducing Control Valves automatically reduce a higher inlet pressure to a lower outlet pressure. They are direct acting, spring loaded, diaphragm type control regulators that operate hydraulically or pneumatically. These valves are held open by the force of the compression spring above the diaphragm, and close when the downstream pressure acting on the underside of the diaphragm exceeds the spring setting. The CRA senses downstream pressure remotely.



### ▶ DIMENSIONS



### ▶ SPECIFICATIONS

<b>Size:</b>	3/8" NPT Threaded
<b>Temperature Range:</b>	Water: to 180°F Max.
<b>Standard Materials*</b>	
Body & Cover:	<del>Low Lead Bronze</del> <b>Stainless Steel</b>
Trim:	Stainless Steel <b>303</b>
Rubber:	Buna-N® Rubber
<b>Pressure Ratings:</b>	<del>Cast Bronze 400 psi Max.</del> <del>Cast Aluminum 275 psi Max.</del> Stainless Steel 400 psi Max.

### ▶ ADJUSTMENT RANGES

<b>psi:</b>	2 - 7
	2 - 30
	15 - 75
	20 - 105
	<b>30 - 300</b>

\*Optional Materials Available

### ► **PRODUCT FEATURES**

Cla-Val Model X141BA Pressure Gauge/Air Bleed Assembly option consists of glycerin-filled pressure gauge, bleeder, and isolation valve. Cla-Val gauges are waterproof, shock resistant, and fully enclosed with a stainless steel case and bronze wetted parts. Ambient temperature ratings are -4 Degrees F to +140 Degrees F (-20 Degrees C to +60 Degrees C). Bleeder and isolation valve are stainless steel construction with 400 psi max working pressure.

All gauges have dual scale (PSI/BAR).

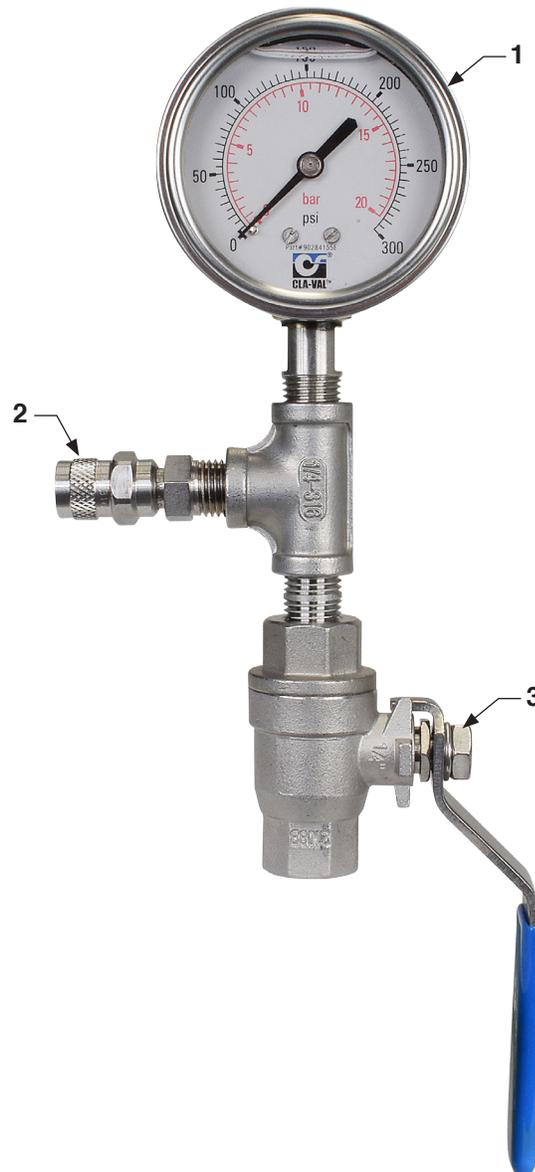
#### **1. Gauge Assembly (2 1/2" Diameter Dial)**

##### **Available Pressure Range**

- 0 - 60 psi
- 0 - 100 psi
- 0 - 160 psi
- 0 - 200 psi
- 0 - 300 psi**
- 0 - 400 psi

#### **2. Bleeder Valve**

#### **3. Isolation Valve**



### ▶ PRODUCT FEATURES

Cla-Val Model X141 Pressure Gauge Option consists of glycerin-filled pressure gauges. Cla-Val gauges are waterproof, shock resistant, and fully enclosed with a stainless steel case and bronze wetted parts. Ambient temperature ratings are -4 Degrees F to +140 Degrees F (-20 Degrees C to +60 Degrees C).

All gauges have dual scale (PSI/BAR) and are supplied with a 1/4" NPT bottom connection.

### ▶ AVAILABLE PRESSURE RANGES

#### X141 Gauge Assembly (2 1/2" Diameter Dial)

**Pressure Range\***

0 - 60 psi

0 - 100 psi

0 - 200 psi

0 - 300 psi

0 - 400 psi



Model X141  
2-1/2" Pressure Gauge

#### X141 Gauge Assembly (4" Diameter Dial)

**Pressure Range\***

0 - 60 psi

0 - 100 psi

0 - 200 psi

0 - 300 psi

0 - 400 psi



Model X141  
4" Pressure Gauge

# 919 PTFE STAINLESS STEEL BRAIDED HOSE



When high temperature performance and excellent chemical compatibility are demanded, Parker 919 PTFE Hose accepts the challenge. This medium pressure hose can withstand temperatures up to 450°F (232°C). A smooth bore natural PTFE core tube and stainless steel braided wire reinforcement tackle corrosive chemicals and abrasive environments.

## FEATURES AND BENEFITS

- Low friction minimizes pressure drops and deposits
- Environmentally safe
- Resists moisture
- Maximum working pressures up to 3,000 psi
- Meets or exceeds SAE 100R14A -919; SAE 100R14B -919B (Static Dissipative PTFE); FDA CFR 177.1550 (Natural Tube)

## Applications:

- Oil burner fronts (boiler)
- Fuel, lube, and oil skids
- Water injection, inlet fogging skids, and water wash
- Fuel control valves
- Compressed air discharge and coolant lines
- Gas analyzer systems
- High pressure steam lines
- Instrument test equipment

## PERFORMANCE CHARACTERISTICS

HOSE COVER MATERIAL	304 Stainless Steel Braid, Extruded Silicone, or Polyurethane
CORE TYPE	Natural PTFE or Static Dissipative PTFE
APPLICATION	Fluid Handling, Chemical Transfer, Manufacturing / Industrial, Medical/Pharmaceutical, Packaging, Instrumentation, Transportation
HOSE I.D. (INCH)	3/16, 1/4, 5/16, 13/32, 1/2, 5/8, 7/8, 1-1/8
HOSE I.D. (MM)	5, 6, 8, 10, 13, 16, 19, 22, 29
INDUSTRY STANDARDS	SAE 100R14A, FDA CFR 177.1550 (natural), SAE 100R14B
MAXIMUM WORKING PRESSURE (PSI)	625 - 3,000
MAXIMUM WORKING TEMPERATURE (C)	135 - 232
MAXIMUM WORKING TEMPERATURE (F)	275 - 450
MEDIA	Various
MINIMUM WORKING TEMPERATURE (C)	-40 to -73
MINIMUM WORKING TEMPERATURE (F)	-40 to -100
VACUUM RATING (INCH OF HG)	10 - 28
HOSE I.D. (SIZE)	-4, -5, -6, -8, -10, -12, -16, -20
HOSE O.D. (INCH)	0.32 - 1.28
HOSE O.D. (MM)	8 - 33
MAXIMUM WORKING PRESSURE (BAR)	43 - 207
MINIMUM BEND RADIUS (INCH)	1-1/2 - 7-1/2
MINIMUM BEND RADIUS (MM)	38 - 406
STYLE	Natural, Static-Dissipative
VACUUM RATING (MM OF HG)	25 - 711
WEIGHT (KG/M)	0.09 - 0.58
WEIGHT (LBS/FT)	0.06 - 0.39
DASH NUMBER	-3 to -20
MAXIMUM WORKING PRESSURE (MPA)	4.3 to 20.7 (dependent on size)
COMPATIBLE FITTINGS	90, 91, or 91N
HOSE TYPE	PTFE Hose or Smoothbore
COLOR	Silver, Red or Black



## 130LTSS1/4X3/8

SKU#: 130LTSS1/4X3/8

### Hose Connector

St. St. 316 Pipe Fitting, Hose Connector 1/4" x Tube Stub 1/4"



BODY MATERIAL	Stainless Steel 316
FITTING TYPE	Adapter
CONNECTION TYPE	Tube Stub
CONNECTION SIZE	3/8"
CROSS REFERENCE	SS-4-HC-A-601
TUBE SIZE	1/4", 3/8"



— MODEL — **X52D**

# Orifice Plate Assembly



- Wafer Design
- Fits ANSI 125, 150, 250, 300
- Easy to use size Selection Chart

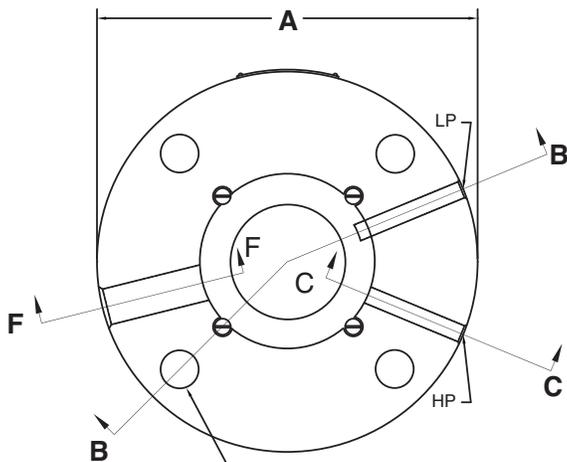
The Cla-Val Model X52D Orifice Plate Assembly is used with Cla-Val flow control valves. The orifice plate is an essential component used to generate a specific, predictable pressure drop in the system. The X52D uses a wafer design holder which offers a compact lightweight assembly that is easy to install. The X52D is designed to be installed to the inlet side of control valve and used for applications with low outlet pressure.

The orifice plate portion of the assembly is made of 302 stainless steel with other materials options also available. The plate is machined to a recommended "square edge". The plate holder portion of the assembly is Ductile Iron standard. Fusion-bonded epoxy coating is an option.

Selecting an orifice plate bore size is made by using charts provided.

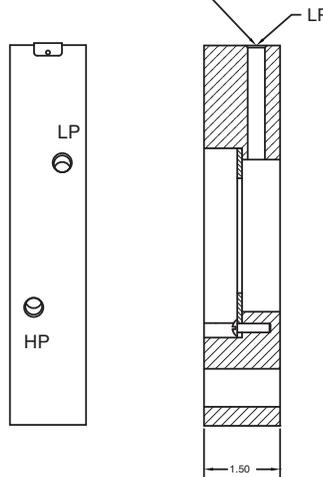
We recommend installation of this assembly with the sensing ports to the side of the pipeline to prevent air pockets and obstructions in the sensing line. Installation adjacent to a butterfly valve is not recommended as the orifice plate assembly may interfere with the opening of this type of valve.

## Dimensions



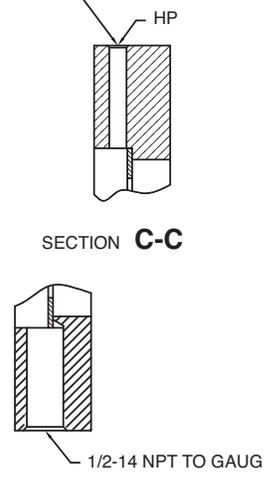
NOTE: BOLT SIZE & NUMBER OF BOLT HOLES VARY WITH PIPE SIZE & PRESSURE CLASS (SEE TABLE BELOW).

1/8-27 NPT TO GAUGE  
(FOR 16" & SMALLER)  
3/8-18 NPT TO GAUGE  
(FOR 18" & LARGER)



SECTION B-B

1/8-27 NPT TO GAUGE  
(FOR 16" & SMALLER)  
3/8-18 NPT TO GAUGE  
(FOR 18" & LARGER)



SECTION C-C

SECTION F-F

NOMINAL PIPE SIZE (INCHES)		1-1/2	2	2-1/2	3	4	6	8	10	12	14	16	18	20	24	
125 LB & 150 LB	DIAMETER OF FLANGE " A"	5.00	6.00	7.00	7.50	9.00	11.00	13.50	16.00	19.00	21.00	23.50	25.00	27.50	32.00	
	BOLT CIRCLE DIAMETER	3.875	4.750	5.500	6.000	7.500	9.500	11.750	14.250	17.000	18.750	21.250	22.750	25.000	29.500	
	NUMBER OF BOLTS	4	4	4	4	8	8	8	8	12	12	12	16	16	20	20
	DIAMETER OF BOLT HOLES	.625	.750	.750	.750	.750	.875	.875	1.000	1.000	1.125	1.125	1.250	1.250	1.375	1.375
250 LB & 300 LB	DIAMETER OF FLANGE " A"	6.13	6.50	7.50	8.25	10.00	12.50	15.00	17.50	20.50	23.00	25.50	—	—	36.00	
	BOLT CIRCLE DIAMETER	4.500	5.000	5.875	6.625	7.875	10.625	13.000	15.250	17.750	20.250	22.500	—	—	32.000	
	NUMBER OF BOLTS	4	8	8	8	8	12	12	16	16	20	20	—	—	24	
	DIAMETER OF BOLT HOLES	.875	.750	.875	.875	.875	.875	1.000	1.125	1.250	1.250	1.375	—	—	1.625	

## Sizing An Orifice Plate Bore: Example

1. In determining a bore size, the nominal flow rate (or range of flow) and the pipe size in which the orifice plate assembly will be installed must be known.
2. Sizing a bore for:

### A constant flow rate:

Select the sizing chart that matches pipe size and locate the flow rate under the nominal column which is closest to required flow; select the corresponding bore size dimension.

#### Example:

A 6" pipe with a desired constant flow of 700 gpm. Using the 6" chart, the closest flow in the nominal column is 670 gpm which has a corresponding bore size of 3.80".

6" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
4.60	490	1960	1100
4.40	435	1740	980
4.20	380	1520	850
4.00	330	1320	750
3.80	300	1200	670
3.60	265	1060	590
3.40	230	920	520
3.20	200	800	450
3.00	175	700	395
2.80	150	600	340
2.60	130	520	295
2.40	110	440	245

### A flow range:

Select the sizing chart that matches pipe size and locate required flow range between the minimum and maximum limits of an orifice bore. Frequently the flow range will fit between more than one bore size. To resolve this, decide the flow rate that system will be operated at most frequently. Locate the flow which is closest to this under the nominal flow column, and select the corresponding bore size dimension.

#### Example:

A 6" pipe with a flow range of 300-1000 gpm. Using the 6" chart, more than one bore size can accommodate this range. The most frequent flow rate will be 500 gpm. Using the nominal flow column, the closest flow is 520 gpm which has a corresponding bore size of 3.40"

6" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
4.60	490	1960	1100
4.40	435	1740	980
4.20	380	1520	850
4.00	330	1320	750
3.80	300	1200	670
3.60	265	1060	590
3.40	230	920	520
3.20	200	800	450
3.00	175	700	395
2.80	150	600	340
2.60	130	520	295
2.40	110	440	245

## Orifice Plate Bore Charts

1 ½" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
1.20	35	142	61
1.00	21	85	37
0.80	13	51	22
0.70	10	38	16
0.60	7	28	12
0.50	5	19	8

2" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
1.55	55	220	125
1.50	50	200	115
1.40	42	168	95
1.20	29	116	65
1.00	19	76	45
.80	12	50	28

## Orifice Plate Bore Charts

2 ½" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
1.87	80	330	180
1.60	55	220	120
1.40	40	160	88
1.20	28	115	62
1.00	19	80	43
.80	12	50	28

4" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
3.00	205	820	450
2.80	170	680	390
2.60	140	560	310
2.40	115	460	260
2.20	96	384	215
2.00	78	312	175
1.80	63	252	140
1.60	49	196	110
1.40	38	152	84
1.20	28	112	62

8" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
6.00	830	3320	1850
5.80	760	3040	1700
5.60	680	2720	1550
5.40	620	2480	1400
5.20	570	2280	1275
5.00	515	2060	1150
4.80	470	1800	1050
4.60	425	1700	950
4.40	385	1540	860
4.20	345	1380	780
4.00	310	1240	700

12" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
9.00	1850	7400	4200
8.50	1575	6300	3500
8.00	1350	5400	3000
7.50	1150	4600	2600
7.00	980	3920	2200
6.50	840	3360	1875
6.00	700	2800	1575
5.50	580	2320	1300
5.00	480	1920	1075
4.50	385	1540	870

3" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
2.29	120	480	270
2.20	105	420	240
2.00	84	336	190
1.80	65	260	145
1.60	50	200	115
1.40	38	152	86
1.20	28	112	62
1.00	19	76	43

6" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
4.60	490	1960	1100
4.40	435	1740	980
4.20	380	1520	850
4.00	330	1320	750
3.80	300	1200	670
3.60	265	1060	590
3.40	230	920	520
3.20	200	800	450
3.00	175	700	395
2.80	150	600	340
2.60	130	520	295
2.40	110	440	245

10" Valve / Pipe Size			
Bore Size	Flow - gpm		
	Min.	Max.	Nominal
7.50	1300	5200	2900
7.00	1075	4300	2400
6.50	880	3520	1950
6.00	730	2920	1650
5.50	600	2400	1350
5.00	490	1960	1100
4.50	390	1560	870
4.00	310	1240	690
3.50	235	940	525
3.00	175	700	385





# Model CDHS-18

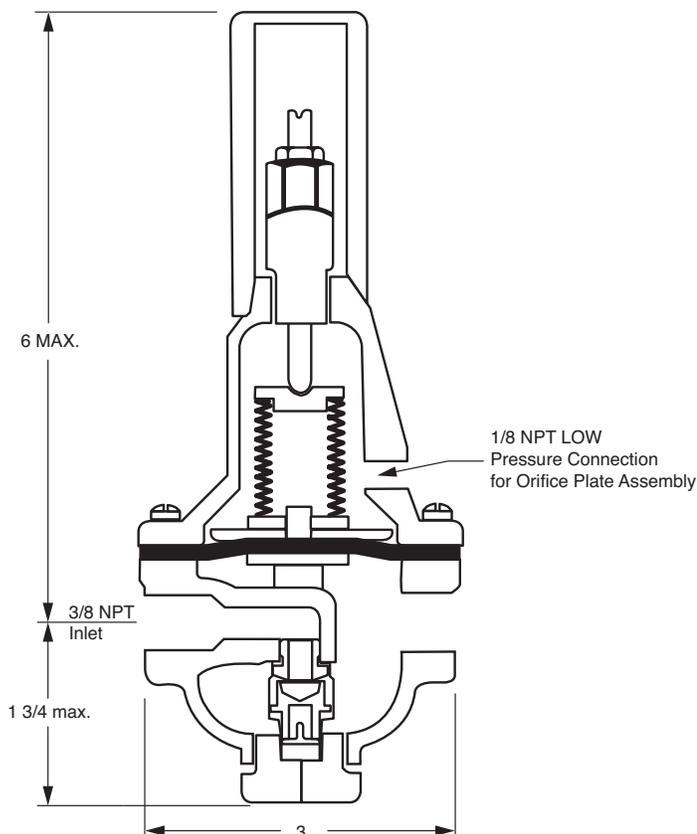
## 3/8" Differential Control

### ▶ PRODUCT FEATURES

Cla-Val Model CDHS-18 Differential Control Valve is a normally-open, spring-loaded, diaphragm-type pilot valve that operates hydraulically and is designed to close on a rising differential pressure. When used as a pilot control with Cla-Val valves it acts as a flow limiting control. The CDHS-18 pilot uses automatic hydraulic control of valve to assure system stability under all conditions. There is one inlet port and two outlet ports in the body for either straight or angle installation. The outlet port senses high pressure created by differential producing device installed downstream of valve. Spring chamber above diaphragm senses lower downstream pressure created by differential producing device.



### ▶ DIMENSIONS



### ▶ SPECIFICATIONS

**Size:** 3/8" NPT Threaded inlet and two outlet ports, with one 1/8" NPT Threaded sensing port

**Temperature Range:** Water: to 180°F Max.

#### Standard Materials\*

Body & Cover: ~~Low Lead Bronze~~ **Stainless Steel**  
Trim: ~~303 and Brass~~ **Stainless Steel**  
Rubber: Buna-N® Rubber

**Pressure Ratings:** ~~Cast Bronze 400 psi Max.~~  
~~Cast Aluminum 275 psi Max.~~  
Stainless Steel 400 psi Max.

### ▶ ADJUSTMENT RANGES

30" to 480" Water Column Differential

\*Optional Materials Available

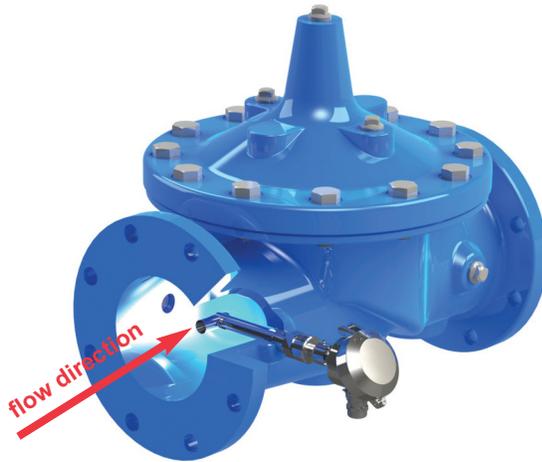


— MODEL — X144D

# e-FlowMeter with Display



- Plug and Play Metering
- Built-In LCD Touch Screen
- Can be factory assembled on a new valve
- Alleviates the need for an in-line meter and the associated installation costs
- IP68 Submersible
- Stainless Steel Construction
- Independent laboratory tested:
  - Utah State University, Imperial College - London



Installation view of the X144D e-FlowMeter

**Note: Consult Factory for Angle Pattern Applications**

The Cla-Val Model X144D e-FlowMeter is a vortex shedding insertion flow meter designed to be retrofitted into a Cla-Val Automatic Control Valve to provide accurate flow measurement data without the need to install a separate meter.

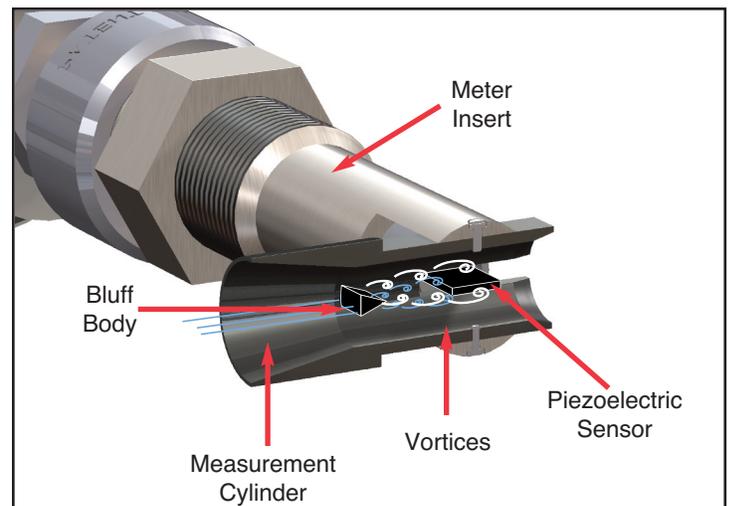
Configured for installation in the inlet tapping of a Cla-Val Automatic Control Valve, the X144D can be used in valves directly downstream of a flow disturbance such as elbows, valves or a reducer. (See page 2 for installation guidelines)

The X144D e-FlowMeter employs an innovative swivel mechanism which allows the meter to be inserted into tappings as small as 1/2-inch. For applications involving installation in close proximity to pump discharge, please consult factory with details.

## Frequency Measurement

The X144D e-FlowMeter uses the vortex shedding method to measure flow. The meter is inserted into the inlet tapping of the valve and the measurement cylinder is oriented parallel to the direction of flow. The flow enters the measurement cylinder where it encounters the bluff body, generating vortices, which in turn, deflects off the piezoelectric sensor.

The sensor counts the vortices and communicates the data to the meter's integral circuit board. The flow data signal is converted to 4-20mA, or transistor (NPN) pulse, depending on the desired application.



# Installation Guidelines and Typical Applications

## Installation Locations

For optimum performance, it is recommended that the valve in which the X144D e-FlowMeter is installed be located as shown below.

Optimum Installations

**Inlet Tapping**

**(vertical rise) Downstream of an Elbow**

**Outside Elbow (top view)**

**> 5 Pipe Diameters (top view)**  
Either Inlet Tapping

Install Isolation Valve (any style) a minimum of 5 pipe diameters upstream of the control valve

For installation directly onto the inlet flange of the control valve or where less than 5 pipe diameters upstream is the only option, an Isolation Valve **MUST** be a full ported, wide open Gate or Sluice style valve. In this scenario, Isolation Valve **MUST NOT** be a Butterfly style valve.

**Pipe Reducer Upstream**

## Typical Applications

The X144D e-FlowMeter is ideal for installation in any application where metering is desired.

Combining additional Cla-Val electronic products with the X144D e-FlowMeter provides even more access to valve performance data installed in remote locations.

Data Acquisition and Storage plus Power

Powered by an X143IP or X143MP Power Generator

**VC-22D**

**Output to SCADA, PLC, data logger, etc.**

## Data Acquisition and Storage using Cla-Val Power Generator

- The X144D e-FlowMeter connects to most commercially available loggers with the choice of 4-20mA or pulse output
- The VC-22D Controller and X145 e-Display are ideal companions to the X144D e-flowMeter, providing access to real-time data
- The VC-22D Controller, e-Display and e-FlowMeter can be powered by the X143 Series Power Generators

Typical Menus

**Display Menu**

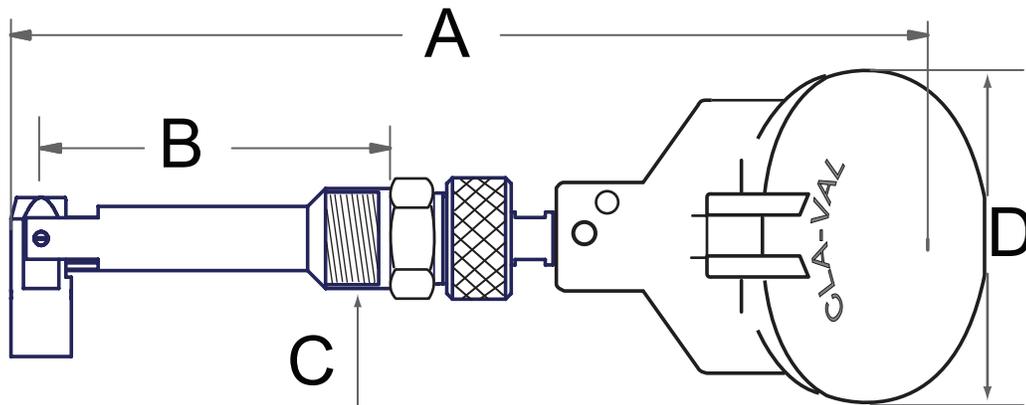
**Settings Menu**

## Installation Notes:

- Consult factory for other installation configurations
- Do not use butterfly valves as isolation valves adjacent to X144D installations

## X144D Dimensions

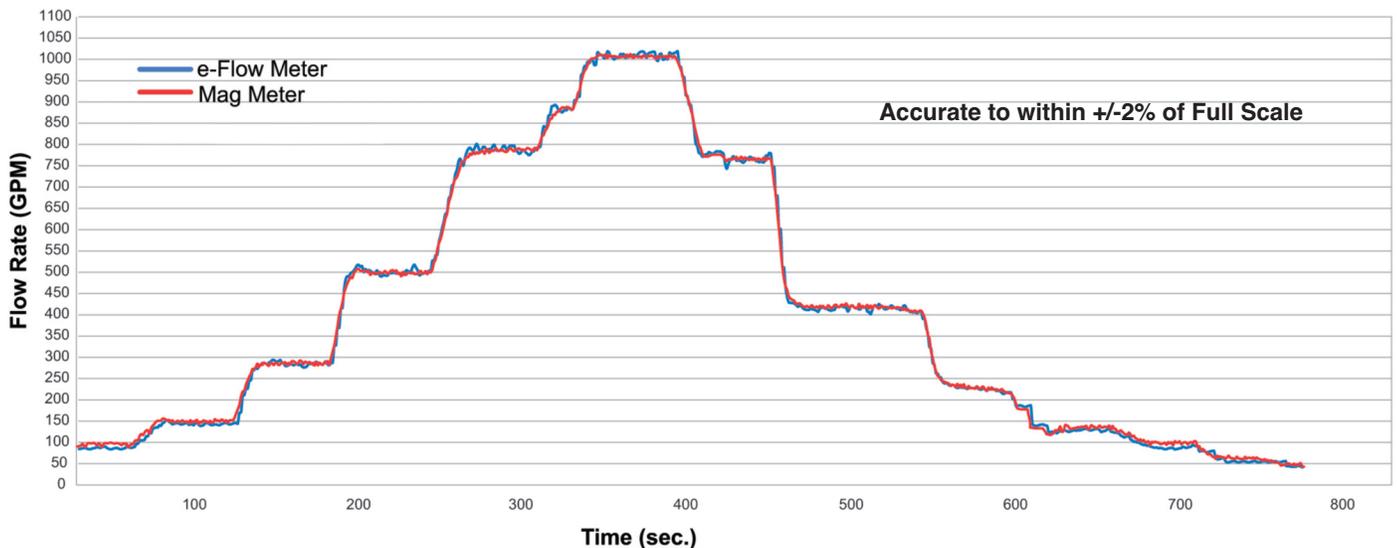
X144D Sizes		1			2		3		4						
Full Port Valve Sizes (inches)		2	2-1/2	3	4	6	8	10	12	14	16	18	20	24	30
Reduced Port Valve Sizes (inches)		4	4	4	6	8	10	12	14	16	18	20	24	CF	CF
Overall Length (in inches)	A	8.85	8.85	8.85	9.45	9.45	13.18	13.18	17.91	17.91	17.91	17.91	17.91	17.91	17.91
Insertion Length (in inches)	B	2.3	2.3	2.3	2.8	2.8	6.8	6.8	11.25	11.25	11.25	11.25	11.25	11.25	11.25
Pipe Thread (NPT)	C	1/2	1/2	1/2	3/4	3/4	1	1	1	1	1	1	1	1	1
Overall Width (in inches)	D	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25



\*2" X144D e-FlowMeter may be installed on new valves only. Consult factory for larger applications

## Typical Performance

### X144D e-FlowMeter vs. Mag Meter



## Product Details

### Insertion Tool and Locking Ring

- Required for installation
- Tool allows the proper installation and alignment of the bluff body to be parallel to upstream flow

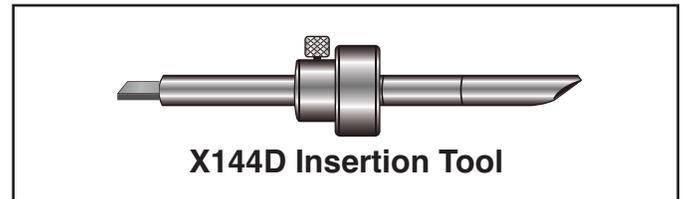
### Power Requirement

- 12/24 VDC, 1.0 Watts minimum

### X144D e-Flow Meter Sizing

- The X144D threads directly into the inlet tapping of a Cla-Val Control Valve. The size of the e-FlowMeter is dependent on the specific valve size for which it has been calibrated - no additional fittings are required.

**See dimension chart on previous page.**



### Cabling

- The unit is supplied with 20 feet of shielded cable.

### Maximum Operating Pressure : 400 PSI

### X144D e-FlowMeter Operational Flow Range = from 0.5 ft/s to 20 ft/s

### X144D e-FlowMeter Analog Range (4-20mA Scaling): Factory Settings

Port Style	Line Size inches (mm)	**2" (50) (100-49 Body)	2-1/2" (65)	3" (80)	4" (100)	6" (150)	8" (200)	10" (250)	12" (300)	14" (350)	16" (400)	18" (450)	20" (500)	24" (600)	30" (750)	
Full Port Valves 4mA = 0 (GPM - l/s)	20mA Range (GPM)	260	375	575	1000	2250	3900	6000	8750	10500	14000	17500	22000	31000	52000	
	20mA Range (l/s)	16.4	23.7	36.3	63.1	140	245	380	550	660	880	1100	1390	1950	3280	
Full Port Pulse Weight*	Gal/Pulse	5	6.5	9.5	17	38	65	100	150	175	235	290	365	515	865	
	l/Pulse	19	25	36	65	145	245	380	565	660	890	1100	1380	1950	3275	
Reduced Port Valves 4mA = 0 (GPM- l/s)	20mA Range (GPM)	<b>Not Available</b>				675	1600	2900	4500	5650	7750	9350	<b>Consult Factory</b>			
	20mA Range (l/s)	<b>Not Available</b>				42.5	100	180	285	355	490	590				
Reduced Port Valves Pulse Weight*	Gal/Pulse	<b>Not Available</b>				11.5	26	48	75	95	130	155				
	l/Pulse	<b>Not Available</b>				44	99	180	285	360	495	585				

\* Pulse Width = 250ms

\*\*2" X144D e-FlowMeter may be installed on new valves only



E-X144D (R 02/2019)

## CLA-VAL

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# Three-Way Solenoid Valve



- No Minimum Operating Pressure Differential required
- Simple Design for Long Service Life
- Brass or Stainless Steel Bodies 1/8" and 1/4" NPT
- Mountable in Any Position
- Pressure Connections in Valve Body Allow Inline Piping

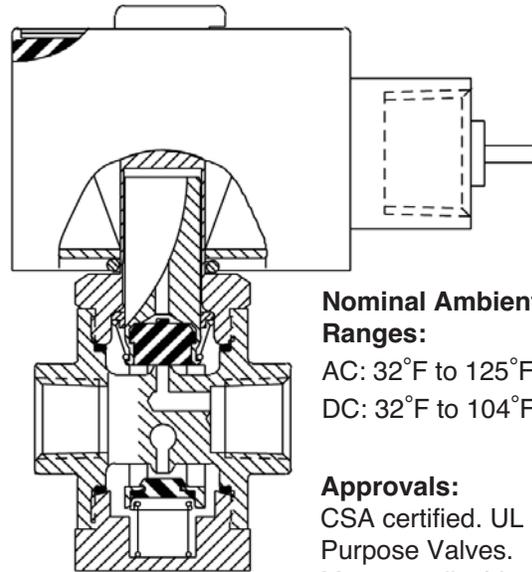
The Cla-Val Model CS3X is a three-way solenoid control providing on/off remote control of larger Cla-Val main valves. The non-metallic, molded-coil enclosure is rated explosion-proof. This three-way solenoid control intercepts other pilot controls and closes the main valve. The solenoid shut-off function is specified either de-energized to open main valve (normally open), or energized to open main valve (normally closed). The CS3X solenoid control also provides remote activation of other functions on Cla-Val control valves, such as selection between two pilot controls with different setpoints. Requiring simple control logic, the CS3X is an easy answer to many complex fluid control problems. A screw-type manual operator to simulate the energized position is optional and specified with suffix letter M. For non-hazardous applications, a general purpose, weather tight enclosure is available, specify Model CS3S or CS3SM.

## Construction

Valve Parts in Contact with Fluid		
Body	Brass	Stainless Steel
Seals and Disc	NBR or Cast UR, as Listed	
Core Tube	Stainless Steel	
Core and Plug Nut	Stainless Steel	
Core Springs	Stainless Steel	
Shading Coil	Copper	Silver
Disc-Holder	Delrin	

## Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption			
	DC Watts	Watts	AC	
			VA Holding	VA Inrush
F	10.6	6.1	16	30



## Nominal Ambient Temperature Ranges:

AC: 32°F to 125°F (0°C to 52°C)  
DC: 32°F to 104°F (0°C to 40°C)

## Approvals:

CSA certified. UL listed General Purpose Valves.  
Meets applicable CE directives.

## Solenoid Control

Voltages:

110, 220 -50Hz AC

24, 120, 240, 480 - 60Hz AC

6, 12, 24, 120, 240 DC

Others available at additional cost

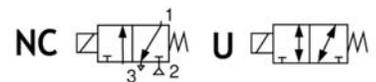
Max. operating pressure differential: 200 psi

Manual operator available at additional cost.

## Solenoid Enclosures

Standard Model CS3S, CS3SM: Watertight, NEMA Types 1, 2, 3, 3S, 4, 4X.

Optional Model CS3X, CS3XM: Explosion Proof and Watertight, NEMA Types 3, 3S, 4, 4X, 6, 6P, 7, and 9.





MODEL

VC-22D

# IP-68 Electronic Valve Controller



Model VC-22D  
IP-68 Valve  
Controller

## Product Description

The Cla-Val VC-22D is designed to provide state of the art valve control for a variety of fluid control parameters. Intuitive programming screens allow easy and fast programming for standard and customized applications such as flow, pressure, level, or position. Complete capabilities allow either stand-alone operation or easy integration into SCADA systems with standard wired signals or Modbus (TCP or RTU) communications.

For ease of use, the controller is pre-loaded with a wide variety of typical valve applications (ValvApps™). Additional custom ValvApps™ can be created by Cla-Val to meet any operational requirement. For example 2 or 3 modulating control functions can be combined into one custom ValveApp.

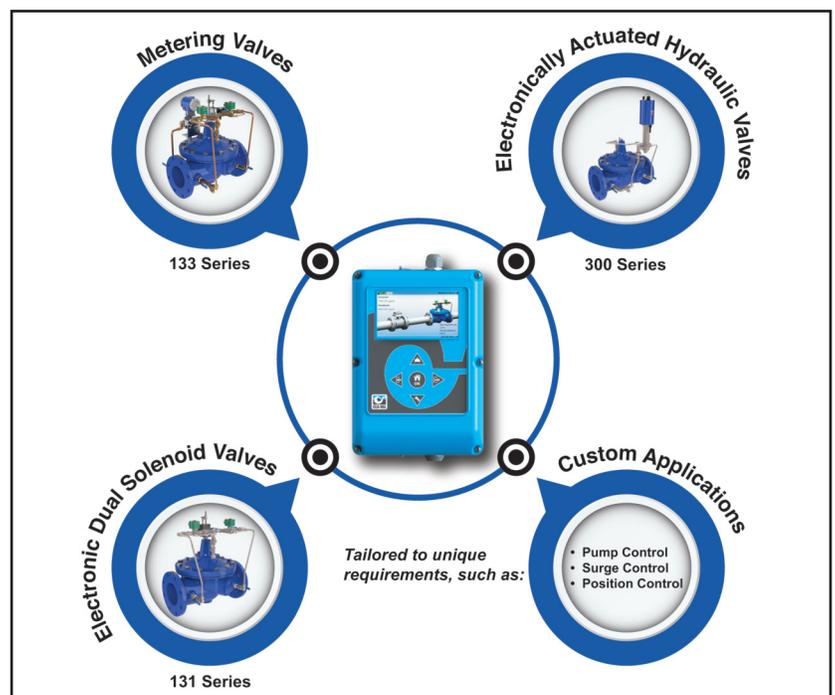
## Pre-Loaded Typical ValvApps™ include:

- Flow Control with Mag Meter or e-Flowmeter Feedback
- Pressure Control with Upstream or Downstream Feedback
- Position Control with Position Feedback
- Modulating Level Control with Level and Position or Flow Feedback
- Metering Valve with Position and DP or P1-P2 Feedback
- Ratio Control with 2 Flowmeter feedbacks
- Altitude On/Off Level Control with Delayed Opening and Level Feedback
- Pressure Management with CRD-34 Electronic Pilots and Flow Feedback

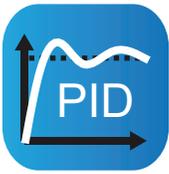
- Provides remote or local setpoint control for valves in a variety of fluid applications
- Highly accurate and stable valve control
- Controller is supplied with pre-loaded ValvApps™ for most common valve functions
- Custom ValvApps™ can be created for Multi-Function Control
- Simple Control Curves graphical programming
- High resolution color screen graphics with color-coded indicators
- Communications via standard 4-20 mA retransmission and relays or by Modbus RTU/TCP
- Internal logging : programmable and download to USB
- Less than 3 Watts power: solar or hydro powered remote valve control
- Simple and intuitive programming and set-up
- IP-68 Submersible (verified by independent lab)



## Controller Applications

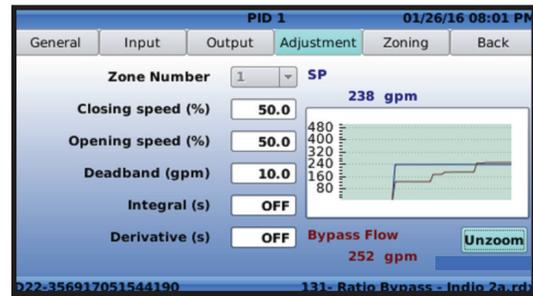


# VC-22D Valve Functions



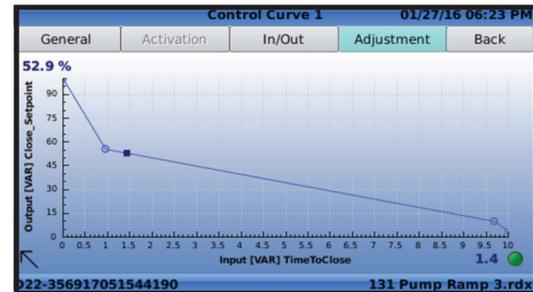
## PID Control

Used in maintaining a control valve at setpoint, multiple PID loops can be programmed with each of them offering local or remote setpoints. A real-time chart view helps to visualize valve response and fine tune valve response. Programmable setpoint ramping prevents hydraulic shocks.



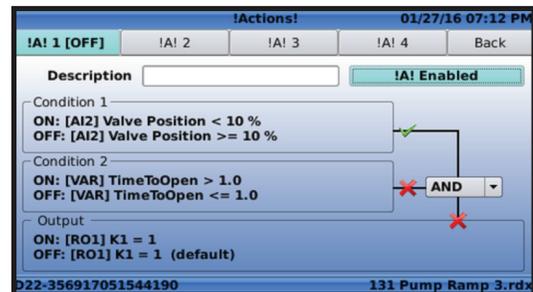
## Control Curves

Offers an easy way to create a relationship between two system variables. Using graphical functions, the user draws the control curve relationship linking pressure, flow, level, and/or time directly on the screen. Up to four control curves allowing independent pump control valve opening and closing or tailored modulating level control.



## Actions

Used to take "action" (or alarms) when programmable conditions (1 or 2) are met by forcing an output relay, solenoid, or 4-20 mA output. The closing relay can be used to send an alarm to SCADA. Up to four actions can be programmed including deadband.



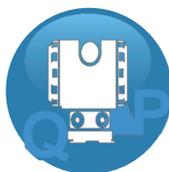
## Retransmission

Used to retransmit any input signal, variable, or calculation to a SCADA system. Up to four input signals such as pressure, flow, or level can be redirected through the 4-20 mA outputs.



## Totalizer

Keeps track of total volume as a function of time. Customizable units & reset functionality allow for simplified set-up and configuration. Can be used for volume (or batch) control applications limiting water volume taken from supplier per day or into tank trucks.



## DP Metering

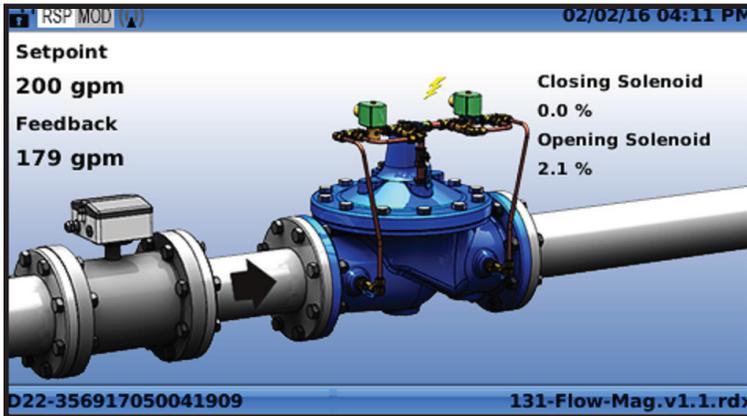
A built-in function to calculate flowrate based on valve position and DP. The returned flow value can be displayed and controlled without a separate flow meter. A metering ValvApp with this feature is included in the standard internal library. All standard Cla-Val valve sizes curves are included.



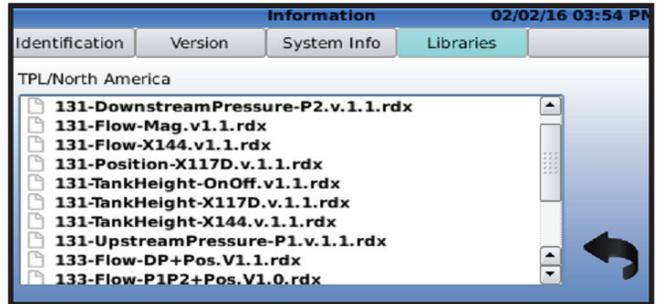
## Data Logging and Log File

All input and output values are logged according to a programmable schedule. Default logging is every 5 minutes but can be as low as 1 minute or at customized intervals. 4 GB SD card memory allows greater than 80,000,000 values storage. Data is stored in MS-Excel (CSV) readable format. Transfer is by USB.

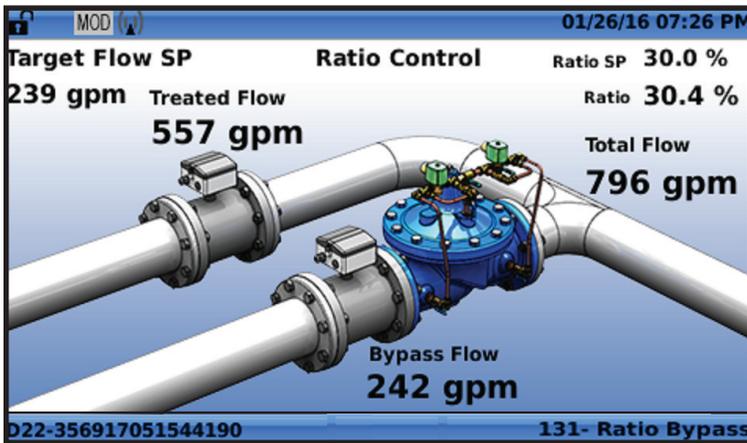
# Standard & Custom ValvApps™



## Standard ValveApps™



At startup the user can select from an internal library of Standard ValveApps designed for the most common control applications such as flow, pressure, level, position, or pressure management. Pre-configured graphics displays actual valve installation and minimizes startup time.



## Custom ValveApps™

Special requirements can easily be handled by importing Custom ValveApps from the USB port. Program files may be either pre-programmed into the controller or sent by email and downloaded into the controller. All within minutes. Typical non-standard applications include ratio (blending), multiple functions, multiple inputs, custom graphics, differential pressure, temperature, salinity, electrical conductivity, parallel valves, etc.



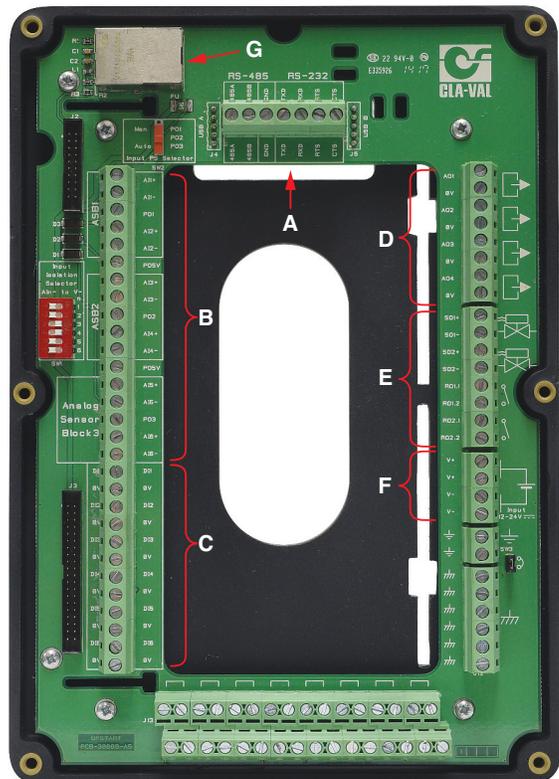
# Inputs, Outputs & Communications

## Features

- A) RS-232/485
- B) Six 4-20 mA Analog Inputs
- C) Six Digital inputs
- D) Four 4-20 mA Analog Outputs
- E) Two Solenoid + Two Relay Outputs
- F) 12 - 24 VDC Power
- G) Ethernet Connection (External)



Typical installation with mounting bracket



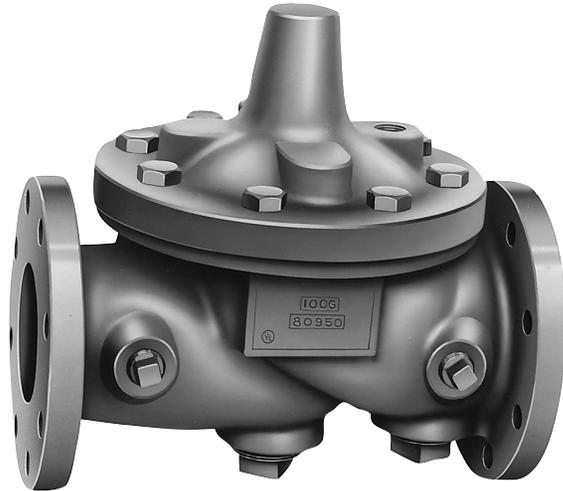
# VC-22D Valve Controller Product Specifications

Inputs	Power Requirements
6x Analog 4-20 mA	12 <span style="border: 1px solid red; padding: 2px;">24 VDC Input</span>
6x Digital (dry contact max 5 VDC @ 0.1A - 100 Hz max)	Consumption: 1.5 W standby, 3 W in use
Reverse polarity and short circuit protection	Max 32 VDC over voltage protection
Optocoupler isolation @ CMR 1000 V - 2 wires insulated	Reverse polarity and short circuit protection
Outputs	Communications
4x 4-20 mA Analog	Modbus TCP / Ethernet
2x Solenoid solid state relay 24 VDC @ 0.5 A - binary or proportional	Modbus RTU / RS-485
2x Mechanical relay 24 VDC - 240 VAC @ 1 A max.	USB
Reverse polarity & short circuit protection	VNC
Control Parameters	GPRS modem quad band (consult factory)
Proportional band 0-100% / independent opening and closing	Enclosure & Display
Deadband 0 - full scale	8.75" (223 mm) H x 6" (153 mm) W x 3.5" (89 mm) D
Cycle time 0 - 60 sec	Weight 3 lbs (1.4 kg)
Integral and Derivative available	PC / ABS plastic UV resistant
Output limits - % of Cycle Time / Independent opening and closing	IP-68 Connections - cable glands, USB, Ethernet
Multi-zone tuning - up to 4 zones	5 mechanical pushbuttons
4x PID loops	Silicon sealed polycarbonate screen
4x Actions or Alarms - 1 or 2 triggering conditions	4.3" color display 480 x 272 - 24 bit
4x Control Curves (graphically programmed)	Password 5-digit
Setpoint ramping	Mounting bracket - anodized aluminum
Input signal filter 0-100%	IP-68, 2 meters 1 month
Flow Totalizer (usable for volume control)	Temperature range 14 to 158 F (-10 to 70 C)
Logging & Data Storage	PCB coating - 90% RH, non condensing
Configurable logging intervals	Optional Power Converter / Supply
Real-time back-up on 4 GB SD card	IP-68; Used to operate AC solenoids
Memory protection 10 year lithium battery	Panel Mount; Used to operate AC solenoids
CSV file format MS-Excel compatible	
File transfer to USB memory	

# ***CLA-VAL WARRANTY***

## **3 Year Warranty on Cla-Val Quality Products**

### **This is a Limited Warranty**



Automatic valves and controls as manufactured by Cla-Val are warranted for three years from date of shipment against manufacturing defects in material and workmanship that develop in the service for which they are designed, provided the products are installed and used in accordance with all applicable instructions and limitations issued by Cla-Val. Electronic components manufactured by Cla-Val are warranted for one year from the date of shipment.

We will repair or replace defective material, free of charge which is returned to our factory, transportation charges prepaid, provided that after inspection the material is found to have been defective at time of shipment. The warranty is expressly conditioned on the purchaser's giving Cla-Val immediate written notice upon discovery of the defect.

Components used by Cla-Val, but manufactured by others, are warranted only to the extent of that manufacturer's guarantee.

This warranty shall not apply if the product has been altered or repaired by others, and Cla-Val shall make no allowance or credit for such repairs or alterations unless authorized in writing by Cla-Val.

### **Disclaimer of Warranties & Limitation of Liability**

The foregoing warranty is exclusive and in lieu of all other warranties and representations whether expressed, implied, oral or written, including but not limited to, any implied warranties or merchantability or fitness for a particular purpose. All such other warranties and representations are hereby cancelled.

Cla-Val shall not be liable for any incidental or consequential loss, damage or expense arising directly or indirectly from the use of the product. Cla-Val shall not be liable for any damages or charges for labor or expense in making repairs or adjustments to the product. Cla-Val shall not be liable for any damages or charges sustained in the adaptation or use of its engineering data and services.

No representative of Cla-Val may change any of the foregoing or assume any additional liability or responsibility in connection with the product.

The liability of Cla-Val is limited to material replacements F.O.B. Newport Beach, California.

#### **CLA-VAL**

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92659-0325

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# Submittal Data Cover Sheet

Date: 4/16/2019



**Model No.:** 50G-13

**Description:** Pressure Relief Valve

**Job/Project Name:** Navajo Gallup Reach 26.1 26.2 PRV Vault

**Company:** Pipestone Equipment

**Contact:** Kira Witwer

**Engineering Firm:** Souder, Miller and Associates

**Address:** 676 Moss Street

**Project Engineer:** Andrew Robertson

**City:** Golden **State:** CO **Zip:** 80401

**Fluid To Be Handled:** Water

**Specific Gravity:** 1

**Temperature:** Ambient

**Max. Flow Rate:** 1620 GPM

**Min. Flow Rate:** 115 GPM

## Main Valve

**Valve Size:**

6"

**Main Valve Body & Cover:**

Ductile Iron ASTM A-536

**End Details:**

Flanged Ductile Iron ANSI B16.42 Class 300

**Base Valve:**

100-01 Hytrol

**Main Valve Trim:**

(Disc Guide, Seat & Cover Bearings)

316 Stainless Steel Anti-Cavitation Trim

**Pressure Rating:**

250/350 Class @ 400 psi Max.

**Quantity:**

1

**Valve Pattern:**

Globe

**Elastomers:** (Max Temperature 180°F)

Buna-N® Synthetic Rubber

## Pilot System

**Hydraulic Pilot System Adjustment Range(s)**

**Electronic Pilot Spring Ranges**

CRL-60 100-300 PSI

**Tubing & Fittings**

Stainless Steel Braided Flex Hose

**Pilot System Configuration**

316 SST with 316 SST Trim

## Electrical

**Electrical - Voltages & Accessories**

N/A

**VC-22D Electronic Valve Controller**

N/A

**VC-22D Power Converter**

N/A

## Features & Options

- Strainer:**
- Pilot System Isolation Valves
- Closing Speed Control
- Opening Speed Control
- Pilot System Check Feature
- Independent Operating Pressure
- Atmospheric Drain
- Fusion Bonded Epoxy Coating 12 mil
- X144D e-FlowMeter
- Reservoir Gauge with Tester
- X145 External Display

**Pressure Gauges:**

Inlet: 2-1/2" 0 - 300 psi

Outlet:

Cover:

**Valve Position Transmitter:**

N/A

**Valve Position Indicator:**

N/A

**Stem Option:**

Dura-Kleen® Stem

**Limit Switch (SPDT):**

X105LCW - CL Position Weather Proof

**Differential Pressure Transmitter:**

N/A

**Pressure Transmitter:**

Inlet: N/A

Outlet: N/A

**Orifice Plate:**

N/A Bore: \_\_\_\_\_

**Power Generator:**

N/A

**X43 H-Style Strainer:**

N/A

**X43 H-Style Strainer Flange:**

(Ductile Iron ASME B16.42)

### Notes:

Factory Set CRL at 184psi

**Cla-Val Contact:**

**Phone:**

**E-Mail:**

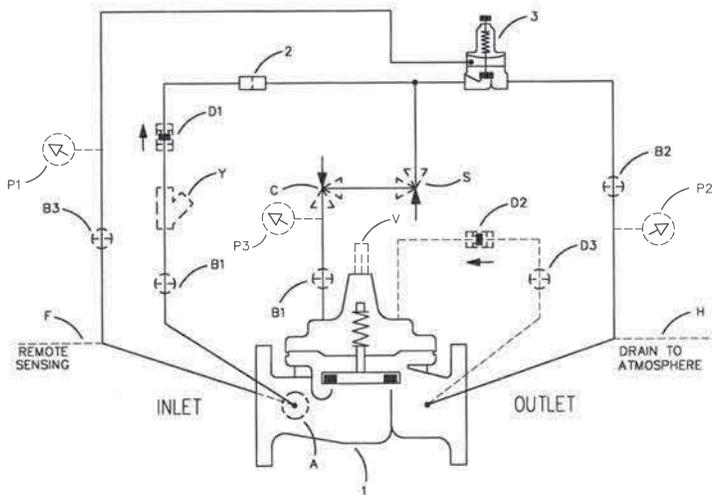
# Pressure Relief Valve

- **Accurate Pressure Control**
- **Optional Check Feature**
- **Fast Opening to Maintain Line Pressure**
- **Slow Closing to Prevents Surges**
- **Completely Automatic Operation**

The Cla-Val Model 50-13 Pressure Relief Valve is a hydraulically operated, pilot-controlled, modulating valve designed to maintain constant upstream pressure within close limits. This valve can be used for pressure relief, pressure sustaining, back pressure, or unloading functions in a by-pass system.

In operation, the valve is actuated by line pressure through a pilot control system, opening fast to maintain steady line pressure but closing gradually to prevent surges. Operation is completely automatic and pressure settings may be easily changed.

If a check feature is added, and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber, closing the valve to prevent return flow.



## Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X58C Restriction Assembly
3	CRL Pressure Relief Control

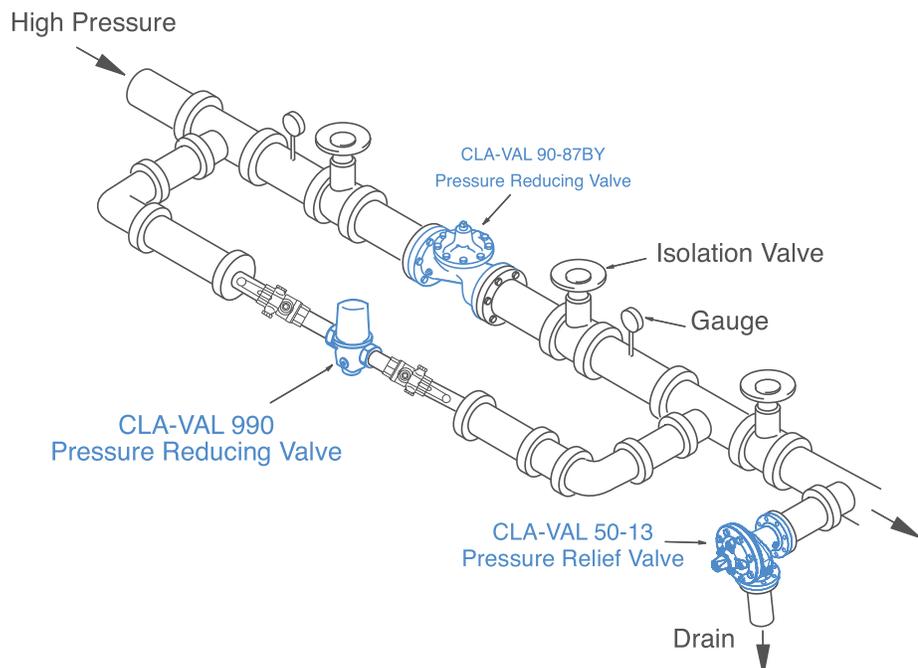
## Optional Features

Item	Description
A	<del>X46A Flow Clean Strainer</del>
B	CK2 (Isolation Valve)
D	<del>Check Valves with Isolation Valve</del>
C	CV Flow Control (Closing)
F	<del>Remote Pilot Sensing</del>
H	<del>Drain to Atmosphere</del>
S	<del>CV Speed Control (Opening)</del>
Y	X43 "Y" Strainer

## Typical Applications

### Pressure Relief Service

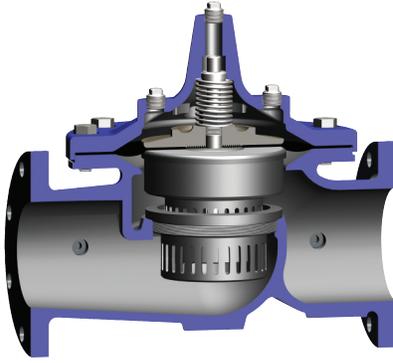
This fast opening, slow closing relief valve provides system protection against high pressure.





— MODEL — **100-01KO**

# Anti-Cavitation Hytrol Valve



- Virtually Cavitation Free Operation
- Severe Service Design - High Pressure Differentials
- Reduced Noise and Vibration
- 316 Stainless Steel Disc Guide and Seat Standard
- Drip-Tight, Positive Sealing
- Service Without Removal From Line
- Retrofit to Standard Hytrol Valves



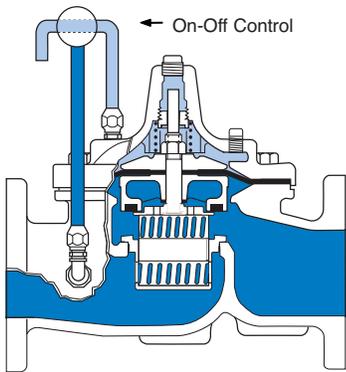
The Cla-Val Model 100-01KO Anti-Cavitation Hytrol Valve is designed for applications where there is a high potential for damage from cavitation. Specify this valve series for a wide variety of control valve applications having pressure differentials up to 300 psid or for relief valves having atmospheric discharge up to 150 psid.

The 100-01KO Hytrol main valve provides optimum internal pressure control through a unique anti-cavitation trim design. Constructed of 316 Stainless Steel, the seat and disc guide trim components feature dual interlocked sleeves containing radial slots that deflect internal flow to impinge upon itself in the center of the flow path, harmlessly dissipating the potential cavitation damage. This unique design also lessens the possibility of fouling if large particles in the water are present due to the large flow path of the radial slots.

The 100-01KO Hytrol is the basic valve used in Cla-Val Automatic Control Valves for high differential applications requiring remote control, pressure regulation, solenoid operation, rate of flow control, or liquid level control.

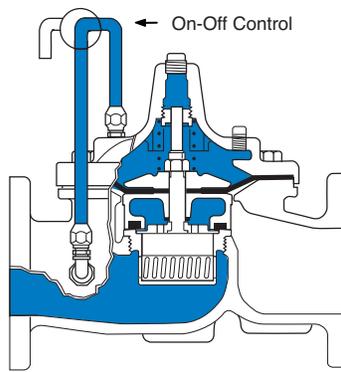
The Anti-Cavitation Trim components can be retrofitted to existing valves if the application indicates an appropriate need. Please consult factory for details.

## Principle of Operation



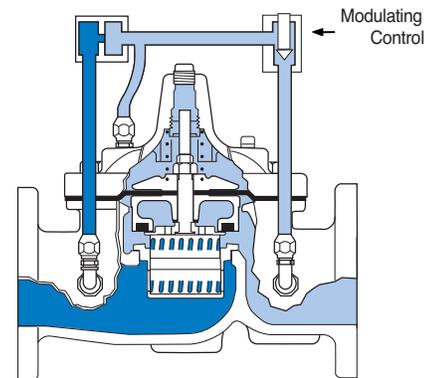
### Full Open Operation

When pressure in the cover chamber is relieved to a zone of lower pressure, the line pressure at the valve inlet opens the valve, allowing full flow.



### Tight Closing Operation

When pressure from the valve inlet is applied to the cover chamber, the valve closes drip-tight.



### Modulating Action

The valve holds any intermediate position when operating pressures are equal above and below the diaphragm. A Cla-Val "Modulating" Pilot Control will allow the valve to automatically compensate for line pressure changes.

# Specifications 100-01KO Hytrol Valve with KO Anti-Cavitation Trim

## Patterns & End Connections

Pattern	Globe	Angle	Grooved End
Size	1-1/4" - 36" 32 - 900 mm	1-1/4" - 16" & 24" 32 - 400 & 600 mm	1-1/2" - 8" 40 - 200 mm

## Operating Temp. Range

Fluids
-40 to 180 F

## Pressure Ratings (Recommended Maximum Pressure - psi)

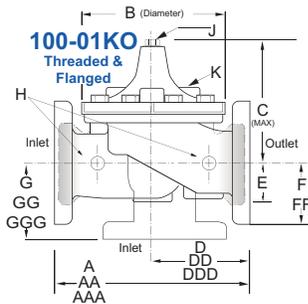
Valve Body & Cover		Pressure Class				
		Flanged	Grooved	Threaded		
Grade	Material	ANSI Standards*	150 Class	300 Class	300 Class	End‡ Details
ASTM A536	Ductile Iron	B16.42	250	400	400	400
ASTM A216-WCB	Cast Steel	B16.5	285	400	400	400
UNS 87850	Bronze	B16.24	225	400	400	400

Note: \* ANSI standards are for flange dimensions only.  
Flanged valves are available faced but not drilled.  
‡ End Details machined to ANSI B2.1 specifications.

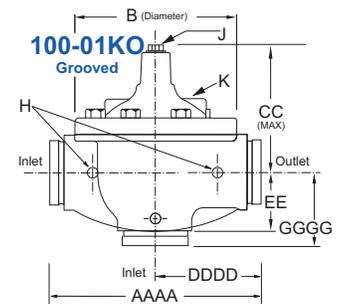
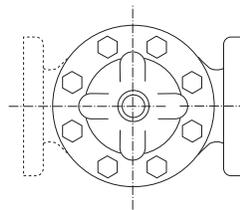
## Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	1-1/4" - 36" 32 - 900 mm	3" - 16" 32 - 900 mm	3" 16" 32 - 900 mm
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Stainless Steel is Standard		
Disc	Buna-N® Rubber		
Diaphragm	Nylon Reinforced Buna-N® Rubber		
Stem, Nut & Spring	Stainless Steel		

For material options not listed consult factory.



Note:  
Consult Factory  
on 10", 12", 16"  
angle pattern



Valve Size (Inches)	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36
A Threaded	7.25	7.25	9.38	11.00	12.50	—	—	—	—	—	—	—	—	—	—	—	—
AA 150 ANSI	—	8.50	9.38	11.00	12.00	15.00	20.00	25.38	29.75	34.00	39.00	41.38	46.00	52.00	61.50	63.00	72.75
AAA 300 ANSI	—	9.00	10.00	11.62	13.25	15.62	21.00	26.38	31.12	35.50	40.50	43.50	47.64	53.62	63.24	64.50	74.75
AAAA Grooved End	—	8.50	9.00	11.00	12.50	15.00	20.00	25.38	—	—	—	—	—	—	—	—	—
B Diameter	5.62	5.62	6.62	8.00	9.12	11.50	15.75	20.00	23.62	28.00	32.75	35.50	41.50	45.00	53.16	56.00	66.00
C Maximum	5.50	5.50	6.50	7.56	8.19	10.62	13.38	16.00	17.12	20.88	24.19	25.00	39.06	41.90	43.93	54.60	59.00
CC Maximum Grooved End	—	4.75	5.75	6.88	7.25	9.31	12.42	14.62	—	—	—	—	—	—	—	—	—
D Threaded	3.25	3.25	4.75	5.50	6.25	—	—	—	—	—	—	—	—	—	—	—	—
DD 150 ANSI	—	4.00	4.75	5.50	6.00	7.50	10.00	12.69	14.88	17.00	19.50	20.81	—	—	30.75	—	—
DDD 300 ANSI	—	4.25	5.00	5.88	6.38	7.88	10.50	13.25	15.56	17.75	20.25	21.62	—	—	31.62	—	—
DDDD Grooved End	—	—	4.75	—	6.00	7.50	—	—	—	—	—	—	—	—	—	—	—
E	1.12	1.12	1.50	1.69	2.06	3.19	4.34	5.31	9.25	10.75	12.62	15.50	12.95	15.00	17.75	21.31	24.56
EE Grooved End	—	2.00	2.50	2.88	3.12	4.25	6.00	7.56	—	—	—	—	—	—	—	—	—
F 150 ANSI	—	2.50	3.00	3.50	3.75	4.50	5.50	6.75	8.00	9.50	10.50	11.75	15.00	16.50	19.25	22.50	28.50
FF 300 ANSI	—	3.06	3.25	3.75	4.13	5.00	6.25	7.50	8.75	10.25	11.50	12.75	15.00	16.50	19.25	24.00	30.00
G Threaded	1.88	1.88	3.25	4.00	4.50	—	—	—	—	—	—	—	—	—	—	—	—
GG 150 ANSI	—	4.00	3.25	4.00	4.00	5.00	6.00	8.00	8.62	13.75	14.88	15.69	—	—	22.06	—	—
GGG 300 ANSI	—	4.25	3.50	4.31	4.38	5.31	6.50	8.50	9.31	14.50	15.62	16.50	—	—	22.90	—	—
GGGG Grooved End	—	—	3.25	—	4.25	5.00	—	—	—	—	—	—	—	—	—	—	—
H NPT Body Tapping	0.375	0.375	0.375	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
J NPT Cover Center Plug	0.25	0.25	0.50	0.50	0.50	0.75	0.75	1.00	1.00	1.25	1.50	2.00	1.00	1.00	1.00	2.00	2.00
K NPT Cover Tapping	0.375	0.375	0.375	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
Stem Travel	0.40	0.40	0.60	0.70	0.80	1.10	1.70	2.30	2.80	3.40	4.00	4.50	5.10	5.63	6.75	7.50	8.50
Approx. Ship Weight (lbs)	15	15	35	50	70	140	285	500	780	1165	1600	2265	2982	3900	6200	7703	11720

Cla-Val Control Valves with KO ANTI-CAVITATION Trim operate with maximum efficiency when mounted in horizontal piping with the main valve cover up. We recommend isolation valves be installed on inlet and outlet for maintenance. Adequate space above and around the valve for service personnel should be considered essential. A regular maintenance program should be established based on the specific application data. However, we recommend a thorough inspection be done at least once a year. Consult factory for specific recommendations.

## Functional Data

100-01KO Valve Size		Inches	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36
		mm.	32	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750	900
C <sub>V</sub> Factor	Globe Pattern	Gal./Min. (gpm.)	14	14	25	37	52	90	218	362	602	900	1100	1200	1550	1950	3900	4660	7100
		Litres/Sec. (l/s.)	3.4	3.4	6.0	8.9	12.5	21.6	52	87	144	216	264	288	360	469	938	1120	1706
	Angle Pattern	Gal./Min. (gpm.)	15	15	26	39	55	95	232	388	560	790	1075	1175	—	—	3775	—	—
		Litres/Sec. (l/s.)	3.6	3.6	6.2	9.4	13.2	22.8	56	93	134	190	258	282	—	—	906	—	—
Equivalent Length of Pipe	Globe Pattern	Feet (ft.)	196	196	237	277	416	572	858	1315	1483	2118	1937	3022	3537	4199	4532	6678	6567
		Meters (m.)	60	60	72	84	127	174	262	401	452	646	590	921	1078	1280	1381	2035	2002
	Angle Pattern	Feet (ft.)	171	171	219	250	372	514	757	1145	1714	2226	2021	3152	—	—	2583	—	—
		Meters (m.)	52	52	67	76	113	157	231	349	522	678	616	961	—	—	787	—	—
K Factor	Globe Pattern		30.6	30.6	26.1	24.3	29.3	29.0	25.5	27.7	24.9	27.7	22.8	31.4	30.2	29.5	15.4	30.1	25.1
	Angle Pattern		26.7	26.7	24.1	21.8	26.2	26.0	22.5	24.1	28.7	29.1	23.8	32.8	—	—	16.4	—	—
Liquid Displaced from Cover Chamber When Valve Opens	U.S. Gal.		0.2	0.2	.03	.04	.08	.17	.53	1.26	2.5	4.0	6.5	9.6	11	12	29	65	90
	Litres		0.8	0.8	.12	.16	.30	.64	2.0	4.8	9.5	15.1	25.6	36.2	41.6	45.4	110	246	340

For assistance in selecting appropriate valve options or valves manufactured with special design requirements, please contact our Regional Sales Office or Factory.

### C<sub>V</sub> Factor

Formulas for computing C<sub>V</sub> Factor, Flow (Q) and Pressure Drop (ΔP):

$$C_V = \frac{Q}{\sqrt{\Delta P}} \quad Q = C_V \sqrt{\Delta P} \quad \Delta P = \left( \frac{Q}{C_V} \right)^2$$

### K Factor (Resistance Coefficient)

The Value of K is calculated from the formula:  $K = \frac{894d^4}{C_V^2}$  (U.S. system units)

### Equivalent Length of Pipe

Equivalent lengths of pipe (L) are determined from the formula:  $L = \frac{Kd}{12f}$  (U.S. system units)

### Fluid Velocity

Fluid velocity can be calculated from the following formula:  $V = \frac{.4085 Q}{d^2}$  (U.S. system units)

### Where:

C<sub>V</sub> = U.S. (gpm) @ 1 psi differential at 60° F water  
or

= (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

d = inside pipe diameter of Schedule 40 Steel Pipe (inches)

f = friction factor for clean, new Schedule 40 pipe (dimensionless) (from Cameron Hydraulic Data, 18th Edition, P 3-119)

K = Resistance Coefficient (calculated)

L = Equivalent Length of Pipe (feet)

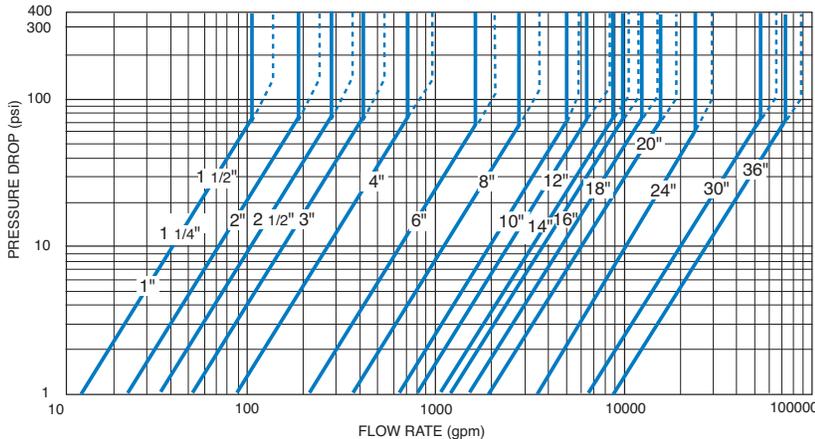
Q = Flow Rate in U.S. (gpm) or (l/s)

V = Fluid Velocity (feet per second) or (meters per second)

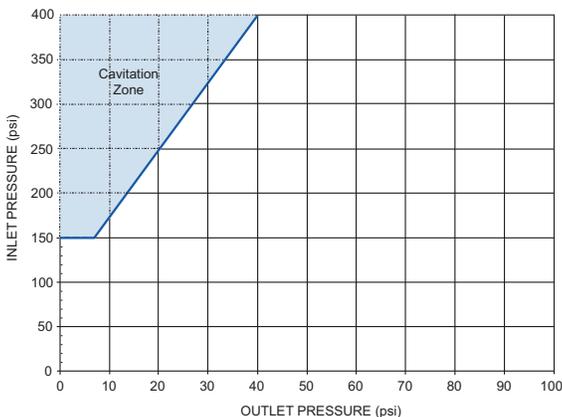
ΔP = Pressure Drop in (psi) or (bar)

### 100G-01KO ANTI-CAVITATION VALVE CURVES

SOLID LINE IS FULL OPEN FLOW CURVES FOR 18 FT/SEC CONTINUOUS DUTY APPLICATIONS  
DASHED LINE IS FULL OPEN FLOW CURVE FOR 25 FT/SEC INTERMITTENT DUTY APPLICATIONS

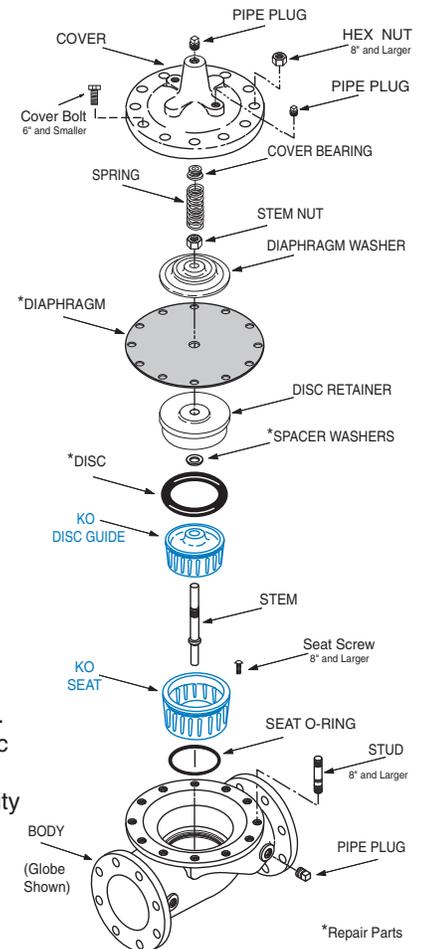


### SELECTION GUIDELINE FOR KO ANTI-CAVITATION VALVES



### Notes: On Operating Differential

1. For atmospheric discharge, the maximum inlet pressure cannot exceed 150 psi.
2. For pressure differentials greater than 300 psi the maximum flow velocity should not exceed 18 ft/sec.
3. Flow velocities greater than 25 ft/sec are not recommended.
4. Recommended minimum flow velocity is 1 ft/sec.
5. Consult factory for conditions exceeding these recommendations.



# 100-01KO Hytrol Main Valve with Anti-Cavitation Trim Purchase Specifications

## Function

The valve shall be hydraulically operated, single diaphragm actuated, globe pattern. The valve shall consist of three major components: the body with seat installed, the cover with bearing installed, and the diaphragm assembly. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the main valve or pilot controls. Ductile Iron is standard, other materials shall be available. No fabrication or welding shall be used in the manufacturing process.

## Description

The anti-cavitation features of the seat and disc guide detail shall have flow slots equally spaced around their perimeters. The seat slots shall be orientated around the perimeter of the seat so that fluid entering the valve shall flow through the seat slot detail such that the fluid flow converges in the center chamber of the seat allowing potential cavitation to dissipate. The disc guide slots shall be positioned around the perimeter of the disc guide, configured and oriented in an angular direction so that fluid flow exiting through the slots is diverted away from direct impact into pressure boundary surfaces. Flow exiting the disc guide slots is directed in an angular path to increase the distance between the slot geometry and pressure boundary surfaces. If cavitation conditions exist, the increased distance between the slots and pressure boundary surfaces minimizes the potential for damage by allowing the cavitation bubbles to dissipate before they come in contact with pressure boundary surfaces. Anti-cavitation characteristics shall be controlled by the described slotted seat and disc guide components. The disc guide shall slide in the seat and allow controlled flow through the seat slots into the central seat chamber where flow shall continue from the seat chamber and exit through the angularly oriented slots of the disc guide. The seat and disc guide features used together shall provide anti-cavitation characteristics suitable for applications where a large controlled pressure drop is desired.

The flexible, non-wicking, FDA approved diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the operating fluid. The diaphragm must withstand a Mullins burst test of a minimum of 600 psi per layer of nylon fabric and shall be cycle tested 100,000 times to insure longevity. The diaphragm shall be fully supported in the valve body and cover by machined surfaces which support no less than one-half of the total surface area of the diaphragm in either the fully open or fully closed position.

The valve seat in six inch and smaller size valves shall be threaded into the body. Valve seat in eight inch and larger size valves shall be retained by flat head machine screws for ease of maintenance. The seat shall be of the solid, one-piece design and shall have a minimum of a five degree taper on the seating surface for positive drip-tight shut-off. Pressed-in bearings and/or multi-piece seats shall not be permitted.

To insure proper alignment of the valve stem, the valve body and cover shall be machined with a locating lip. No "pinned" covers to the valve body shall be permitted. All necessary repairs and/or modifications other than replacement of the main valve body shall be possible without removing the valve from the pipeline.

The valve manufacturer shall warrant the valve to be free of defects in material and workmanship for a period of three years from date of shipment, provided the valve is installed and used in accordance with all applicable instructions. The valve manufacturer shall be able to supply a complete line of equipment from 1 1/4" through 48" sizes and a complete selection of complementary equipment.

## Material Specification

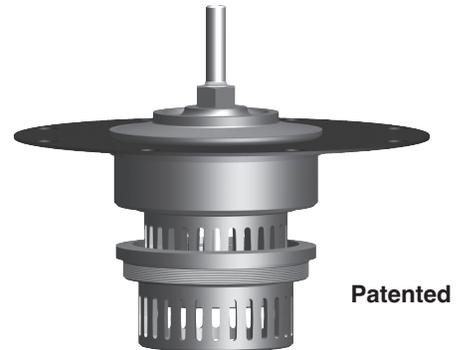
Valve Size:	Pressure Rating:
Main Valve Body and Cover:	Temperature Range:
Main Valve Trim:	Coating:
End Detail:	Desired Options:

## Application Information

Inlet/Outlet Pressures:  
Flow Rate:  
Pipe Diameter:  
Function (i.e. - Pressure Reducing, Pressure Relief, etc.):

This valve shall be a Cla-Val Model No. 100-01KO Hytrol Main Valve with Anti-Cavitation Trim as manufactured by Cla-Val, Newport Beach, CA

**Note:** Add this Hytrol Anti-Cavitation Trim Purchase Specification to main valve specification for control valves where there is a high potential for cavitation damage. Please contact our Regional Sales Offices or Factory for assistance.



The Anti-Cavitation Trim components can be retrofitted to existing Hytrol valves if the application indicates an appropriate need. Please consult factory for details.



E-100-01KO US Units (R-02/2019)

## CLA-VAL

1701 Placentia Avenue • Costa Mesa, CA 92627

800-942-6326 • Fax: 949-548-5441 • Web Site: [cla-val.com](http://cla-val.com) • E-mail: [info@cla-val.com](mailto:info@cla-val.com)

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E-mail: [sales@cla-val.ca](mailto:sales@cla-val.ca)

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Phone: 41-21-643-15-55  
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E-mail: [info@cla-valpacific.com](mailto:info@cla-valpacific.com)

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visit [www.cla-val-latinamerica.com](http://www.cla-val-latinamerica.com) for Spanish literature



## **EPOXY PROTECTIVE COATING** (Blue Epoxy and Red Epoxy)

Epoxy resin powders were created and developed specifically for the application of thin film corrosion protection to metal or other substrates. Epoxy resin coatings are suitable for continuous exposure to a wide range of corrosive elements. Of particular interest for control valves is the high resistance to various water conditions. They also provide resistance to certain acids, chemicals, solvents and alkalis. They have excellent adhesion to almost any prepared surface. They are sufficiently flexible to be used to protect steel springs from corrosion and have an impact strength that allows retainability and restoration of surface coating under normal drop conditions.

Since the early 1970's the application process used by Cla-Val is the fusion method. This method of applying epoxy resins utilizes the principal of covering a suitably cleaned and preheated part with a one-part dry powdered resin. The dry powdered resin fuses itself to the heated part. A curing period in an oven at 400 degrees F completes the process. No volatile solvents are required and thus there are no pinholes left by evaporation of such materials. The coating is applied by electrostatic spray or flock spray to a nominal thickness recommended by the coating manufacturer.

Cla-Val valves specified with epoxy coating applied at the factory fully conform to the standards below. Applied to the inside and outside of all ferrous parts, this coating option is indicated with "KC" as a suffix to the valve catalog number.

### **CERTIFICATION**

This is to confirm that Cla-Val uses AKZO Nobel R4-HJF42R (**Blue**) epoxy powder coating material for our factory applied protective coating. Our coating application process conforms to all applicable requirements of the American Water Works Association Standard C550 entitled "Protective Interior Coatings for Valves and Hydrants."

The AKZO Nobel R4-HJF42R (**Blue**) epoxy powder coating material is certified as a protective barrier material and approved by NSF Standard 61 - Drinking Water System Components - Health Effects (Nov. 16, 1995).

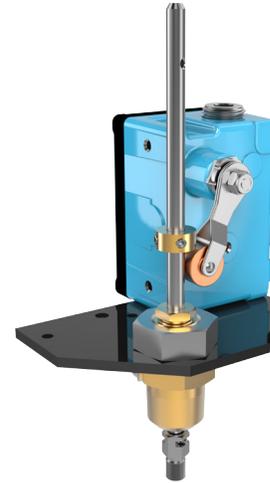
The AKZO Nobel R4-HJF42R (**Blue**) epoxy powder coating material is formulated with ingredients which are listed in or cited by the suppliers as in compliance with Federal Drug Administration Document, Title 21 of the Federal Regulations on Food Additives, Section 175.300, "Resinous and Polymeric Coatings."

This is to certify that Cla-Val uses H.B. Fuller Co. IF-1947 (**Red Oxide color**) epoxy powder coating material for our factory applied protective coating on Fire Protection main valves. Our coating application process conforms to all applicable requirements of the American WaterWorks Association Standard C550-90 entitled "Protective Interior Coatings for Valves and Hydrants."

This also certifies that H. B. Fuller Co. IF-1947 epoxy powder coating material (**Red Oxide color**) is applied and inspected according to Cla-Val procedures no. 97165 to interior and exterior of all ferrous parts.

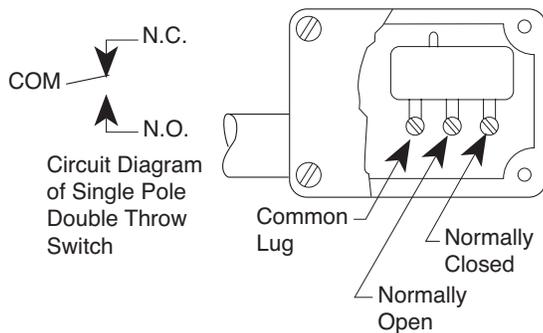
### ► PRODUCT FEATURES

Cla-Val Model X105L Limit Switch Assembly is a rugged, dependable and positive acting switch assembly actuated by the opening or closing of a Cla-Val control valve on which it is mounted. The single pole, double throw micro switch can be connected either to open or to close an electrical circuit when actuated. By loosening the allen screw on the actuating collar and raising or lowering the collar on the stem, the X105L is easily adjusted to signal that the valve has fully reached the desired position (open or closed).

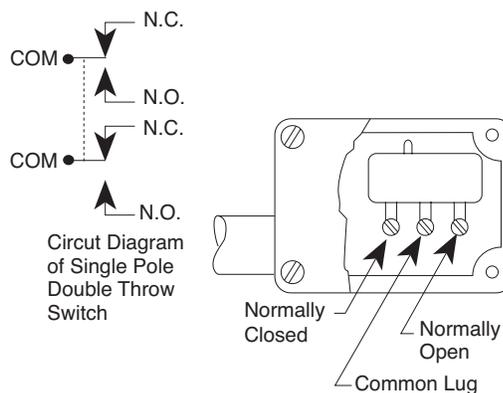


### ► INSTALLATION

#### Single Pole Double Throw Switch



#### Double Pole Double Throw Switch



Switches shown in unactivated position.

### ► SPECIFICATIONS

**Standard Materials\*:** Aluminum switch housing  
Steel bracket and brass adapter  
Stainless steel stem

**Electrical:** 1/2" Conduit connection

**Switch Type:** SPDT UL, File No. E12252,  
CSA Certified, File No. LR57325  
Weather proof  
NEMA 1,3,4, and13

**Switch Rating:** UL/CSA rating: L96  
15 amp. 125, 250, or 480 volts AC  
1/2 amp. 125 volts DC  
1/4 amp. 250 volts DC

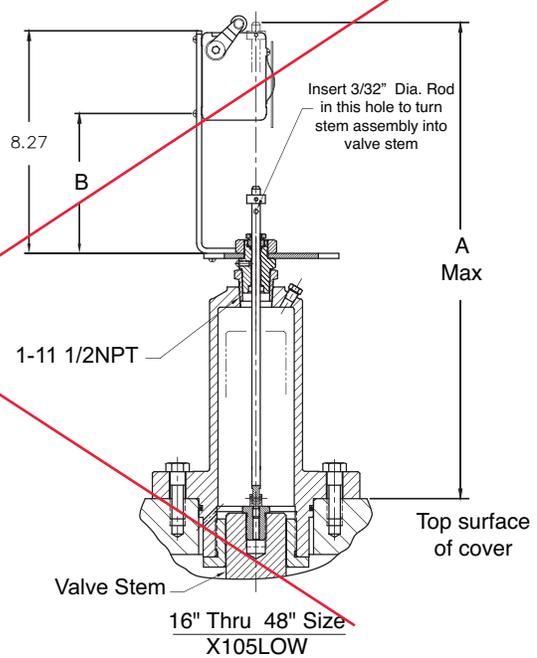
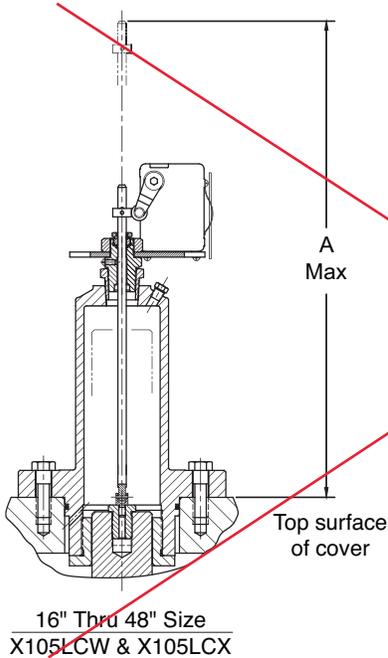
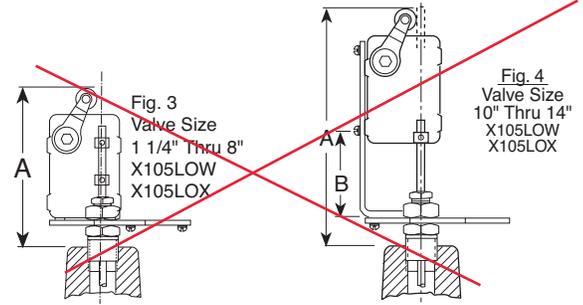
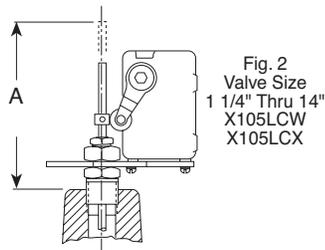
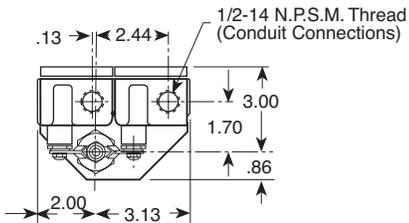
**Switch Options:** DPDT switches available on request  
UL/CSA Rating: L59, 10 amps

Explosion proof micro switches are NEMA 1,7, and 9  
UL Listed, File No. E14274 and CSA Certified, File No. LR57324: Class I, Group C and D and Class II, Group E, F and G.

CATALOG NO.	ACTUATION POSITION	SWITCH ENCLOSURE
X105LCW	Valve Closed	Weather Proof
X105LCX	Valve Closed	Explosion Proof
X105LOW	Valve Open	Weather Proof
X105LOX	Valve Open	Explosion Proof

\*Optional Materials Available

► DIMENSIONS



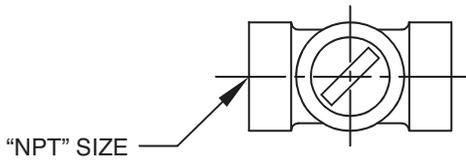
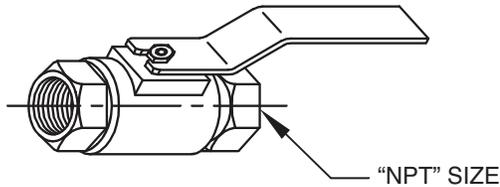
Basic Valve 100-01	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
Dimension "A"	10.19	10.19	7.16	7.16	7.43	7.00	6.69	6.91	9.88	9.59	9.16	10.78	10.78	18.23	19.10	35.07	36.07	36.07	36.07
Dimension "B"							1.69	1.69	2.44	2.94	2.94	2.94	2.94	4.32	5.19	8.40	8.40	8.40	8.40
Basic Valve 100-20					3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
Dimension "A"					7.16	7.34	7.00	6.69	6.91	9.88	9.59	9.59	10.78	10.78	10.78	11.30	35.07	36.07	36.07
Dimension "B"								1.69	1.69	2.44	2.94	2.94	2.94	2.94	2.94	5.19	8.40	8.40	8.40

### ▶ PRODUCT FEATURES

Model CK2 is a ball valve used for isolating components within the pilot system.



### ▶ DIMENSIONS



"NPT" SIZE								
1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"

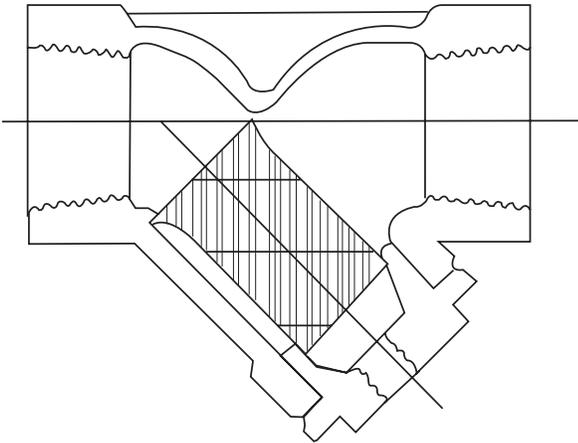
### ▶ SPECIFICATIONS

PART	MATERIAL
Body:	316 Stainless Steel
Handle and Nut:	316 Stainless Steel
Maximum working pressure:	600 psi
Temperature range:	33°F to 180°F

► **PRODUCT FEATURES**

- **Stainless Steel Body**
- **Blow-off Standard**
- **Stainless Steel Mesh Screen**

Model X43A 'Y' Strainers are in-line strainers intended to be installed for protection of pilot systems. These strainers are constructed of corrosion resistant materials. All sizes have blow-off standard.



► **SPECIFICATIONS**

<b>PART</b>	<b>MATERIAL</b>
Body:	316 Stainless Steel
Screen:	304 Stainless Steel
Gasket:	Non-Asbestos Fiber
Ends:	Threaded ANSI/ASME B1.20 1
Maximum working pressure:	800 psi
Temperature range:	33°F to 180°F
Screen:	Standard screen size is 40 mesh perforated stainless steel
Standard:	Blowdown Ball Valve

## WATER FLOW

### Description

The fixed flow rate orifices contain a deformable opening which decreases in size as the pressure differential increases. The design of the unit compensates for pressure differential increase by reducing the area of the orifice resulting in constant flow over the differential pressure range 15-150 psig.

### Specifications

- Maximum Pressure** 150 psig
- Constant Flow Pressure Range** 15 - 150 psig
- Temperature Range** 32 to 160° F
- Accuracy** ± 10%
- Materials** Body - Brass • Diaphragm - Buna-N

### Applications

- Water Flow Rate Control
- Heating and Cooling Systems
- Water Spray

- Film Process and Rinse
- Water Conservation
- Flow Rate Limitation

### Ordering Information

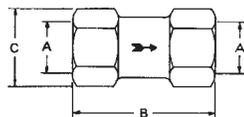
- Select the flow rate
- Select the pipe size
- Obtain part number from charts at right

### Dimensions

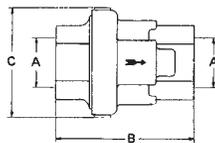
Series 2305		
A. Pipe Size - NPT	B. Overall Length	C. Height
1/4"	2"	1-1/6"
3/8"	1-3/4"	1-1/16"
1/2"	2-7/32"	1-1/4"
3/4"	2-9/16"	1-17/32"

Series 2307		
A. Pipe Size - NPT	B. Overall Length	C. Height
3/4"	3-19/32"	2-7/8"
1"	3-19/32"	2-7/8"
1-1/4"	6-3/16"	5-1/4"
1-1/2"	8-7/8"	7-3/8"

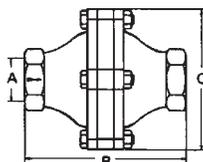


**2305**



**2307**

3/4", 1" NPT



**2307**

1-1/4", 1-1/2" NPT

### Part Numbers - Series 2305 0.2 to 10 GPM

FLOW RATE GPM-H <sub>2</sub> O	PIPE SIZE			
	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT
0.20	2305-0011-1/4			
0.25	2305-1011-1/4			
0.30	2305-0031-1/4	2305-0031-3/8		
0.40	2305-0041-1/4	2305-0041-3/8		
0.50	2305-1021-1/4	2305-1021-3/8	2305-1021-1/2	
0.60	2305-0061-1/4	2305-0061-3/8	2305-0061-1/2	
0.75	2305-1031-1/4	2305-1031-3/8	2305-1031-1/2	
1.00	2305-1041-1/4	2305-1041-3/8	2305-1041-1/2	2305-1041-3/4
1.25	2305-1051-1/4	2305-1051-3/8	2305-1051-1/2	2305-1051-3/4
1.50	2305-1061-1/4	2305-1061-3/8	2305-1061-1/2	2305-1061-3/4
1.75	2305-1071-1/4	2305-1071-3/8	2305-1071-1/2	2305-1071-3/4
2.00	2305-1081-1/4	2305-1081-3/8	2305-1081-1/2	2305-1081-3/4
2.50			2305-1091-1/2	2305-1091-3/4
3.00			2305-1101-1/2	2305-1101-3/4
3.50			2305-1111-1/2	2305-1111-3/4
4.0			2305-1121-1/2	2305-1121-3/4
4.5				2305-1131-3/4
5				2305-1141-3/4
6				2305-1151-3/4
7				2305-1161-3/4
8				2305-1171-3/4
9				2305-1181-3/4
10				2305-1191-3/4

### Part Numbers - Series 2307 8 to 100 GPM

FLOW RATE GPM-H <sub>2</sub> O	PIPE SIZE			
	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT
8	2307-1171-3/4	2307-1171-1		
9	2307-1181-3/4	2307-1181-1		
10	2307-1191-3/4	2307-1191-1		
11	2307-1201-3/4	2307-1201-1		
12	2307-1211-3/4	2307-1211-1		
13	2307-1221-3/4	2307-1221-1		
14	2307-1231-3/4	2307-1231-1		
15	2307-1241-3/4	2307-1241-1		
16	2307-1251-3/4	2307-1251-1		
17	2307-1261-3/4	2307-1261-1		
18	2307-1271-3/4	2307-1271-1	2307-1271-1-1/4	
19		2307-1281-1	2307-1281-1-1/4	
20		2307-1291-1	2307-1291-1-1/4	
21		2307-1301-1	2307-1301-1-1/4	
22		2307-1311-1	2307-1311-1-1/4	
24			2307-1321-1-1/4	
26			2307-1331-1-1/4	
28			2307-1341-1-1/4	
30			2307-1351-1-1/4	
32			2307-1361-1-1/4	
34			2307-1371-1-1/4	
36			2307-1381-1-1/4	
38			2307-1391-1-1/4	
40			2307-1401-1-1/4	
42			2307-1411-1-1/4	
44			2307-1421-1-1/4	
46			2307-1431-1-1/4	
48			2307-1441-1-1/4	
50				2307-1451-1-1/2
55				2307-1461-1-1/2
60				2307-1471-1-1/2
65				2307-1481-1-1/2
70				2307-1491-1-1/2
75				2307-1501-1-1/2
80				2307-1511-1-1/2
85				2307-1521-1-1/2
90				2307-1531-1-1/2
95				2307-1541-1-1/2
100				2307-1551-1-1/2



# Model CRL-60 Pressure Relief Control

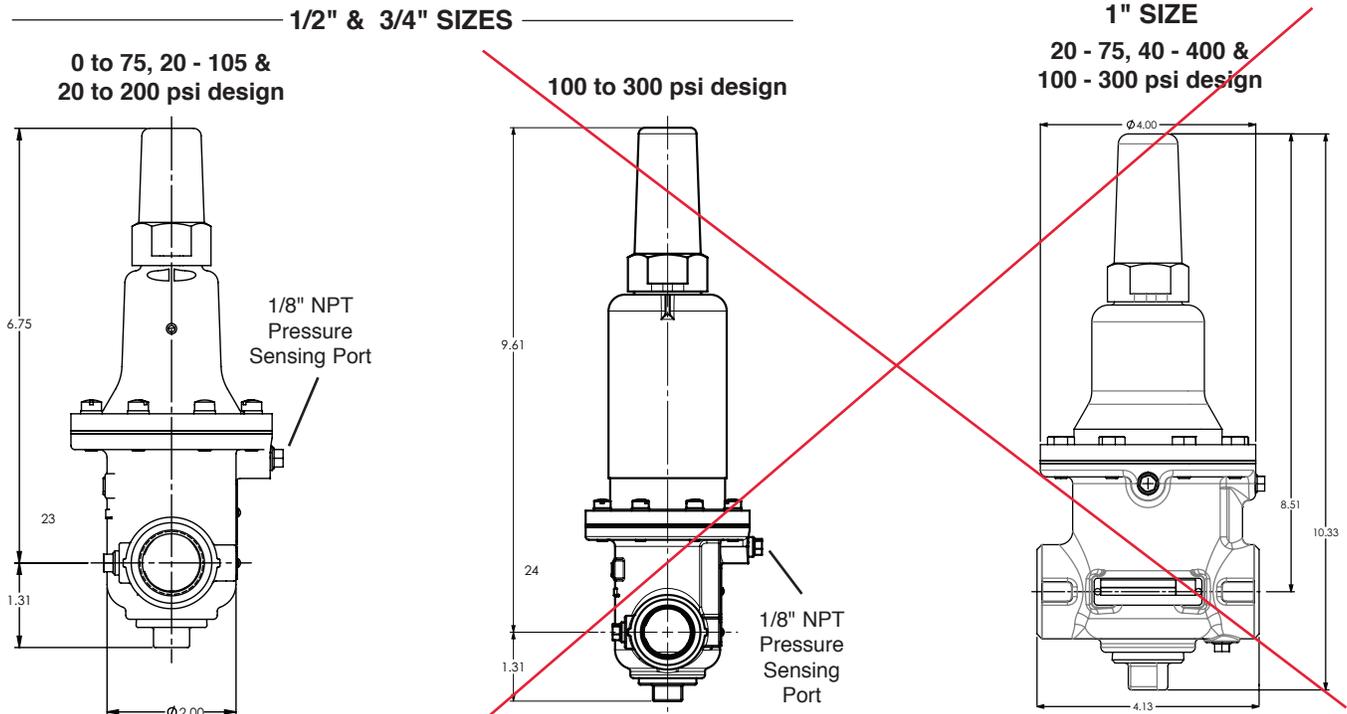
## ▶ PRODUCT FEATURES

Cla-Val Model CRL-60 Pressure Relief Valve is a direct-acting, spring loaded, diaphragm type relief valve. Often used as a pilot control for Cla-Val Hytrol valves, it can also be used as a standalone pressure relief valve. The CRL-60 may be installed in any position. The bottom plug may be removed and installed in the inlet to convert it to an angle pattern flow path.

When the controlling pressure exceeds the spring setting, the disc is lifted off its seat, permitting flow through the control. When control pressure drops below the spring setting, the spring forces the control back to its normally closed position.



## ▶ DIMENSIONS



## ▶ SPECIFICATIONS

**Size:** 1/2", 3/4" & 1" Threaded  
**Temperature Range:** Water, Air: to 180°F Max.  
**Standard Materials\***  
 Body & Cover: ~~Low Load Bronze~~ **Stainless Steel**  
 Trim: ~~303~~ **316**  
 Rubber: Buna-N® Synthetic Rubber  
**Pressure Ratings:** Bronze 400 psi Max.  
 Stainless Steel 400 psi Max.

**Adjustment Ranges:** 0 to 75 psi  
 20 to 105 psi (1/2" size only)  
 20 to 200 psi  
**100 to 300 psi**

### Pressure Drop Chart (Full Open Valve)

Valve Size	Cv Factor	Flow of Water - gpm					
		5	10	15	20	30	40
1/2"	6.0	0.7	2.7	6.0	11.0	--	--
3/4"	8.5	0.3	1.4	3.1	5.5	12.2	--
1"	12.5	0.2	0.6	1.4	2.6	5.8	10.2

\*Optional Materials Available

### ► **PRODUCT FEATURES**

Cla-Val Model X141BA Pressure Gauge/Air Bleed Assembly option consists of glycerin-filled pressure gauge, bleeder, and isolation valve. Cla-Val gauges are waterproof, shock resistant, and fully enclosed with a stainless steel case and bronze wetted parts. Ambient temperature ratings are -4 Degrees F to +140 Degrees F (-20 Degrees C to +60 Degrees C). Bleeder and isolation valve are stainless steel construction with 400 psi max working pressure.

All gauges have dual scale (PSI/BAR).

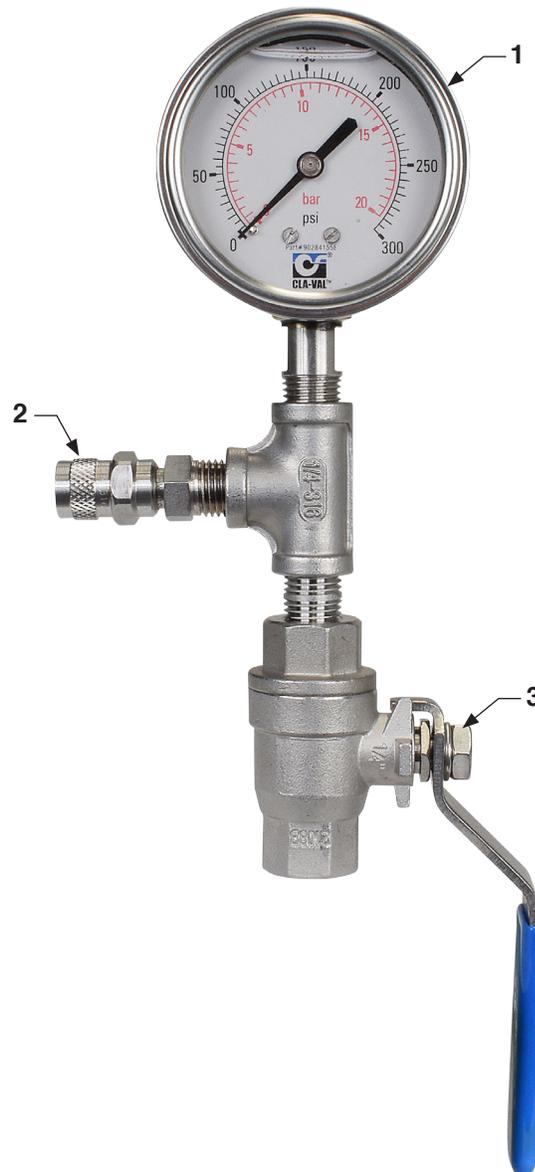
#### **1. Gauge Assembly (2 1/2" Diameter Dial)**

##### **Available Pressure Range**

- 0 - 60 psi
- 0 - 100 psi
- 0 - 160 psi
- 0 - 200 psi
- 0 - 300 psi**
- 0 - 400 psi

#### **2. Bleeder Valve**

#### **3. Isolation Valve**



### ▶ PRODUCT FEATURES

Cla-Val Model X141 Pressure Gauge Option consists of glycerin-filled pressure gauges. Cla-Val gauges are waterproof, shock resistant, and fully enclosed with a stainless steel case and bronze wetted parts. Ambient temperature ratings are -4 Degrees F to +140 Degrees F (-20 Degrees C to +60 Degrees C).

All gauges have dual scale (PSI/BAR) and are supplied with a 1/4" NPT bottom connection.

### ▶ AVAILABLE PRESSURE RANGES

#### X141 Gauge Assembly (2 1/2" Diameter Dial)

**Pressure Range\***

0 - 60 psi

0 - 100 psi

0 - 200 psi

0 - 300 psi

0 - 400 psi



Model X141  
2-1/2" Pressure Gauge

#### X141 Gauge Assembly (4" Diameter Dial)

**Pressure Range\***

0 - 60 psi

0 - 100 psi

0 - 200 psi

0 - 300 psi

0 - 400 psi



Model X141  
4" Pressure Gauge

# 919 PTFE STAINLESS STEEL BRAIDED HOSE



When high temperature performance and excellent chemical compatibility are demanded, Parker 919 PTFE Hose accepts the challenge. This medium pressure hose can withstand temperatures up to 450°F (232°C). A smooth bore natural PTFE core tube and stainless steel braided wire reinforcement tackle corrosive chemicals and abrasive environments.

## FEATURES AND BENEFITS

- Low friction minimizes pressure drops and deposits
- Environmentally safe
- Resists moisture
- Maximum working pressures up to 3,000 psi
- Meets or exceeds SAE 100R14A -919; SAE 100R14B -919B (Static Dissipative PTFE); FDA CFR 177.1550 (Natural Tube)

## Applications:

- Oil burner fronts (boiler)
- Fuel, lube, and oil skids
- Water injection, inlet fogging skids, and water wash
- Fuel control valves
- Compressed air discharge and coolant lines
- Gas analyzer systems
- High pressure steam lines
- Instrument test equipment

## PERFORMANCE CHARACTERISTICS

HOSE COVER MATERIAL	304 Stainless Steel Braid, Extruded Silicone, or Polyurethane
CORE TYPE	Natural PTFE or Static Dissipative PTFE
APPLICATION	Fluid Handling, Chemical Transfer, Manufacturing / Industrial, Medical/Pharmaceutical, Packaging, Instrumentation, Transportation
HOSE I.D. (INCH)	3/16, 1/4, 5/16, 13/32, 1/2, 5/8, 7/8, 1-1/8
HOSE I.D. (MM)	5, 6, 8, 10, 13, 16, 19, 22, 29
INDUSTRY STANDARDS	SAE 100R14A, FDA CFR 177.1550 (natural), SAE 100R14B
MAXIMUM WORKING PRESSURE (PSI)	625 - 3,000
MAXIMUM WORKING TEMPERATURE (C)	135 - 232
MAXIMUM WORKING TEMPERATURE (F)	275 - 450
MEDIA	Various
MINIMUM WORKING TEMPERATURE (C)	-40 to -73
MINIMUM WORKING TEMPERATURE (F)	-40 to -100
VACUUM RATING (INCH OF HG)	10 - 28
HOSE I.D. (SIZE)	-4, -5, -6, -8, -10, -12, -16, -20
HOSE O.D. (INCH)	0.32 - 1.28
HOSE O.D. (MM)	8 - 33
MAXIMUM WORKING PRESSURE (BAR)	43 - 207
MINIMUM BEND RADIUS (INCH)	1-1/2 - 7-1/2
MINIMUM BEND RADIUS (MM)	38 - 406
STYLE	Natural, Static-Dissipative
VACUUM RATING (MM OF HG)	25 - 711
WEIGHT (KG/M)	0.09 - 0.58
WEIGHT (LBS/FT)	0.06 - 0.39
DASH NUMBER	-3 to -20
MAXIMUM WORKING PRESSURE (MPA)	4.3 to 20.7 (dependent on size)
COMPATIBLE FITTINGS	90, 91, or 91N
HOSE TYPE	PTFE Hose or Smoothbore
COLOR	Silver, Red or Black



## 130LTSS1/4X3/8

SKU#: 130LTSS1/4X3/8

### Hose Connector

St. St. 316 Pipe Fitting, Hose Connector 1/4" x Tube Stub 1/4"

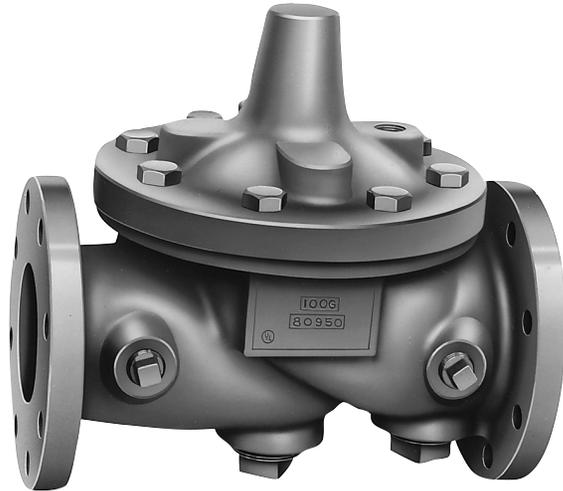


BODY MATERIAL	Stainless Steel 316
FITTING TYPE	Adapter
CONNECTION TYPE	Tube Stub
CONNECTION SIZE	3/8"
CROSS REFERENCE	SS-4-HC-A-601
TUBE SIZE	1/4", 3/8"

# ***CLA-VAL WARRANTY***

## **3 Year Warranty on Cla-Val Quality Products**

### **This is a Limited Warranty**



Automatic valves and controls as manufactured by Cla-Val are warranted for three years from date of shipment against manufacturing defects in material and workmanship that develop in the service for which they are designed, provided the products are installed and used in accordance with all applicable instructions and limitations issued by Cla-Val. Electronic components manufactured by Cla-Val are warranted for one year from the date of shipment.

We will repair or replace defective material, free of charge which is returned to our factory, transportation charges prepaid, provided that after inspection the material is found to have been defective at time of shipment. The warranty is expressly conditioned on the purchaser's giving Cla-Val immediate written notice upon discovery of the defect.

Components used by Cla-Val, but manufactured by others, are warranted only to the extent of that manufacturer's guarantee.

This warranty shall not apply if the product has been altered or repaired by others, and Cla-Val shall make no allowance or credit for such repairs or alterations unless authorized in writing by Cla-Val.

### **Disclaimer of Warranties & Limitation of Liability**

The foregoing warranty is exclusive and in lieu of all other warranties and representations whether expressed, implied, oral or written, including but not limited to, any implied warranties or merchantability or fitness for a particular purpose. All such other warranties and representations are hereby cancelled.

Cla-Val shall not be liable for any incidental or consequential loss, damage or expense arising directly or indirectly from the use of the product. Cla-Val shall not be liable for any damages or charges for labor or expense in making repairs or adjustments to the product. Cla-Val shall not be liable for any damages or charges sustained in the adaptation or use of its engineering data and services.

No representative of Cla-Val may change any of the foregoing or assume any additional liability or responsibility in connection with the product.

The liability of Cla-Val is limited to material replacements F.O.B. Newport Beach, California.

#### **CLA-VAL**

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Newport Beach CA  
92659-0325  
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Fax: 949-548-5441  
E-mail: [claval@cla-val.com](mailto:claval@cla-val.com)

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Fax: 905-563-4040  
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#### **CLA-VAL FRANCE**

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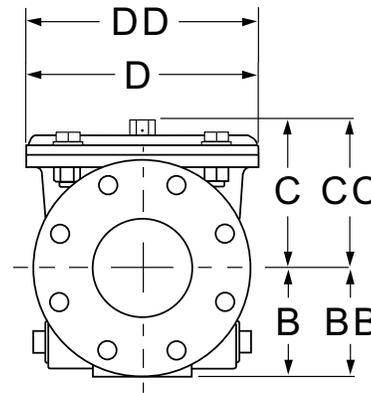
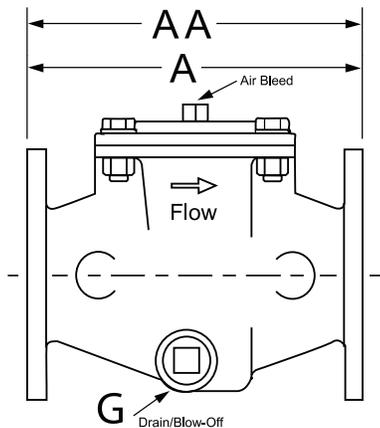
— MODEL — **X43H**

# H Style Strainer



- Low Pressure Drop
- Ductile Iron Fusion Bonded Epoxy Coated Construction with a 316 Stainless Steel Strainer
- Large Flow Area H-Style Design
- Service Without Removal From Line
- The materials of construction and epoxy coating used in this product meets the intent of the federal NSF-61 lead content mandate

The Cla-Val Model X43H Strainer offers an effective means of removing unwanted solid particles in pipeline flow. These strainers are ideal for preventing fouling, debris and particle buildup in Cla-Val Automatic Control Valves. The large flow area design, with a flat stainless steel strainer mesh perpendicular to flow, is optimized for low pressure drop applications. Maintenance is fast and easy with the compact H-pattern, requiring only top cover removal. Though the strainer may be installed in any position, installation with the cover up is recommended.



## Dimensions

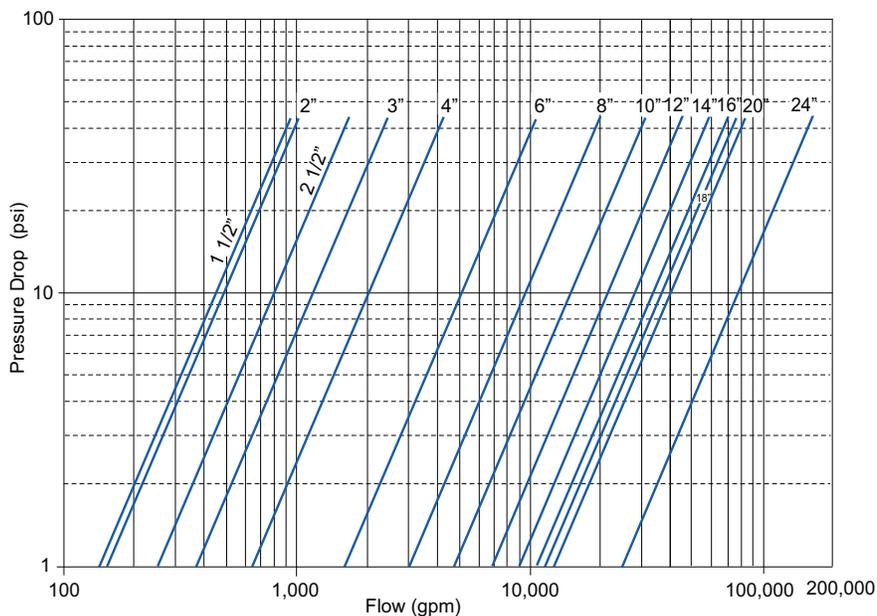
Strainer Size (inches)	1 ½	2	2 ½	3	4	6	8	10	12	14	16	18	20	24	30	36	48
A 150 ANSI	9.06	9.06	9.06	11.81	11.81	15.75	19.69	22.83	24.02	25.59	31.50	31.50	37.40	43.31	45.27	45.67	45.67
AA 300 ANSI	9.13	9.13	9.13	11.89	11.89	15.83	19.76	22.91	24.09	25.67	31.57	31.57	37.48	43.39	--	--	--
B 150 ANSI	2.50	3.26	3.66	4.06	4.33	5.63	6.69	8.40	9.40	10.24	12.20	13.18	19.09	19.09	22.49	26.00	34.00
BB 300 ANSI	3.26	3.26	3.66	4.06	5.02	5.63	7.50	8.86	10.20	10.94	12.70	15.00	19.09	19.09	--	--	--
C Max. 150 ANSI	3.78	3.78	3.78	5.91	5.91	7.52	8.82	11.61	15.16	14.96	19.69	19.69	23.98	23.98	25.10	36.20	34.11
CC Max. 300 ANSI	5.20	5.20	5.35	6.22	6.22	7.99	9.33	12.79	15.67	15.67	19.69	19.69	23.98	23.98	--	--	--
D Dia. 150 ANSI	7.87	7.87	7.87	9.25	9.25	15.74	18.11	22.05	26.77	26.77	35.43	35.43	46.85	46.85	46.85	61.65	61.65
DD Dia. 300 ANSI	7.99	7.99	7.99	9.37	9.37	15.86	18.23	22.17	26.85	26.85	35.43	35.43	46.85	46.85	--	--	--
G Drain/Blow-off Plug NPT	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	2	2	2	2	2	2	2	2	2
Approx. Ship Wt. Lbs.	33	36	39	59	73	143	212	432	626	683	970	1073	1175	1962	2249	4123	4828

Strainer Size (mm)	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750	900	1200
A 150 ANSI	230	230	230	300	300	400	500	580	610	650	800	800	950	1100	1150	1160	1160
AA 300 ANSI	232	232	232	302	302	402	502	582	612	652	802	802	952	1102	--	--	--
B 150 ANSI	64	83	93	103	110	143	170	213	240	260	310	335	485	485	571.5	660.5	862.5
BB 300 ANSI	83	83	93	103	128	143	191	225	259	278	321	380	485	486	--	--	--
C Max. 150 ANSI	96	96	96	150	150	191	224	295	385	380	500	500	609	609	637.5	919.5	866.5
CC Max. 300 ANSI	132	132	136	158	158	203	237	325	398	398	500	500	609	609	--	--	--
D Dia. 150 ANSI	200	200	200	235	235	400	460	560	680	680	900	900	1190	1190	1190	1566	1566
DD Dia. 300 ANSI	203	203	203	238	238	403	463	563	682	682	900	900	1190	1190	--	--	--
G Drain/Blow-off Plug NPT	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	2	2	2	2	2	2	2	2	2
Approx. Ship Wt. (kg)	15	16	18	27	33	65	96	196	284	310	440	600	810	890	1020	1870	2190

## Specifications

<b>Sizes (Inches):</b>	1½, 2, 2½, 3, 4, 6, 8, 10, 12, 14, 16, 18, 20, 24, 30, 36 and 48
<b>Sizes (mm):</b>	40, 50, 65, 80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 750, 900, 1200
<b>Ends:</b>	Flanged, ANSI Class 150 and 300 ( <b>Note:</b> 300# Flanges are Raised Face)
<b>Max Pressure Rating:</b>	150# - 250 psi • 300# - 400 psi
<b>Temperature:</b>	Maximum 175°F
<b>Materials:</b>	
<b>Body &amp; Cover:</b>	Ductile Iron ANSI B16.42; Fusion Bonded Epoxy Coating Standard
<b>Cover Seal:</b>	Buna-N® Synthetic Rubber
<b>Strainer:</b>	316 Stainless Steel; Ductile Iron, Epoxy Coated Frame
<b>Strainer Mesh Sizes:</b>	Standard 10 mesh / 2000 Micron / Openings 0.078 inch • Optional .039 and .059 inch openings available
<b>Drain/Blow-Off:</b>	Connection furnished with Standard Stainless Steel Plug
<b>Cover Fasteners:</b>	Stainless Steel

## Model X43H Flow Chart



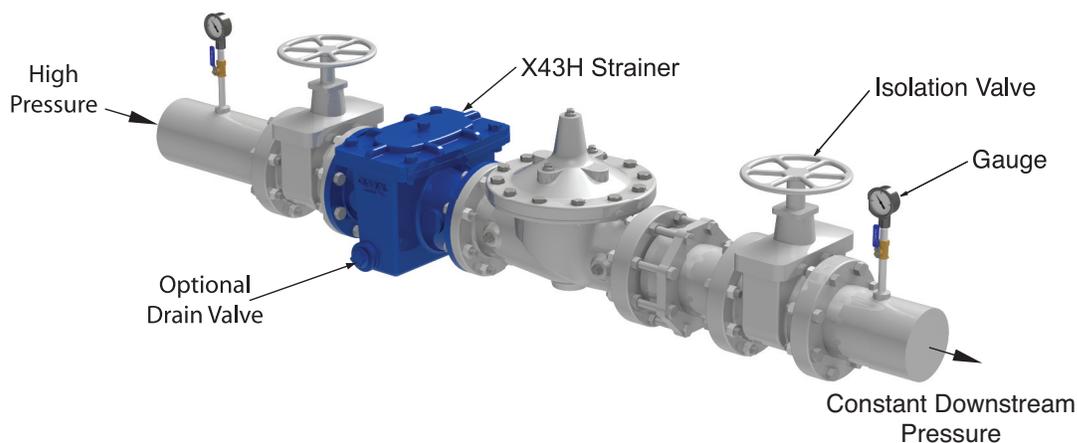
## C<sub>v</sub> Factor

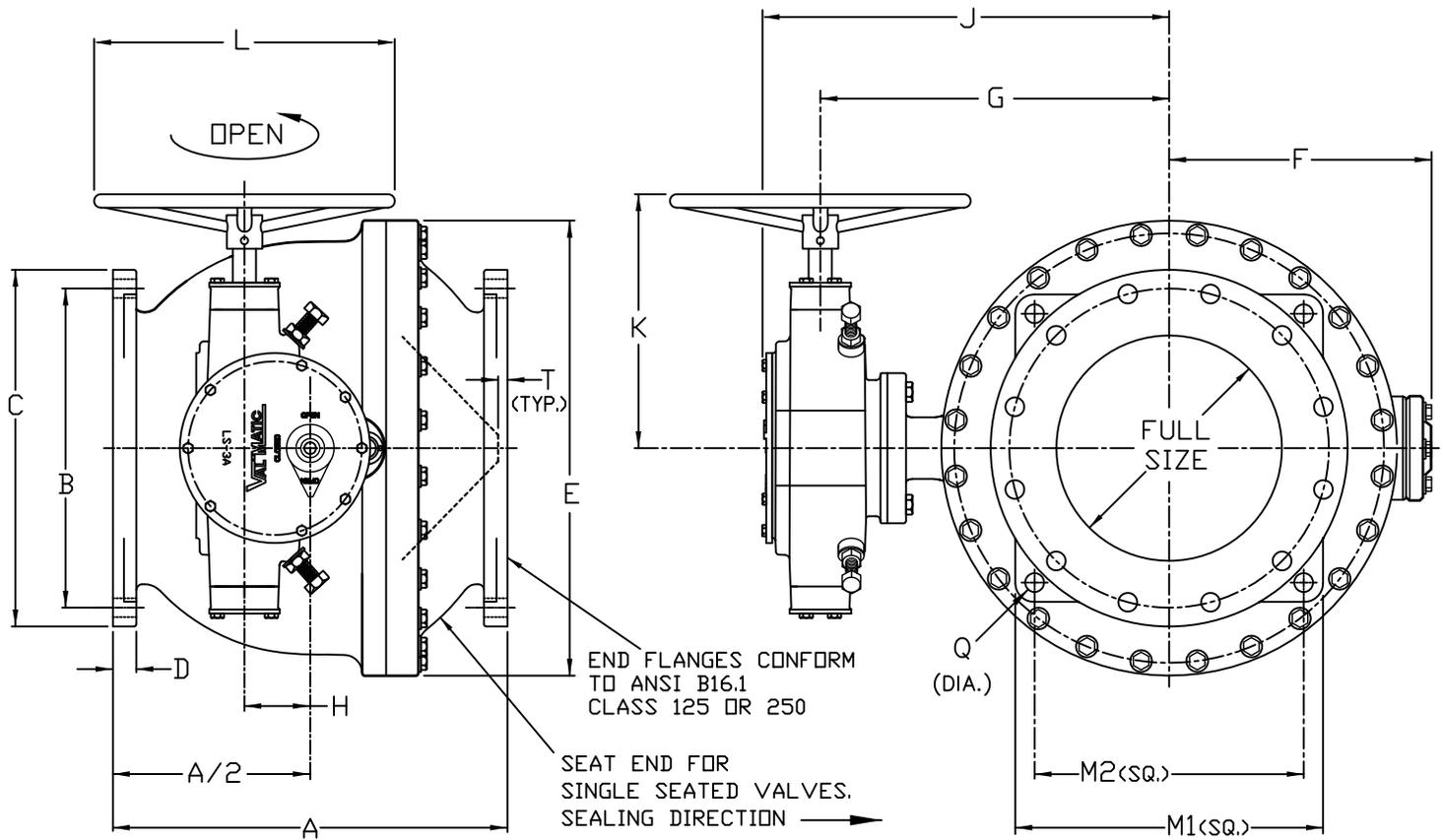
Size (inches)	1 ½	2	2 ½	3	4	6	8	10	12	14	16	18	20	24	*30	*36	*48
Size (millimeters)	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750	900	1200
C <sub>v</sub> (Gal/Min. - gpm.)	96	150	254	367	654	1644	3922	4566	6800	8949	11692	12796	18264	26302	CF	CF	CF
C <sub>v</sub> (Litres/Sec - l/s.)	23	36	61	88	157	395	942	1097	1634	2150	2809	3074	4388	6319	CF	CF	CF

C<sub>v</sub> in gpm = gpm @ 1psid head loss • C<sub>v</sub> in l/s = l/s @ 1bar head loss

\*Consult factory to confirm flow data for 30-inch/750mm and larger strainers

## Model X43H Strainer Typical Application





VALVE DEPICTS 12" 150 SIZE WITH LS-3A ACTUATOR

FLANGE DIMENSIONS, INCHES

VALVE SIZE	AWWA PRESS. CLASS	A	B	C	D	E	F	G	H	J	K	L	M1	M2	Q	T	ACT. SIZE	TURNS TO OPEN	NO. OF BOLTS	BOLT SIZE	SHPG. WT.
4	150	12.38	7.50	9.00	0.95	11.75	7.25	10.25	1.50	12.58	9.38	8	8.25	7.11	0.75	2.00	LS-1A	15	8	5/8	160
	300	13.00	7.88	10.00	1.25	11.75	7.25	10.50	1.50	12.58	9.38	8	9.25	7.87	0.88	2.38	LS-1A	15	8	3/4	177
6	150	15.75	9.50	11.00	1.00	14.75	8.50	11.38	2.00	13.63	11.25	12	10.13	8.57	0.88	2.25	LS-2.2A	20	8	3/4	245
	300	16.00	10.63	12.50	1.44	15.00	9.50	12.38	2.00	14.63	11.25	12	11.31	9.63	0.88	2.38	LS-2A	20	12	3/4	284
8	150	18.00	11.75	13.50	1.13	17.88	10.38	13.63	2.00	15.88	11.25	12	12.00	10.34	0.88	2.00	LS-2A	20	8	3/4	386
	300	18.00	13.00	15.00	1.63	18.13	11.75	15.00	2.00	17.25	12.25	16	13.25	11.49	1.00	2.00	LS-2A	20	12	7/8	450
	300	18.00	13.00	15.00	1.63	18.13	11.75	16.13	3.50	19.13	13.88	12	13.25	11.49	1.00	2.00	LS-3.2A	35	12	7/8	472
10	150	19.50	14.25	16.00	1.19	21.13	12.38	16.00	3.50	18.88	13.88	12	14.25	12.20	1.00	1.25	LS-3A	35	12	7/8	390
	300	21.13	15.25	17.50	1.88	21.63	13.88	17.50	3.50	20.38	13.88	12	15.25	13.34	1.13	2.00	LS-3A	35	16	1	507
12	150	21.00	17.00	19.00	1.25	24.25	14.38	18.13	3.50	21.13	14.88	16	16.63	14.32	1.00	0.50	LS-3A	35	12	7/8	794
	300	24.00	17.75	20.50	2.00	24.50	16.50	20.25	3.50	23.13	14.88	16	17.68	15.55	1.25	2.00	LS-3A	35	16	1 1/8	1002
	300	24.00	17.75	20.50	2.00	24.50	16.38	20.50	5.00	23.50	16.63	16	17.68	15.55	1.25	2.00	LS4.2A	50	16	1 1/8	1033
14	150	26.25	18.75	21.00	1.38	27.50	16.38	20.25	5.00	23.25	16.63	16	18.50	15.82	1.13	1.63	LS-4A	50	12	1	867
	300	27.75	20.25	23.00	2.13	27.75	18.75	22.38	3.50	25.38	14.88	16	19.75	17.32	1.25	2.38	LS-3A	35	20	1 1/8	1025
	150	26.25	18.75	21.00	1.38	27.50	16.38	20.00	3.50	22.88	14.88	16	18.50	15.82	1.13	1.63	LS-3A	35	12	1	836
	300	27.75	20.25	23.00	2.13	27.75	18.75	22.63	5.00	25.63	19.88	24	19.75	17.32	1.25	2.38	LS-4A	50	20	1 1/8	1079
16	150	27.00	21.25	23.50	1.44	30.63	18.63	22.25	5.00	25.50	19.88	24	20.25	17.59	1.13	0.63	LS-4A	50	16	1	1264
	300	28.13	22.50	25.50	2.25	31.63	21.75	25.35	3.50	28.38	14.88	16	21.68	19.18	1.38	1.13	LS-3A	35	20	1 1/4	1475
	150	27.00	21.25	23.50	1.44	30.63	18.63	22.25	3.50	25.13	14.88	16	20.25	17.59	1.13	0.63	LS-3A	35	16	1	1210
	300	28.13	22.50	25.50	2.25	31.63	21.75	25.63	5.00	28.63	21.38	30	21.68	19.18	1.38	1.13	LS-4A	50	20	1 1/4	1552
18	150	30.00	22.75	25.00	1.56	33.88	20.38	24.38	5.00	27.38	21.38	30	21.75	18.74	1.25	0.63	LS-4A	50	16	1 1/8	1774
	300	31.00	24.75	28.00	2.38	34.50	23.63	27.63	5.00	30.63	21.38	30	23.88	20.94	1.38	1.13	LS-4A	50	24	1 1/4	2132
20	150	32.00	25.00	27.50	1.69	36.75	21.88	25.75	5.00	28.75	21.38	30	23.68	20.50	1.25	0.25	LS-4A	50	20	1 1/8	2375

Revised 3-13-12

AWWA FLANGED BALL VALVE WITH HANDWHEEL ACTUATOR

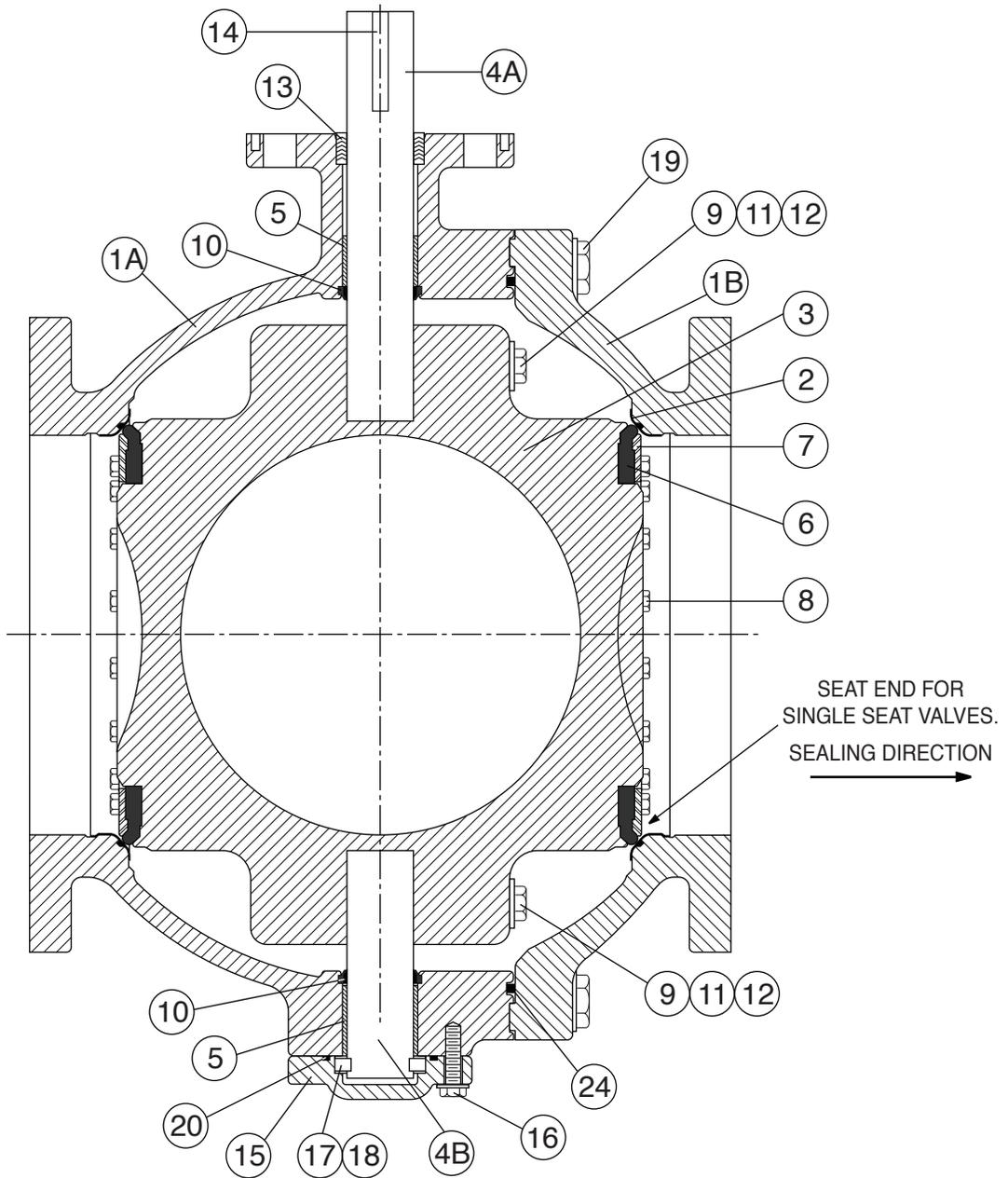
DATE 5-6-11



VALVE AND MANUFACTURING CORP.

DRWG. NO.

VMC-4104/LSA



1. VALVES CONFORM TO AWWA STANDARD C-507, LATEST EDITION.
2. SEE DRAWING VM-4104-M FOR STANDARD MATERIALS OF CONSTRUCTION.

Revised 4-26-12

4" - 48" AWWA FLANGED BALL VALVE CONSTRUCTION

DATE 5-6-11

**VAL-MATIC®**

VALVE AND MANUFACTURING CORP.

DRWG. NO.

**VM-4104**

## BALL VALVE

4"- 48" AWWA CLASS 150 AND 300 SERIES 4000

### STANDARD MATERIALS OF CONSTRUCTION

<u>PART NO.</u>	<u>PART NAME</u>	<u>MATERIAL</u>
1A, 1B	<del>BODY (CLASS 150)</del> BODY (CLASS 300)	<del>CAST IRON ASTM A126, CLASS B</del> DUCTILE IRON ASTM A536, GRADE 65-45-12
2	BODY SEAT	STAINLESS STEEL ASTM A240, T316
3	<del>BALL (CLASS 150)</del> BALL (CLASS 300)	<del>CAST IRON ASTM A126, CLASS B</del> DUCTILE IRON ASTM A536, GRADE 65-45-12
4A, 4B	<del>SHAFT (CLASS 150)</del> SHAFT (CLASS 300)	<del>STAINLESS STEEL ASTM A276, T304 OR</del> STAINLESS STEEL ASTM A564, T630
5	SLEEVE BEARING	TEFLON-LINED, FIBERGLASS BACKED
6	RESILIENT SEAT	<b>BUNA N</b>
7	SEAT RETAINING RING	STAINLESS STEEL ASTM A743, GRADE CF8M
8	NYLOK <sup>®</sup> CAP SCREWS	STAINLESS STEEL ASTM F593, T316
9	TAPER PIN	STAINLESS STEEL ASTM A582, T416
10	GRIT SEAL	MOLYTHANE
11	TAPER PIN NUT	STAINLESS STEEL ASTM F593, T316
12	TAPER PIN WASHER	STAINLESS STEEL ASTM A276, T316
13	PACKING, V-TYPE	BUNA-N
14	KEY	CARBON STEEL
15	THRUST BEARING CAP	CAST IRON ASTM A126, CLASS B
16	CAP SCREWS	<b>Stainless Steel</b>
17	THRUST BEARING SHIMS	BRASS
18	THRUST BEARING	BRONZE ASTM B763, ALLOY C99500
19	BODY BOLTS	<b>Stainless Steel</b>
20	CAP O-RING	RESILIENT, ASTM D2000
24	BODY O-RING	RESILIENT, ASTM D2000

NYLOK IS A REGISTERED TRADE MARK OF THE NYLOK FASTENER CORPORATION.

NOTE: ALL SPECIFICATIONS AS  
LAST REVISED.

MATERIALS OF CONSTRUCTION

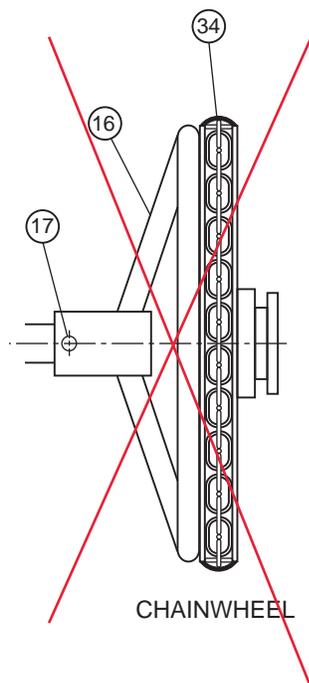
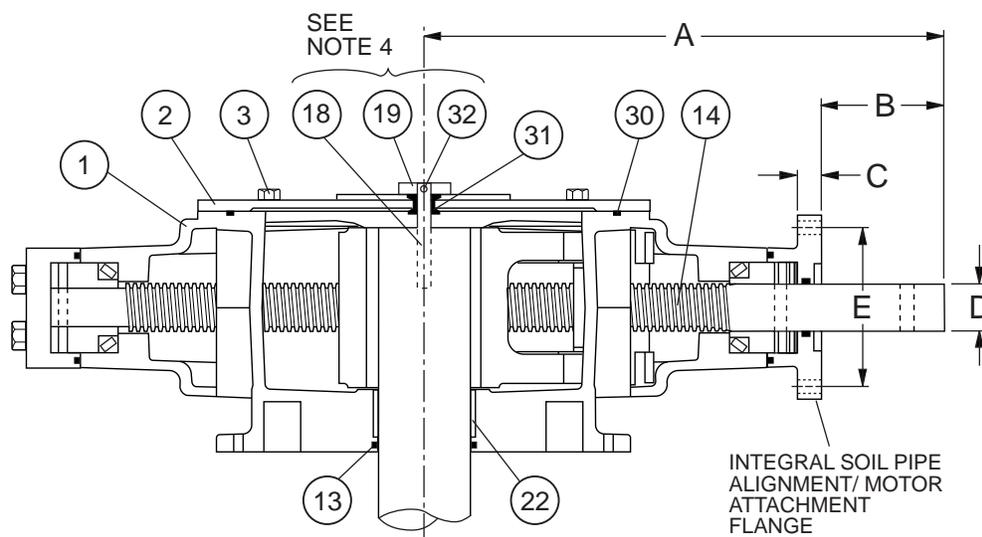
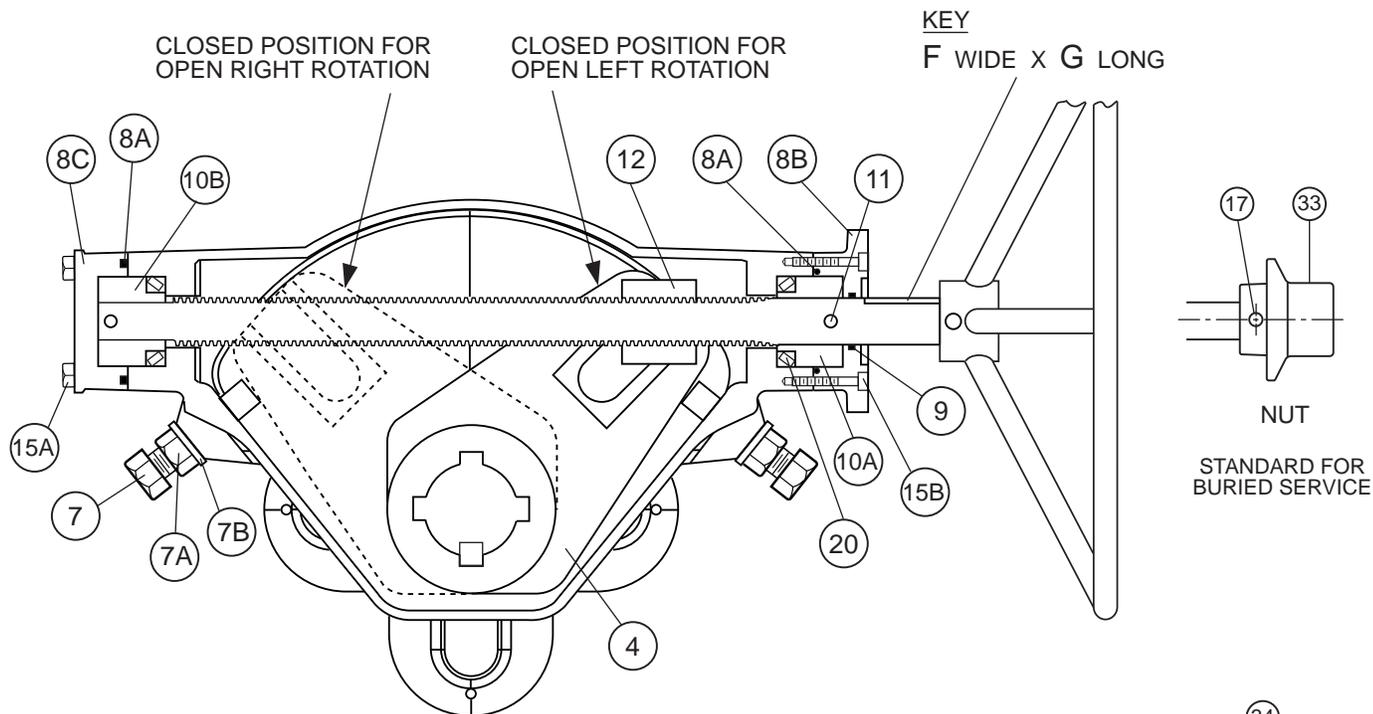
DATE 5/6/11

**VAL-MATIC<sup>®</sup>**

VALVE AND MANUFACTURING CORP.

DRWG. NO.

VM-4104-M



**NOTES**

1. THE DIRECTION OF OPENING MAY BE REVERSED BY PULLING KEY WITH THE VALVE IN THE CLOSED POSITION, CYCLING ACTUATOR 90°, AND THEN REINSERTING KEY AS SHOWN BY DOTTED LINES.
2. ACTUATOR MEETS AWWA C504, AND AWWA C507 LATEST REVISION.
3. SEE DRAWING NO. VM-LS1A-M FOR STANDARD MATERIALS OF CONSTRUCTION.
4. FOR BURIED OR SUBMERGED SERVICE, UNIT PACKED WITH GREASE, NO INDICATION.

DIMENSION, INCHES							
ACTUATOR SIZE	A	B	C	D	E	F	G
LS-1A	6.89	2.52	0.63	1.00	4.00	0.25	2.00
LS-2A	7.71	2.52	0.63	1.00	4.00	0.25	2.00
LS-3A	11.06	3.25	0.63	1.25	4.00	0.25	2.75
LS-4A	12.81	3.25	0.63	1.25	4.00	0.25	2.75

Revised 4-19-11

**TRAVELING NUT ACTUATOR**

DATE 8-22-08

## TRAVELING NUT ACTUATOR

### SIZES LS-1A THROUGH LS-4A

<u>PART NO.</u>	<u>PART NAME</u>	<u>MATERIAL</u>
1	HOUSING	DUCTILE IRON ASTM A536, GRADE 65-45-12
2	HOUSING COVER	DUCTILE IRON ASTM A536, GRADE 65-45-12
3	COVER BOLTS	STAINLESS STEEL T316
4	LEVER	DUCTILE IRON ASTM A536, GRADE 65-45-12
7	STOP BOLT	PLATED STEEL
7A	LOCK NUT	PLATED STEEL
7B	STOP BOLT THREAD SEAL	PLATED STEEL WITH BUNA-N
8A	END CAP O-RING	BUNA-N
8B	END CAP (FOR SOIL PIPE ALIGNMENT OR MOTOR ATTACHMENT)	DUCTILE IRON ASTM A536, GRADE 65-45-12
8C	END CAP (BLIND END)	DUCTILE IRON ASTM A536, GRADE 65-45-12
9	STEM O-RING	BUNA-N
10A	STEM COLLAR (INPUT END)	ALUMINUM BRONZE (SIZES LS-1A & LS-2A) <del>CARBON STEEL (SIZES LS-3A thru LS-4A)</del>
10B	STEM COLLAR (BLIND END)	ALUMINUM BRONZE (SIZES LS-1A & LS-2A) <del>CARBON STEEL (SIZES LS-3A thru LS-4A)</del>
11	COLLAR PIN	ALLOY STEEL
12	CROSSHEAD	ALUMINUM BRONZE
13	SHAFT O-RING	BUNA-N
14	STEM	HIGH TENSILE STEEL (NICKEL PLATED EXPOSED END)
15A	END CAP HEX HD. BOLTS	STAINLESS STEEL T316
15B	END CAP SOCKET HD. BOLTS	STAINLESS STEEL T316
16	HANDWHEEL (OPTIONAL)	STEEL
17	PIN	STAINLESS STEEL T316
18	DOWEL PIN (NOTE 2)	PLATED STEEL ASTM A307
19	INDICATOR (NOTE 2)	CAST IRON ASTM A126, CLASS B
20	TAPERED ROLLER BEARING	HARDENED ALLOY STEEL (SEE NOTE 1)
22	SHAFT BEARING	TEFLON / FIBERGLASS BACKED
30	COVER O-RING	BUNA-N
31	GROMMET	BUNA-N
32	SET SCREW (NOTE 2)	STEEL
33	OPERATING NUT (OPTIONAL FOR ABOVE GROUND SERVICE, STANDARD FOR BURIED SERVICE)	CAST IRON ASTM A126, CLASS B
<del>34</del>	<del>CHAINWHEEL KIT (OPTIONAL)</del>	<del>DUCTILE IRON</del>

#### NOTES:

1. FOR SIZES LS-3A & LS-4A, TAPERED ROLLER BEARINGS (PART NO. 20) ARE USED ON INBOARD SIDE OF EACH STEM COLLAR.

2. NOT FURNISHED FOR BURIED/SUBMERGED SERVICE.

NOTE: ALL SPECIFICATIONS AS LAST REVISED.

Revised 7-10-17

### MATERIALS OF CONSTRUCTION

DATE 8/22/08

**VAL-MATIC**<sup>®</sup>

VALVE AND MANUFACTURING CORP.

DRWG. NO.

VM-LS1A-M

# FUSION BONDED EPOXY (FBE) COATING

## General Description:

Fusion Bonded Epoxy is a one-part, heat cured, thermosetting epoxy coating that is applied as a dry powder to the sandblasted surface of a pre-heated valve and then fused and cured in a high-temperature oven. The result is a durable coating with exceptional abrasion and chemical resistance ideally suited for valves in water and wastewater applications.

## Advantages of FBE:

1. The coating is applied in accordance with AWWA Standard C550 "Protective Epoxy Coatings for Valves and Hydrants" and certified by to the requirements of ANSI/ NSF Standard 61 - "Drinking Water System Components - Health Effects" for coating valves and fittings.
2. FBE coatings are applied in an automated one-part process so that the mixing, surface preparation, and multiple-coat problems associated with liquid paints are eliminated.
3. The electrostatic application process for FBE provides a smooth, even coating thickness with no runs, sags, or thin spots common with applying liquid paints.
4. FBE coatings are durable and provide twice the impact strength of liquid epoxies. The surface provides high abrasion resistance and has become a standard seating material for resilient gate and check valves.
5. FBE has a long-term performance history in water and sewage environments including salt water, slurries, methane and hydrogen sulfide exposure.

## Application Process:

1. FBE is applied in an automated manufacturing process in accordance with the coating manufacturers' procedures and industry standards to assure consistency and high quality.
2. The valve is cleaned, sandblasted, and preheated in an oven.
3. An electrical charge is applied to the body and the powder is deposited over the surfaces of the valve to the specified thickness.
4. The epoxy is post cured in an oven to cure specifications and allowed to air cool to room temperature.
5. The final surface is visually and electrically (when specified) tested to verify thickness and that it is holiday free.

## Typical Performance Characteristics:

1. Color:	Blue	
2. Thickness	12-20 mils	1 Coat
3. Gloss at 60 deg:	60-80 units	Din 67 530
4. Impact Resistance	>5 Joule (44 in-lb)	Din 30 677-2
5. Elongation:	>5%	Din 30 671
6. Hardness:	>100	Din 53 153
7. Water Immersion:	No visible change	90C, 672 Hours
8. Salt Spray Test:	>3000 hours	Din 53167
9. Adhesion:	16 Mpa (2320 psi)	7 days, 90C EN 24 624

Revised 2-15-17

## FUSION BONDED EPOXY (FBE) COATING

DATE 7-17-02



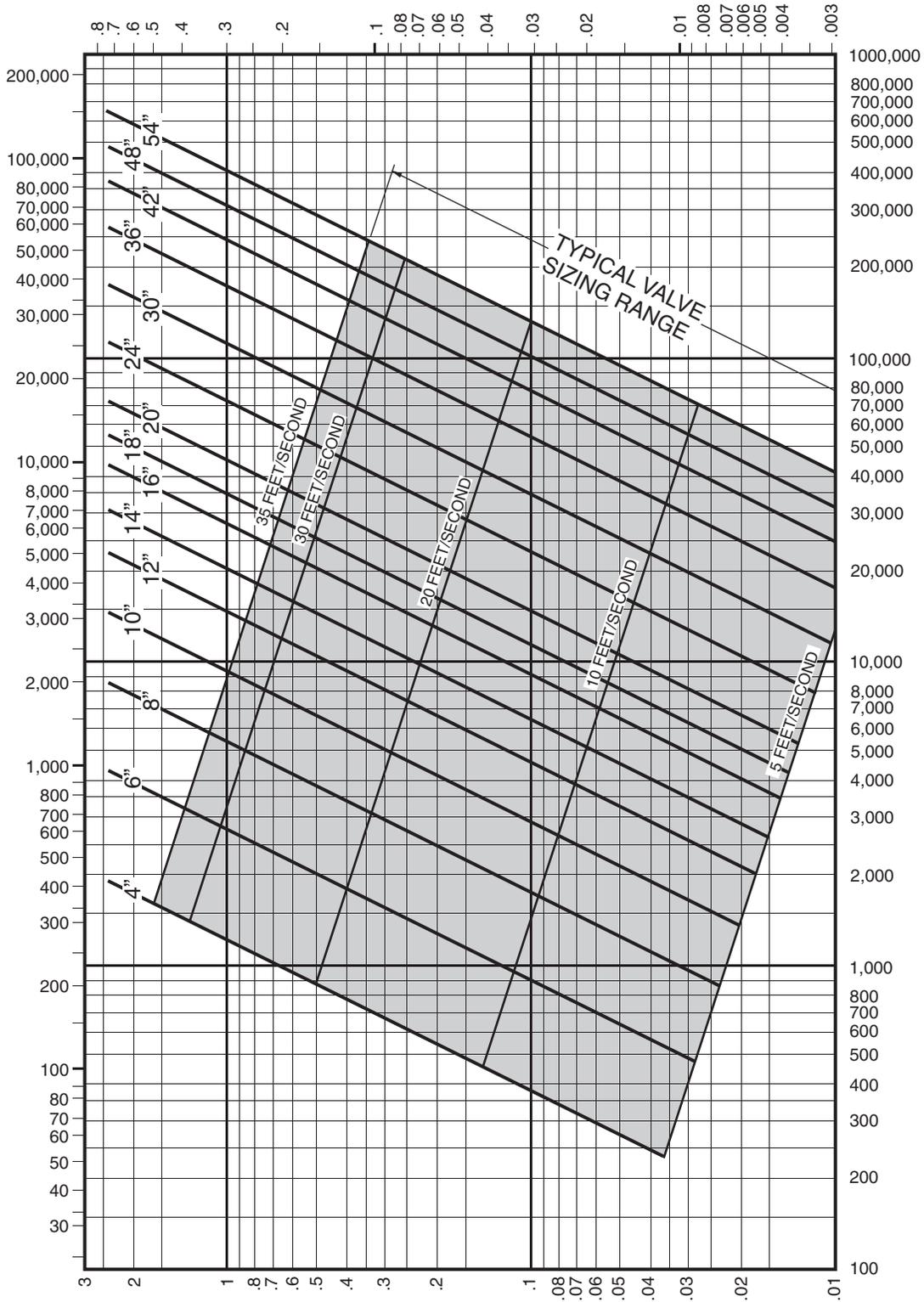
VALVE AND MANUFACTURING CORP.

DRWG. NO.

SS-1847

(METERS OF WATER)

(CUBIC METERS PER HOUR)



HEAD LOSS IN FEET OF WATER

FLOW OF WATER IN GALLONS PER MINUTE

SIZE	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
Cv	1,910	4,310	8,520	14,700	22,800	30,500	42,700	56,100	70,500	106,000	172,000	257,000	369,000	480,000	620,000

Revised 8-19-16

HEAD LOSS CHART FOR CLASS 150 AND 300 BALL VALVE

DATE 4-23-08

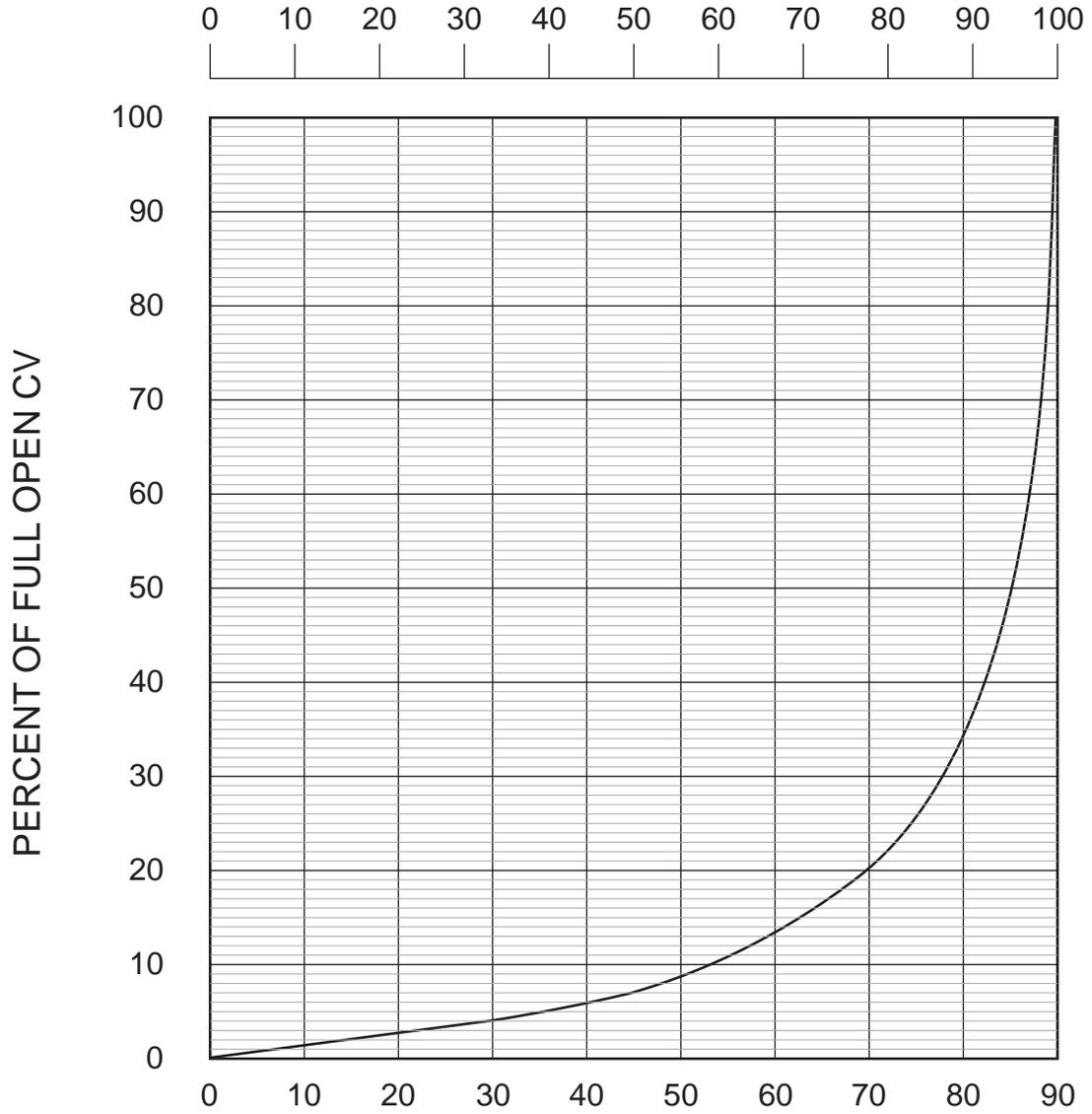


VALVE AND MANUFACTURING CORP.

DRWG. NO.

SS-2285

BALL POSITION (PERCENT OPEN)



BALL POSITION (DEGREES FROM CLOSED POSITION )

THE ABOVE GRAPH IS BASED ON INDEPENDENT LABORATORY TEST DATA.

FLOW CHARACTERISTICS OF SERIES 4000 BALL VALVES

DATE 6-17-08

**VAL-MATIC**<sup>®</sup> VALVE AND MANUFACTURING CORP.

DRWG. NO. SS-2298

# DJ400 DISMANTLING JOINT 3" - 12" CLASS "F" FLANGE

## SUBMITTAL INFORMATION



## MATERIALS

### FLANGED SPOOL

AWWA C207 Class F Steel Ring Flange, compatible with ANSI Class 250 & 300 bolt circles. Pipe is standard weight class per ASTM A53.

### END RING AND BODY

The end ring and body are made from ASTM A536 65-45-12 Ductile Iron.

### GASKETS

Compounded for water and sewer service meeting the requirements of ASTM D 2000. Other compounds available on request.

Bolts and Nuts ASTM A588 HSLA bolt material. Stainless Steel, Types 304 or 316 is optional.

### TIE RODS

High tensile steel per ASTM A193 grade B7. Stainless steel, type 304 or 316 is optional.

### COATINGS

Fusion bonded epoxy, NSF 61 certified. All surfaces are coated, including flange faces.

## PRESSURE

When properly installed on a pipe that is within the coupling manufacturer's tolerances, Romac style DJ400 can work at pressures up to the maximum rating of the flange. AWWA C207 Class F flanges are rated for 300 psi working pressure.

## ASSEMBLY TOLERANCE

Two inch adjustment see catalog. For a different length, contact Romac Engineering.

## SIZE

3" - 12", See drawing B2090-A for more detail.

## STANDARD

The DJ400 meet the specifications set forth in AWWA C219 Standard

*This information is based on the best data available at the date printed above. Please check with Romac for any updates or changes.*

**ROMAC INDUSTRIES, INC.**  
**STYLE DJ400 DISMANTLING JOINT WITH TIE RODS**  
**& ANSI B16.5 CLS 300 FLANGES**  
**SUBMITTAL INFORMATION**

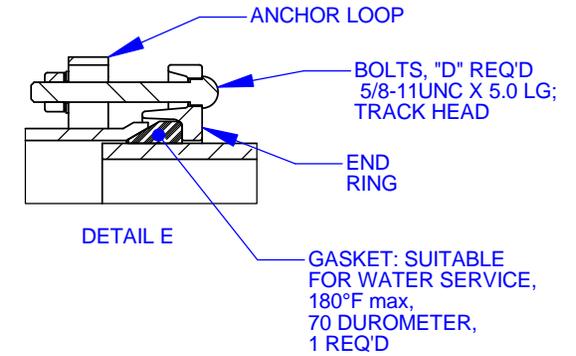
**MATERIALS**

Flanged Spool	3-12"- ANSI B16.5 Class 300 RF Flange compatible with ANSI/ASME Class 250 and 300 bolt circles. Pipe is Schedule 40 ASTM A53.
End Ring and Body	The end ring and body are made from ASTM A536 65-45-12 Ductile Iron.
Gasket and O-ring	Compounded for water and sewer service meeting the requirements of ASTM D 2000. Other compounds available on request.
Bolts and Nuts	ASTM A588 HSLA bolt material. Ten inch uses ductile iron through bolts per ASTM A536 with HSLA heavy hex nuts. Stainless Steel, Types 304 or 316 is optional.
Tie Rods	High tensile steel per ASTM A193 grade B7, nuts ASTM A 194 grade 2H. Stainless steel, type 304 (ASTM A193 GR B8) or 316 (ASTM A193 GR B8M) is optional.
Coatings	Fusion bonded epoxy, NSF 61 certified. All surfaces are coated, including flange faces.
<b>PRESSURE</b>	When properly installed the Romac style DJ400 can be designed to work at pressures up to the maximum rating of the flange. ANSI B16.5 CLS 300 are rated for 750 psi maximum.
<b>ASSEMBLY TRAVEL</b>	Two inches flange face to flange face.
<b>SIZES</b>	3" – 12"

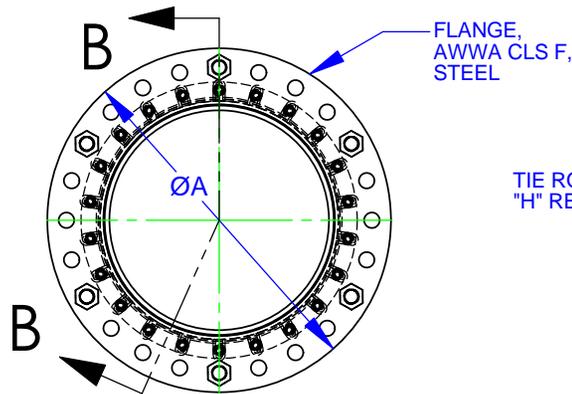
**B2090-A**

NOM SIZE	DIMENSIONS					END RING BOLTS	TIE RODS				SPOOL		APPROX WEIGHT LBS
	FLANGE OD	FLANGE THK	C - LENGTH			QTY	SIZE (UNC)	LENGTH	STEEL QTY	SS QTY	OD	PIPE THK	
			A	B	NOM.								
3*	8.25	1.13	13.00	11.50	14.50	4	3/4 - 10	19.25	2	2	3.50	0.22	45
4	10.00	1.13	13.00	11.50	14.50	4	3/4 - 10	19.25	2	2	4.50	0.24	61
6	12.50	1.31	13.25	11.75	14.75	6	3/4 - 10	20.00	2	2	6.63	0.28	96
8	15.00	1.31	13.50	12.00	15.00	6	7/8 - 9	20.50	2	2	8.63	0.32	131
10	17.50	1.50	14.00	12.50	15.50	8	1 - 8	21.50	2	2	10.75	0.37	183
12	20.50	1.63	14.50	13.00	16.00	8	1 1/8 - 7	22.75	2	4	12.75	0.38	267
14	23.00	1.94	15.50	14.00	17.00	8	1 1/8 - 7	24.25	2	4	14.00	0.25	351
16	25.50	2.14	16.00	14.50	17.50	10	1 1/4 - 7	25.75	2	4	16.00	0.25	449
18	28.00	2.25	16.25	14.75	17.75	10	1 1/4 - 7	25.75	2	4	18.00	0.25	533
20	30.50	2.33	16.50	15.00	18.00	12	1 1/4 - 7	26.25	4	4	20.00	0.25	632
24	36.00	2.69	17.25	15.75	18.75	14	1 1/2 - 6	28.25	4	4	24.00	0.25	954
28	40.75	3.13	19.00	17.50	20.50	16	1 3/4 - 5	31.50	4	4	28.00	0.25	1300
30	43.00	3.15	18.75	17.25	20.25	16	1 3/4 - 5	31.25	4	6	30.00	0.38	1537
36	50.00	3.46	19.75	18.25	21.25	18	2 - 4 1/2	33.25	4	6	36.00	0.38	2078
42	57.00	3.81	21.00	19.50	22.50	22	2 - 4 1/2	35.25	6	8	42.00	0.50	2939
48	65.00	4.50	22.50	21.00	24.00	24	2 - 4 1/2	38.00	6	10	48.00	0.50	4356

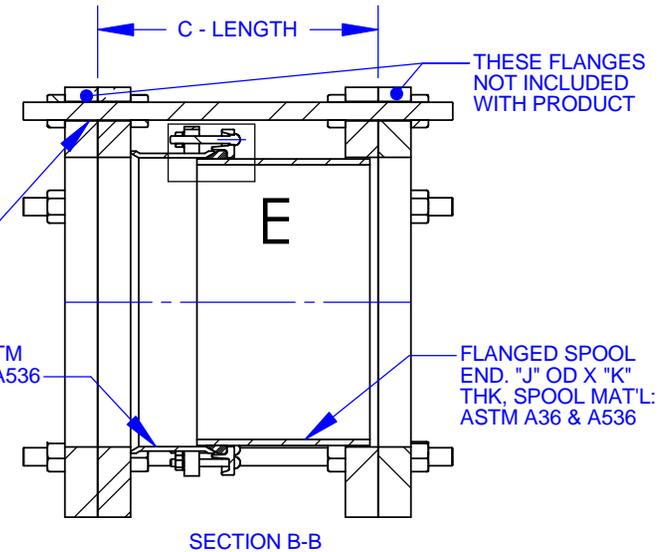
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
0	INITIAL RELEASE	10/17/2002	NST III
1	ADDED 3" SIZE	11/15/2002	NST III
2	UPDATED APPROX WEIGHT 3"-48"	7/6/2009	PNN
3	ADDED 28" SIZE	10/21/2015	NST III



\* 3" SIZE USES AN ANSI CLS 300 FLANGE WITH A FLAT FACE



TIE ROD, "F" UNC X "G" LG. "H" REQ'D, ASTM A193 GR. B7



**NOTES:**

1. COATING: CUSTOMER SPECIFIED. ROMAC NSF 61 SHOPCOAT PAINT OR NSF 61 CERTIFIED FUSION BONDED EPOXY.
2. FASTENERS: CUSTOMER SPECIFIED. HSLA PER ASTM A588 OR STAINLESS STEEL TYPE 304 OR 316 PER ASTM A193.
3. PRESSURE RATED UP TO FLANGES PROVIDED. 4"-48" AWWA CLS F 300 PSIG WORKING, 450 PSIG TEST.
4. WHEN INSTALLING, POSITION THE FLANGED COUPLING END IN THE REQUIRED LOCATION & THEN FOLLOW BOLTING INSTRUCTIONS.
5. NOT INTENDED TO PROVIDE LATERAL MOVEMENT IN PIPELINE.

PROPRIETARY NOTICE	UNLESS OTHERWISE SPECIFIED	SIGNATURES	ROMAC INDUSTRIES INC., BOTHELL, WA			
THIS DRAWING CONTAINS CONFIDENTIAL PROPRIETARY INFORMATION AND IS THE PROPERTY OF ROMAC IND., INC. IT IS TO BE USED ONLY FOR THE PURPOSE FOR WHICH IT WAS SUBMITTED AND SHALL NOT HAVE ITS INFORMATION DISCLOSED OR REPRODUCED IN WHOLE OR IN PART FOR ANY PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF ROMAC IND., INC.	DIMENSIONS ARE IN INCHES  TOLERANCES ARE ON: 1 PL DECIMALS ± .060 2 PL DECIMALS ± .030 3 PL DECIMALS ± .010 ANGLES ± 1° FRACTIONS ± 1/64	DRAWN	TITLE <b>DISMANTLING JOINT DJ400 3"-48" AWWA CLS F</b>			
		CHECKED				
		APPROVAL ORGANIZATIONS ENGINEERING	DWG. NO. <b>B2090-A</b>	SIZE <b>A</b>	REV. NO. <b>3</b>	SCALE <b>NTS</b>

# Zero-Flex® Rigid Coupling



**STYLE 07**

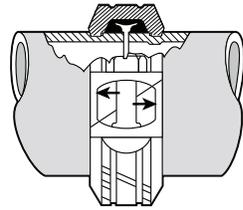
The unique angle-pad design of the Zero-Flex® Style 07 coupling adjusts to standard pipe and roll or cut groove tolerances, positively clamping the pipe to resist flexural and torsional loads. The wider key section fills more of the groove area.

The Victaulic standard rigid coupling offering for grade “EHP” or “T” gaskets is the Style 107 installation-ready rigid coupling. For all available sizes, the Style 107 is the standard rigid coupling Victaulic supplies in North America for piping systems using Grade “EHP” or “T” gaskets. Contact Victaulic for further details.

Style 07 couplings are rated up to 750 psi/5175 kPa, dependant on size, for 1 – 12”/25 – 300 mm piping systems. Rigid couplings provide rigidity for valve connections, machinery rooms, fire mains, and long straight runs. Support and hanging requirements correspond to ASME B31.1 Power Piping Code, ASME B31.9 Building Services Code and NFPA 13 Sprinkler Systems. Angle-pad design permits assembly by removing one nut/bolt and scissoring housing over gasket. This reduces the number of components to handle during assembly, speeds and eases installation.

Performance data presented in this document is based on use with standard wall, carbon steel pipe. For use with stainless steel pipe, please reference document 17.09 for pressure ratings and end loads. When used on light wall stainless steel pipe, the Victaulic RX roll set must be used to roll groove the pipe. For further information regarding roll grooving stainless steel, refer to document 17.01.

For 14 – 24”/350 – 600 mm sizes Victaulic offers the Advanced Groove System (AGS) line of products. Request publication 20.02 for information on the rigid W07 AGS coupling.



Exaggerated for clarity

**MATERIAL SPECIFICATIONS**

**Housing:** Ductile iron conforming to ASTM A-536, grade 65-45-12. Ductile iron conforming to ASTM A-395, grade 65-45-15, is available upon special request.

**Housing Coating:** Orange enamel.  
 • **Optional:** Hot dipped galvanized and others.

**Coupling Gasket:** (specify choice‡)

- **Grade “E” EPDM**  
 EPDM (Green color code). Temperature range –30°F to +230°F/–34°C to +110°C. Recommended for cold and hot water service within the specified temperature range plus a variety of dilute acids, oil-free air and many chemical services. UL classified in accordance with ANSI/NSF 61 for cold +86°F/+30°C and hot +180°F/+82°C potable water service. **NOT RECOMMENDED FOR PETROLEUM SERVICES.**
- **Grade “T” nitrile**  
 Nitrile (Orange color code). Temperature range –20°F to +180°F/–29°C to +82°C. Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Not recommended for hot water services over +150°F/+66°C or for hot dry air over +140°F/+60°C.

‡ Services listed are General Service Recommendations only. It should be noted that there are services for which these gaskets are not recommended. Reference should always be made to the latest Victaulic Gasket Selection Guide for specific gasket service recommendations and for a listing of services which are not recommended.

NOTE: Additional gasket styles are available. Contact Victaulic for details.

**Bolts/Nuts:** Heat-treated plated carbon steel, trackhead meeting the physical and chemical requirements of ASTM A-449 and physical requirements of ASTM A-183.

**JOB/OWNER**

System No. \_\_\_\_\_  
 Location \_\_\_\_\_

**CONTRACTOR**

Submitted By \_\_\_\_\_  
 Date \_\_\_\_\_

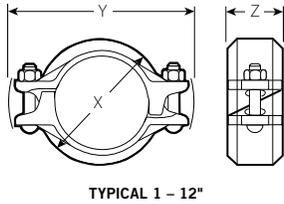
**ENGINEER**

Spec Sect \_\_\_\_\_ Para \_\_\_\_\_  
 Approved \_\_\_\_\_  
 Date \_\_\_\_\_

# Zero-Flex® Rigid Coupling

STYLE 07

**DIMENSIONS**



TYPICAL 1 – 12"

Size		Max. Work Pressure *	Max. End Load *	Allow. Pipe End Sep. †	Bolt/Nut@ No – Size	Dimensions – Inches/mm			Approx. Wgt. Each
Nominal Size Inches/mm	Actual Outside Diameter Inches/mm	psi/kPa	Lbs. N	Inches/mm	Inches	X	Y	Z	Lbs. kg
1 25	1.315 33.7	750 5175	650 2890	0.05 1.2	2 – 3/8 x 2	2.36 60	4.22 107	1.84 47	1.6 0.7
1 1/4 32	1.660 42.4	750 5175	1,620 7210	0.05 1.2	2 – 3/8 x 2	2.69 68	4.62 117	1.84 47	1.6 0.7
1 1/2 40	1.900 48.3	750 5175	2,130 9480	0.05 1.2	2 – 3/8 x 2	2.94 75	5.81 148	1.84 47	1.6 0.7
2 50	2.375 60.3	750 5175	3,320 14775	0.07 1.7	2 – 1/2 x 2 1/2	3.35 85	5.78 147	1.84 47	2.3 1.0
2 1/2 65	2.875 73.0	750 5175	4,875 21695	0.07 1.7	2 – 1/2 x 2 3/4	3.88 98	6.38 162	1.84 47	2.6 1.2
76.1 mm	3.000 76.1	750 5175	5,300 23585	0.07 1.7	2 – 12 x 70.0	4.21 107	6.61 168	1.84 47	3.6 1.6
3 80	3.500 88.9	750 5175	7,215 32105	0.07 1.7	2 – 1/2 x 2 1/2	4.54 115	6.81 173	1.84 47	3.0 1.4
4 100	4.500 114.3	750 5175	11,925 53065	0.16 4.1	2 – 1/2 x 2 3/4	5.81 148	8.21 209	2.07 53	5.3 2.4
108.0 mm	4.250 108.0	750 5175	10,635 47325	0.16 4.1	2 – 12 x 70.0	5.56 141	7.98 203	2.07 53	5.2 2.4
5 125	5.563 141.3	750 5175	18,225 81100	0.16 4.1	2 – 3/4 x 3 1/4	7.03 179	9.89 251	2.07 53	7.4 3.4
133.0 mm	5.250 133.0	700 4825	15,145 67395	0.16 4.1	2 – 16 x 82.5	6.69 170	9.60 244	2.07 53	7.4 3.4
139.7 mm	5.500 139.7	700 4825	16,625 73980	0.16 4.1	2 – 16 x 82.5	6.94 176	9.82 249	2.07 53	7.6 3.4
6 150	6.625 168.3	700 4825	24,130 107380	0.16 4.1	2 – 3/4 x 3 1/4	8.26 210	10.83 275	2.07 53	8.3 3.8
159.0 mm	6.250 159.0	700 4825	21,465 95520	0.16 4.1	2 – 16 x 82.5	7.84 199	10.54 268	2.07 53	9.2 4.2
165.1 mm	6.500 165.1	700 4825	23,225 103305	0.16 4.1	2 – 3/4 x 3 1/4	8.13 207	10.84 275	2.07 53	8.3 3.8
8 § 200	8.625 219.1	600 4130	35,000 155750	0.19 4.8	2 – 3/4 x 4 1/4	10.54 268	13.74 349	2.51 64	15.1 6.8
10 § 250	10.750 273.0	500 3450	45,400 202030	0.13 3.3	2 – 7/8 x 6 1/2	12.86 327	16.98 431	2.56 65	23.5 10.7
12 § 300	12.750 323.9	400 2750	51,000 226950	0.13 3.3	2 – 7/8 x 6 1/2	14.86 377	18.88 480	2.56 65	28.2 12.8
14 – 24 350 – 600	<b>For 14 – 24"/350 – 600 mm sizes Victaulic offers the Advanced Groove System (AGS) line of products. Request publication 20.02 for information on the rigid W07 AGS coupling.</b>								

§ Couplings 8, 10, 12"/200, 250, 300mm sizes available to JIS standard. Refer to section 06.17 for details.

\* Working Pressure and End Load are total, from all internal and external loads, based on standard weight (ANSI) steel pipe, standard **roll** or **cut** grooved in accordance with Victaulic specifications. Contact Victaulic for performance on other pipe.

WARNING: FOR ONE TIME FIELD TEST ONLY, the Maximum Joint Working Pressure may be increased to 1½ times the figures shown.

† For field installation only on roll grooved pipe or cut grooved pipe. Zero-Flex Style 07 couplings are essentially rigid and do not permit expansion/contraction.

@ Number of bolts required equals number of housing segments.

Metric thread size bolts are available (color coded gold) for all coupling sizes upon request. Contact Victaulic for details.

Style 07 couplings must **not** be used to join PVC pipe.

## Zero-Flex<sup>®</sup> Rigid Coupling

### STYLE 07

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**INSTALLATION**

Reference should always be made to the I-100 Victaulic Field Installation Handbook for the product you are installing. Handbooks are included with each shipment of Victaulic products for complete installation and assembly data, and are available in PDF format on our website at [www.victaulic.com](http://www.victaulic.com).

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**WARRANTY**

Refer to the Warranty section of the current Price List or contact Victaulic for details.

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**NOTE**

This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

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For complete contact information, visit [www.victaulic.com](http://www.victaulic.com)

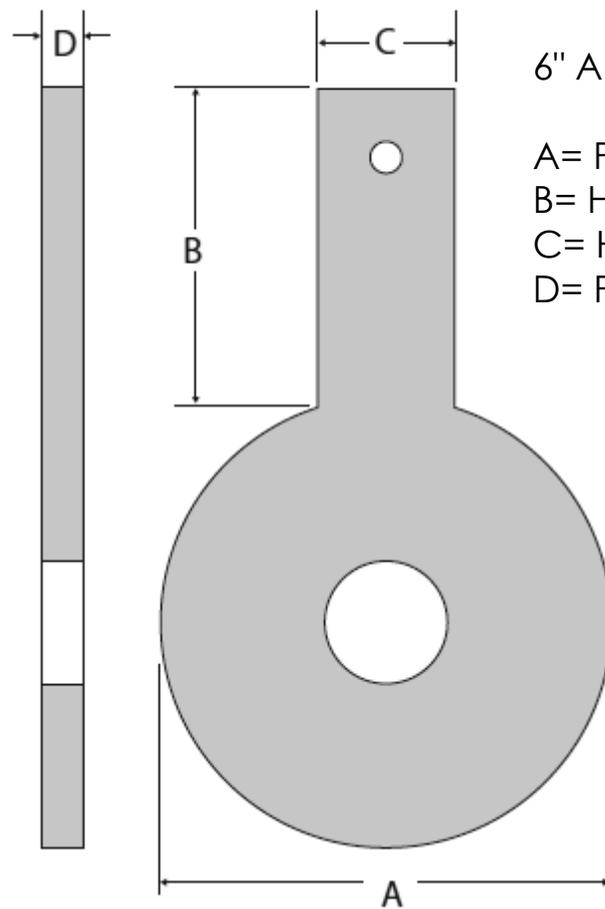
06.02 1482 REV L UPDATED 01/2013

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06.02



## Paddle-Type Orifice Plate:



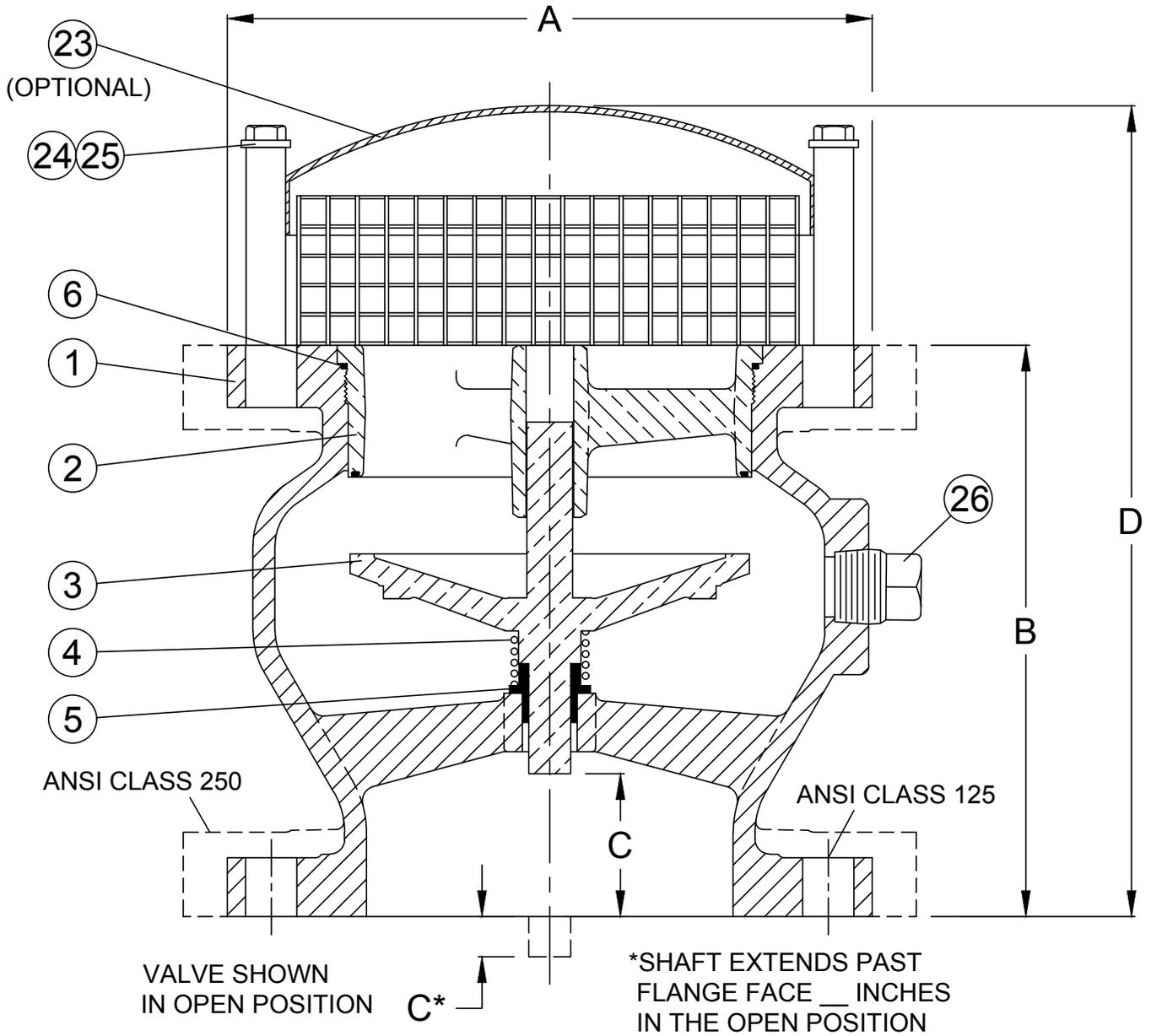
6" ANSI 300

A= Plate OD=9.875"

B= Handle Length =6"

C= Handle Width= 1.5"

D= Plate Thickness = 0.375"



SEE DRAWING NO. VM-1800AVB.1-M FOR STANDARD MATERIALS OF CONSTRUCTION.

PART NO.	NAME
1.	BODY
2.	SEAT W/BUNA-N
3.	DISC
4.	SPRING
5.	BUSHING
6.	O-RING
23.	HOOD ASSEMBLY
24.	HOOD RETAINING SCREWS
25.	HOOD WASHER
26.	1/2" PLUG (2"-2.5") 1" PLUG (3"+)

		DIMENSIONS, INCHES							
VALVE SIZE	MODEL NO.				A (125#)	A (250#)	B	C	D
	125 # CLASS (CWP)	250 # CLASS (CWP)							
2	<del>1802AVB.1</del>	<del>200</del>	1852AVB.1	400	7.00	7.50	5.50	1.00	8.82
2.5	1825AVB.1	200	1875AVB.1	400	7.00	7.50	5.50	1.00	8.82
3	1803AVB.1	200	1853AVB.1	400	7.50	8.25	6.00	1.38	9.80
4	1804AVB.1	200	1854AVB.1	400	9.00	10.00	7.25	1.75	10.5
5	1805AVB.1	200	1855AVB.1	400	10.00	11.00	8.50	2.00	11.8
6	1806AVB.1	200	1856AVB.1	400	11.00	12.50	9.75	2.50	13.8
8	1808AVB.1	200	1858AVB.1	400	13.50	15.00	12.5	3.25	17.4
10	1810AVB.1	200	1860AVB.1	400	16.00	17.50	15.5	4.25	20.4
12	1812AVB.1	200	1862AVB.1	400	19.00	20.50	14.3	-0.63	20.8

REV 2-7-17

FLANGED VACUUM BREAKER

DATE 9-23-16



VALVE AND MANUFACTURING CORP.

DRWG. NO. VMC-1800AVB

## VACUUM BREAKER

2" - 10" SERIES NO. 1800AVB.1 ANSI CLASS 125 & 250 (LEAD FREE)

### STANDARD MATERIALS OF CONSTRUCTION

<u>PART NO.</u>	<u>PART NAME</u>	<u>MATERIAL</u>
1	BODY	CAST IRON ASTM A126, CLASS B
2	SEAT	SILICON BRONZE ASTM B584, C87600 WITH BUNA-N SEAL
3	DISC	SILICON BRONZE ASTM B584, C87600
4	SPRING	STAINLESS STEEL T316, ASTM A313
5	BUSHING	ALUMINUM BRONZE ASTM B505, C95400
6	O-RING	EPDM (NSF61 AND WRAS APPROVED)
23	HOOD ASSEMBLY (OPTIONAL)	STEEL #1020
24	HOOD RETAINING SCREWS (OPT.)	STEEL GRADE 2-ZINC PLATED
25	HOOD WASHER (OPTIONAL)	STEEL-ZINC PLATED
26	PLUG	STEEL

NOTE: ALL SPECIFICATIONS AS  
LAST REVISED.

MATERIALS OF CONSTRUCTION

DATE 10/12/16

**VAL-MATIC**<sup>®</sup>

VALVE AND MANUFACTURING CORP.

DRWG. NO.

VM-1800AVB.1-M

# FUSION BONDED EPOXY (FBE) COATING

## General Description:

Fusion Bonded Epoxy is a one-part, heat cured, thermosetting epoxy coating that is applied as a dry powder to the sandblasted surface of a pre-heated valve and then fused and cured in a high-temperature oven. The result is a durable coating with exceptional abrasion and chemical resistance ideally suited for valves in water and wastewater applications.

## Advantages of FBE:

1. The coating is applied in accordance with AWWA Standard C550 "Protective Epoxy Coatings for Valves and Hydrants" and certified by to the requirements of ANSI/ NSF Standard 61 - "Drinking Water System Components - Health Effects" for coating valves and fittings.
2. FBE coatings are applied in an automated one-part process so that the mixing, surface preparation, and multiple-coat problems associated with liquid paints are eliminated.
3. The electrostatic application process for FBE provides a smooth, even coating thickness with no runs, sags, or thin spots common with applying liquid paints.
4. FBE coatings are durable and provide twice the impact strength of liquid epoxies. The surface provides high abrasion resistance and has become a standard seating material for resilient gate and check valves.
5. FBE has a long-term performance history in water and sewage environments including salt water, slurries, methane and hydrogen sulfide exposure.

## Application Process:

1. FBE is applied in an automated manufacturing process in accordance with the coating manufacturers' procedures and industry standards to assure consistency and high quality.
2. The valve is cleaned, sandblasted, and preheated in an oven.
3. An electrical charge is applied to the body and the powder is deposited over the surfaces of the valve to the specified thickness.
4. The epoxy is post cured in an oven to cure specifications and allowed to air cool to room temperature.
5. The final surface is visually and electrically (when specified) tested to verify thickness and that it is holiday free.

## Typical Performance Characteristics:

1. Color:	Blue	
2. Thickness	12-20 mils	1 Coat
3. Gloss at 60 deg:	60-80 units	Din 67 530
4. Impact Resistance	>5 Joule (44 in-lb)	Din 30 677-2
5. Elongation:	>5%	Din 30 671
6. Hardness:	>100	Din 53 153
7. Water Immersion:	No visible change	90C, 672 Hours
8. Salt Spray Test:	>3000 hours	Din 53167
9. Adhesion:	16 Mpa (2320 psi)	7 days, 90C EN 24 624

Revised 2-15-17

## FUSION BONDED EPOXY (FBE) COATING

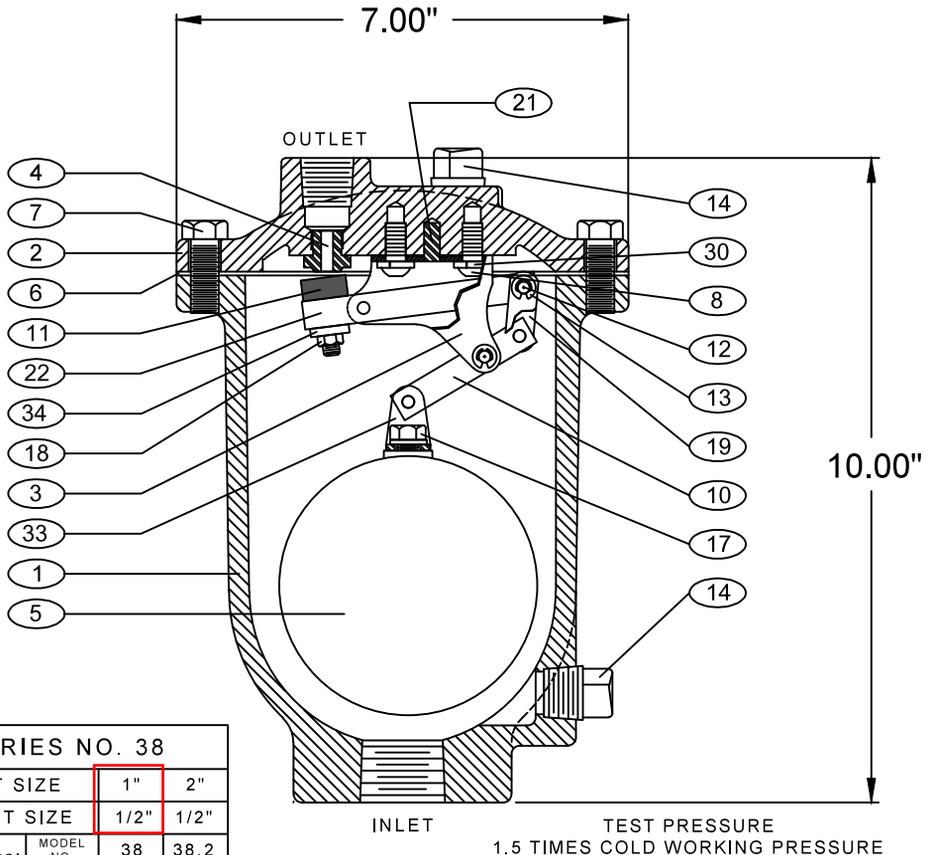
DATE 7-17-02



VALVE AND MANUFACTURING CORP.

DRWG. NO.

SS-1847



SERIES NO. 38			
INLET SIZE		1"	2"
OUTLET SIZE		1/2"	1/2"
WORKING PRESSURE	150 PSI CWP	MODEL NO.	38 38.2
		ORIFICE SIZE	3/16" 3/16"
	300 PSI CWP	MODEL NO.	38.5 38.6
		ORIFICE SIZE	5/32" 5/32"
500 PSI CWP	MODEL NO.	38HP 38HP.2	
	ORIFICE SIZE	1/8" 1/8"	

SEE DRAWING NO. VM-38-M FOR STANDARD MATERIALS OF CONSTRUCTION  
 SEE DRAWING NO. VM-38DISV-M FOR SUPER VALVE MATERIALS OF CONSTRUCTION

- |                |                    |                        |
|----------------|--------------------|------------------------|
| 1. BODY        | 8. RETAINING SCREW | 18. LOCK NUT           |
| 2. COVER       | 10. FLOAT ARM      | 19. LINK               |
| 3. LEVER FRAME | 11. ORIFICE BUTTON | 21. LOCATING PIN       |
| 4. SEAT        | 12. PIVOT PIN      | 22. ORIFICE BUTTON ARM |
| 5. FLOAT       | 13. RETAINING RING | 30. WASHER             |
| 6. GASKET      | 14. PIPE PLUG      | 33. CLEVIS             |
| 7. COVER BOLT  | 17. FLOAT RETAINER | 34. LOCK WASHER        |



WATER QUALITY  
 NSF / ANSI 61  
 2LA8

Revised 8-19-14 (Rev 1)

## AIR RELEASE VALVE

DATE 6-16-10



VALVE AND MANUFACTURING CORP.

DRWG. NO.

VMC-38

# AIR RELEASE VALVE

SERIES NO. 38

## DI SUPER VALVE MATERIALS OF CONSTRUCTION

<u>PART NO.</u>	<u>PART NAME</u>	<u>MATERIAL</u>
1	BODY	DUCTILE IRON ASTM A536, GRADE 65-45-12
2	COVER	DUCTILE IRON ASTM A536, GRADE 65-45-12
3	LEVERAGE FRAME	STAINLESS STEEL T316, ASTM A240
4	SEAT	STAINLESS STEEL T316, ASTM A582
5	FLOAT	STAINLESS STEEL T316, ASTM A240
6	GASKET	COMPRESSED NON-ASBESTOS FIBER
7	COVER BOLT	STAINLESS STEEL T316, ASTM F593
8	RETAINING SCREW	STAINLESS STEEL T316, ASTM F879
10	FLOAT ARM	STAINLESS STEEL T316, ASTM A582
11	ORIFICE BUTTON	STAINLESS STEEL & EPDM
12	PIVOT PIN	STAINLESS STEEL T316, ASTM A276
13	RETAINING RING	STAINLESS STEEL PH 15-7 MO
14	PIPE PLUG	STAINLESS STEEL
17	FLOAT RETAINER	STAINLESS STEEL T316, ASTM F593
18	LOCK NUT	STAINLESS STEEL T316, ASTM F594
19	LINK	STAINLESS STEEL T316, ASTM A240
21	LOCATING PIN	STAINLESS STEEL T420
22	ORIFICE BUTTON ARM	STAINLESS STEEL T316, ASTM A582
30	WASHER	STAINLESS STEEL T316, ASTM A240
33	CLEVIS	STAINLESS STEEL T316, ASTM A240
34	LOCK WASHER	STAINLESS STEEL T316, ASTM A240

NOTE: ALL SPECIFICATIONS AS  
LAST REVISED.

MATERIALS OF CONSTRUCTION

DATE 8/19/14

**VAL-MATIC**<sup>®</sup> VALVE AND MANUFACTURING CORP.

DRWG. NO.

VM-38DISV-M

# FUSION BONDED EPOXY (FBE) COATING

## General Description:

Fusion Bonded Epoxy is a one-part, heat cured, thermosetting epoxy coating that is applied as a dry powder to the sandblasted surface of a pre-heated valve and then fused and cured in a high-temperature oven. The result is a durable coating with exceptional abrasion and chemical resistance ideally suited for valves in water and wastewater applications.

## Advantages of FBE:

1. The coating is applied in accordance with AWWA Standard C550 "Protective Epoxy Coatings for Valves and Hydrants" and certified by to the requirements of ANSI/ NSF Standard 61 - "Drinking Water System Components - Health Effects" for coating valves and fittings.
2. FBE coatings are applied in an automated one-part process so that the mixing, surface preparation, and multiple-coat problems associated with liquid paints are eliminated.
3. The electrostatic application process for FBE provides a smooth, even coating thickness with no runs, sags, or thin spots common with applying liquid paints.
4. FBE coatings are durable and provide twice the impact strength of liquid epoxies. The surface provides high abrasion resistance and has become a standard seating material for resilient gate and check valves.
5. FBE has a long-term performance history in water and sewage environments including salt water, slurries, methane and hydrogen sulfide exposure.

## Application Process:

1. FBE is applied in an automated manufacturing process in accordance with the coating manufacturers' procedures and industry standards to assure consistency and high quality.
2. The valve is cleaned, sandblasted, and preheated in an oven.
3. An electrical charge is applied to the body and the powder is deposited over the surfaces of the valve to the specified thickness.
4. The epoxy is post cured in an oven to cure specifications and allowed to air cool to room temperature.
5. The final surface is visually and electrically (when specified) tested to verify thickness and that it is holiday free.

## Typical Performance Characteristics:

1. Color:	Blue	
2. Thickness	12-20 mils	1 Coat
3. Gloss at 60 deg:	60-80 units	Din 67 530
4. Impact Resistance	>5 Joule (44 in-lb)	Din 30 677-2
5. Elongation:	>5%	Din 30 671
6. Hardness:	>100	Din 53 153
7. Water Immersion:	No visible change	90C, 672 Hours
8. Salt Spray Test:	>3000 hours	Din 53167
9. Adhesion:	16 Mpa (2320 psi)	7 days, 90C EN 24 624

Revised 2-15-17

## FUSION BONDED EPOXY (FBE) COATING

DATE 7-17-02

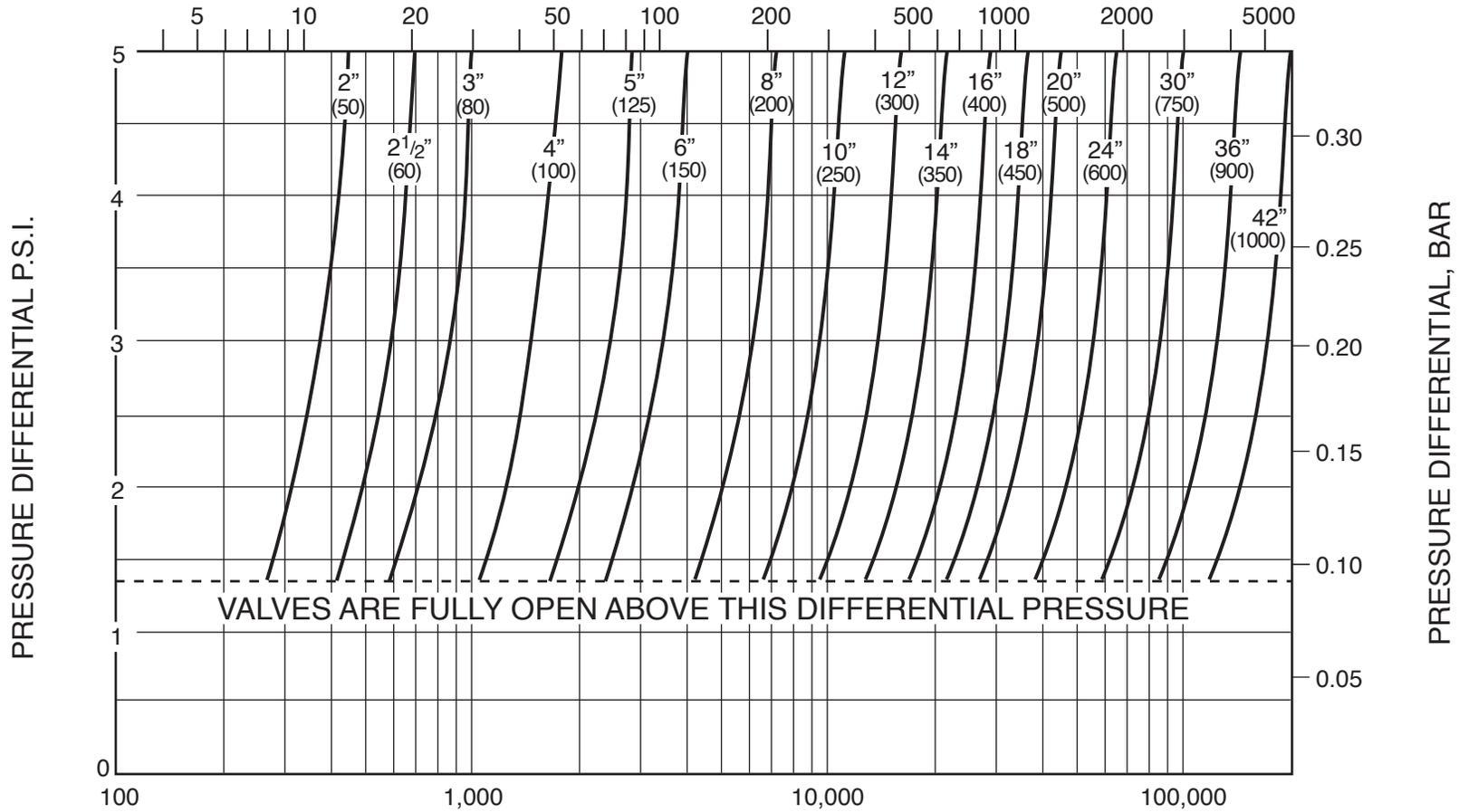


VALVE AND MANUFACTURING CORP.

DRWG. NO.

SS-1847

FLOW OF AIR IN STANDARD CUBIC METERS PER MINUTE



FLOW OF AIR IN S.C.F.M.  
(STANDARD CUBIC FEET OF FREE AIR PER MINUTE)

Revised 3-4-13

VENTING CAPACITY FOR VACUUM BREAKERS, IN. (mm)

DATE 2-10-04



VALVE AND MANUFACTURING CORP.

DRWG. NO.

SS-1971

# 87A-900 SERIES

## Stainless Steel ASME Class 300 Flanged Full Port Ball Valve - 1.5" through 2.5"

For **STANDARDS COMPLIANCE** and **STANDARD FEATURES** refer to page D-3.



### STANDARD MATERIAL LIST

PART	MATERIAL	
1	Body	ASTM A351 CF8M
2	Retainer	ASTM A351 CF8M
3	Ball	ASTM A276 Type 316 or A351 CF8M
4	Stem	ASTM A276 Type 316
5	Packing Gland	ASTM A276 Type 316
6	Stem Seals	PTFE
7	Seats	RPTFE
8	Gland Screws	ASTM A193 B8 Class 1
9	Gland Plate	316 SS
10	Stem Nut	18-8 SS
11	Lever	316 SS
12	Stem Bearing	RPTFE
13	Stop	ASTM A276 Type 316
14	Stop Screw	316 SS
15	Lock Plate	302 or 304 SS
16	Body Seal	RPTFE
17	Grounding Spring	SS
18	Body Joint Stud	ASTM A193 Grade B8M
19	Body Joint Nut	ASTM A194 Grade 8
20	Lockwasher	302 or 304 SS

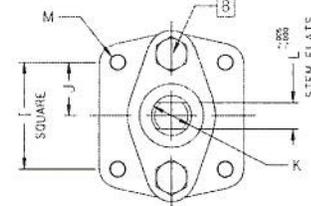
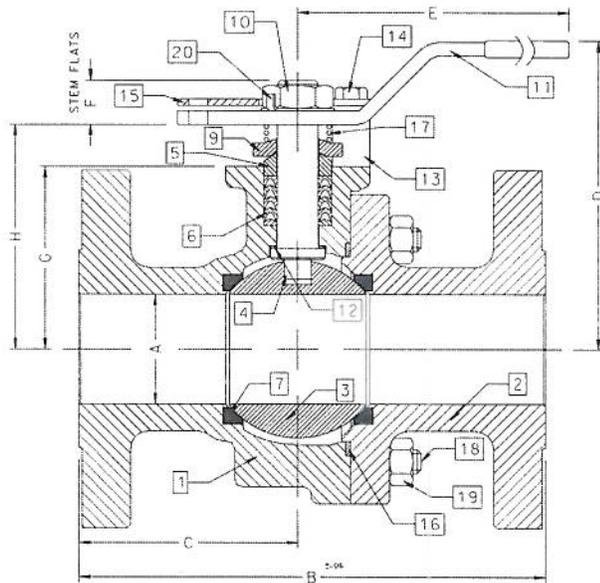
### VARIATIONS AVAILABLE:

- 87H - Hastelloy
- 87M - Monel
- 87N - Nickel
- 87S - 304L SS

### OPTIONS AVAILABLE: (More information in Section J)

- Minimum quantities apply
- To specify an option, replace the "01" standard suffix with the suffix of the option.
- To specify multiple options, replace the "01" suffix with the desired suffixes in the numerical order shown below. NOTE: Not all suffixes can be combined together.

(SUFFIX)	OPTION
-01	Standard Configuration
-04	2.25" Stem Extension (Carbon Steel, Zinc Plated)
-14	Side Vented Ball (Uni-Directional)
-21	UHMWPE Seats
-24	Graphite packing, spiral wound graphite body seal, RPTFE bearing (API 607, 6th edition, ISO 10497:2010)
-35	PTFE Seats and Seals
-38	PEEK Seats and Graphite Packing (3" Only)
-49	No Lubrication. Assembled Dry.
-57	Oxygen Cleaned
-65	MPTFE Seats and Graphite Packing (Fire Safe)
-69	Drilled and Tapped Purge Ports with Plugs
-70	4" Extended Bonnet
-73	316 SS Spiral Wound Gaskets w/PTFE Filler
-76	Live Loaded (Lever)
-77	Live Loaded (Gear, Actuator)
-80	Multi-Seal (Super TFE)
-82	Flat Face Flanges
-90	Double Packed 4" Extended Bonnet
-9P	Double Packed 4" Extended Bonnet with Monitoring Port
-EP	Garlock EVSP Stem Packing w/Spiral Wound Graphite Gasket (Fire Safe by Design)
-KF	PCTFE Stem Bearing
-MG	Gear Operator with Standard Handwheel
-MH	Gear Operator with Standard Handwheel & Locking Device
-MJ	Gear Operator with Oversize Handwheel
-MK	Gear Operator with Oversize Handwheel & Locking Device
-MP	Positive Material Identification
-TC	With Test Certificate
-TD	Tested to API Spec 6D
-UL	UL & CSA Listed (w/Markings)



ACTUATOR MOUNTING

FOR PRESSURE/TEMPERATURE RATINGS, REFER TO PAGE M-11, GRAPH NO. 6

PRODUCT NUMBER	SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	WT.
87A-907-01	1.5"	1.50	7.50	3.50	4.62	6.65	0.72	2.41	3.09	1.949	0.974	0.625	0.412	5/16-18	21
87A-908-01	2"	2.00	8.50	4.00	5.61	8.41	0.80	3.31	4.08	1.949	0.974	0.750	0.477	5/16-18	37
87A-909-01	2.5"	2.50	9.50	4.44	6.24	8.41	0.80	3.94	4.71	1.949	0.974	0.750	0.477	5/16-18	57

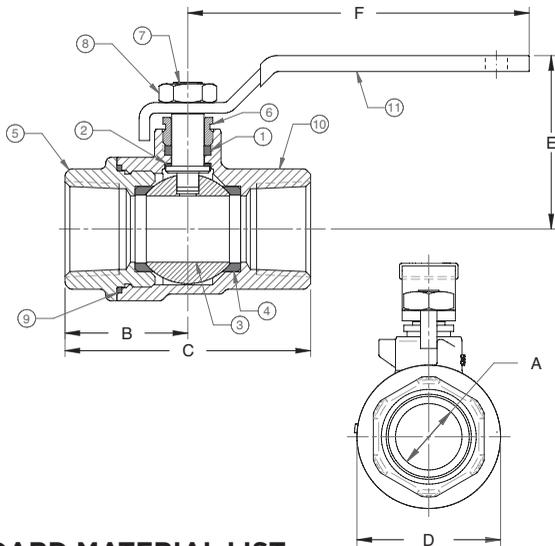


Female NPT Thread, 1/4"-3" 1000 CWP (psig), Cold Non-Shock. (See referenced P/T chart)  
150 psig Saturated Steam.  
Vacuum Service to 29 inches Hg.  
MSS SP-110 Compliant.  
Designed, cast, machined, assembled, and 100% factory tested in USA.

**FEATURES**

- Investment cast components
- Reinforced seats
- Blowout-proof stem design
- Adjustable packing gland
- Stainless steel lever and nut

- Fire safe to API 607 (requires -24 suffix)
- Meets NACE MR0175 (2000) & MR0103 (2012)
- CSA CGA 3.16-M88 (Requires "GS" suffix)
- NSF/ANSI 61 Section 8, Annex G (1/4" to 2")
- NSF/ANSI 372 - Drinking Water System Components - Lead Content



**OPTIONS AVAILABLE**

(MORE INFORMATION IN SECTION J)

- Minimum quantities apply
- To specify an option, replace the "01" standard suffix with the suffix of the option.
- To specify multiple options, replace the "01" suffix with the desired suffixes in the numerical order shown below. NOTE: Not all suffixes can be combined together.

(SUFFIX)	OPTION	SIZES
-01	Standard Configuration	All
-P -01-	BSPP (Parallel) Thread Connection	1/2" to 2"
-T -01-	BSPT (Tapered) Thread Connection	1/2" to 3"
-02-	Stem Grounded	1/2" to 3"
-04-	2.25" Stem Extension (Carbon Steel, Zinc Plated)	1/2" to 2"
-08-	90° Reversed Stem	1/2" to 2"
-11-	Therma-Seal™ Insulating Tee Handle	1/4" to 2"
-14-	Side Vented Ball (Uni-Directional)	3/8" to 3"
-24-	Graphite packing, PTFE body seal, RPTFE bearing (Fire Safe API 607, 6th edition, ISO 10497:2010)	1/2" to 3"
-27-	SS Latch-Lock Lever & Nut	3/8" to 3"
-30-	Cam-Lock and Grounded	1/2" to 2"
-32-	SS Tee Handle & Nut	1/2" to 2"
-35-	PTFE Trim	3"
-39-	SS Hi-Rise Locking Wheel Handle, SS Nut	1/2" to 2"
-40-	Cyl-Loc and Grounded	1/2" to 2"
-44-	Seal Welded	1/4" to 3"
-45-	Less Lever & Nut	1/2" to 3"
-46-	Latch Lock Lever - Lock in Closed Position Only	1/2" to 2"
-47-	SS Latch Lock Oval Handle	1/2" to 2"
-48-	SS Oval Handle (No Latch) & Nut	1/4" to 2"
-49-	No Lubrication. Assembled Dry.	1/2" to 3"
-50-	2.25" CS Locking Stem Extension	1/2" to 2"
-56-	Multifill Seats & Packing	1/2" to 3"
-57-	Oxygen Cleaned	1/4" to 3"
-60-	Static Grounded Ball & Stem	1/2" to 3"
-GS	CSA CGA 3.16 (RTFE Seat - All sizes)	All

**STANDARD MATERIAL LIST**

PART	MATERIAL
1	Stem packing MPTFE
2	Stem bearing RPTFE
3	Ball A276-316SS (1/4" to 2", except 1.25") A276-316SS or A351-CF8M stainless (1.25") A351-CF8M stainless (3")
4	Seat (2) RPTFE (2" & smaller); RTFM (3")
5	Retainer ASTM A276-316SS (1/4" & 3/8") ASTM A351-CF8M stainless (1/2" to 3")
6	Gland A276-316 Stainless Steel
7	Stem A276-316 Stainless Steel
8	Lever nut 304 Stainless Steel
9	Body Seal RPTFE (1/2" to 3")
10	Body A351-CF8M
11	Lever and grip SS w/vinyl

**DIMENSIONS**

PRODUCT NO.	SIZE	A	B	C	D	E	F	WT.
76F-101-01	1/4"	0.37	0.95	1.91	1.12	1.60	3.85	0.47
76F-102-01	3/8"	0.37	0.95	1.91	1.12	1.60	3.85	0.44
76F-103-01A	1/2"	0.50	1.21	2.35	1.27	1.73	3.85	0.57
76F-104-01A	3/4"	0.81	1.39	2.77	1.62	1.96	3.85	0.91
76F-105-01A	1"	1.00	1.67	3.34	2.00	2.27	4.75	1.38
76F-106-01A	1.25"	1.25	1.96	3.92	2.73	3.21	7.77	4.17
76F-107-01A	1.5"	1.50	2.05	4.10	2.92	3.31	7.77	4.69
76F-108-01A	2"	2.00	2.37	4.74	3.75	3.69	7.77	6.90
76F-100-01A	3"	3.00	3.70	7.40	5.68	5.23	10.00	22.40

**Pressure/Temperature Ratings - Page M-12, Graph No. 8**

\*LEAD FREE: The wetted surfaces of this product shall contain no more than 0.25% lead by weighted average. Complies with Federal Public Law 111-380. ANSI 3rd party approved and listed.  
REV. 14FEB18

The listed  $C_v$  "factors" are derived from actual flow testing, at Apollo's Pageland, South Carolina factory. These tests were completed using standard "off the shelf" valves with no special preparation and utilizing standard schedule 40 pipe. It should be understood that these factors are for the valve only and also include the connection configuration. The flow testing is done utilizing water as a fluid media and is a direct statement of the gallons of water flowed per minute with a 1 psig pressure differential across the valve/connection unit. Line pressure is not a factor. Because the  $C_v$  is a factor, the formula can be used to estimate flow of most media for valve sizing.

**FLOW OF LIQUID**

$$Q = C_v \sqrt{\frac{\Delta P}{SpGr}}$$

$$\text{or } \Delta P = \frac{(Q)^2 (SpGr)}{(C_v)^2}$$

**WHERE:**

- Q = Flow in US gpm
- ΔP = Pressure drop (psig)
- SpGr = Specific gravity at flowing temperature
- $C_v$  = Valve constant

**FLOW OF GAS**

$$Q = 1360 C_v \sqrt{\frac{(\Delta P) (P_2)}{(SpGr) (T)}}$$

$$\text{or } \Delta P = \frac{5.4 \times 10^{-7} (SpGr) (T) (Q)^2}{(C_v)^2 (P_2)}$$

**WHERE:**

- Q = Flow in SCFH
- ΔP = Pressure drop (psig)
- SpGr = Specific gravity (based on air = 1.0)
- P2 = Outlet pressure-psia (psig + 14.7)
- T = (temp. °F + 460)
- $C_v$  = Valve constant

**CAUTION:** The gas equation shown, is valid at very low pressure drop ratios. The gas equation is NOT valid when the ratio of pressure drop (ΔP) to inlet pressure (P1) exceeds 0.02.

**NOTE:** Only use the gas equation shown if (P1-P2)/P1 is less than 0.02.

**CV FACTORS FOR APOLLO® VALVES (CONTINUED ON M-4)**

VALVE	SIZE (IN.)															
	1/4	3/8	1/2	3/4	1	1.25	1.5	2	2.5	3	4	6	8	10	12	
70B-140 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--	
70-100/200 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--	
70-300/400 Series	--	--	15	30	43	48	84	108	--	--	--	--	--	--	--	
70-600 Series	2.3	4.5	5.4	12	14	21	34	47	--	--	--	--	--	--	--	
70-800 Series	8.4	7.2	15	30	43	48	84	--	--	--	--	--	--	--	--	
71-AR Series	--	--	--	30	43	48	84	108	190	370	--	--	--	--	--	
71-100/200 Series	--	--	--	30	43	48	84	108	190	370	--	--	--	--	--	
72-100/900 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--	
72-1xx-A/72-9xx-A Series	--	--	26	48	65	125	170	245	--	--	--	--	--	--	--	
73A-100 Series	8.4	7.2	15	30	43	48	84	108	--	--	--	--	--	--	--	
73-300/400 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--	
74-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--	
75-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--	
76-AR Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--	
76F-100 Series	8.1	15	15	51	68	125	177	389	--	--	--	--	--	--	--	
76FJ-100 Series	8.1	15	15	51	68	125	177	389	--	--	--	--	--	--	--	
76FK-100 Series	8.1	15	15	51	68	125	177	389	--	--	--	--	--	--	--	
76-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--	
76-300/400 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--	
76-600 Series	2.3	4.5	5.4	12	14	21	34	47	--	--	--	--	--	--	--	
76J-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--	
76J-AR Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--	
76K-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--	
76K-AR Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--	
7K-100 Series	--	--	15	51	68	125	177	389	503	--	--	--	--	--	--	
77-AR Series	8.1	15	15	51	68	--	177	389	--	--	--	--	--	--	--	

REV. 21APR17

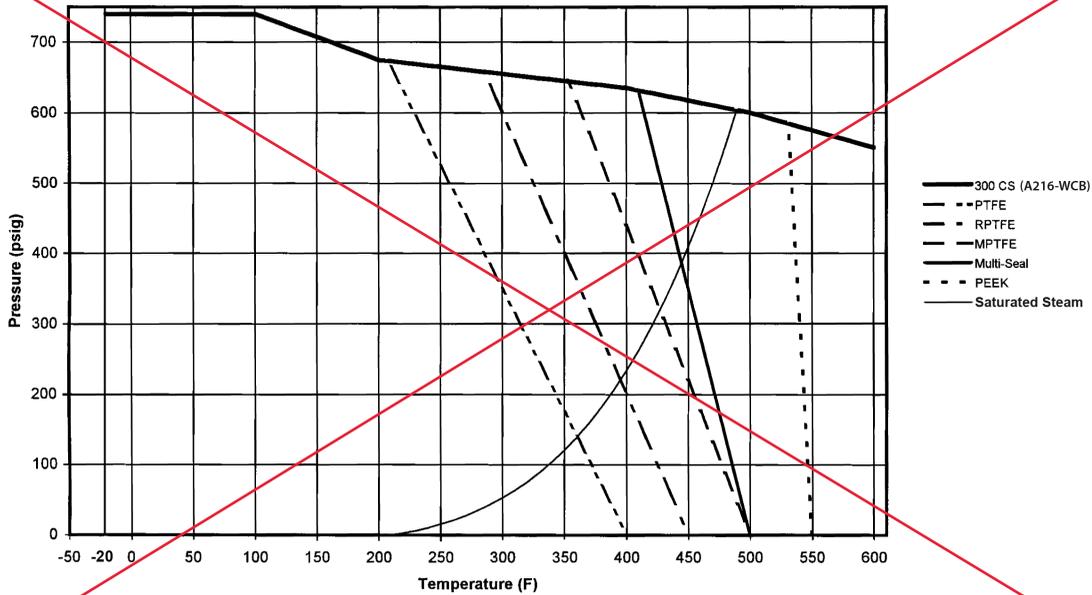
**CV FACTORS FOR APOLLO® VALVES (CONTINUED FROM M-3)**

VALVE	SIZE (IN.)														
	1/4	3/8	1/2	3/4	1	1.25	1.5	2	2.5	3	4	6	8	10	12
77C-100/200 Series	4.5	7.2	16	36	68	125	177	389	503	--	--	--	--	--	--
77D-140 Series	4.5	7.2	16	36	68	125	177	389	--	--	--	--	--	--	--
77D-640 Series	--	--	--	11	24	35	--	--	--	--	--	--	--	--	--
77G-UL Series	4.5	7.2	16	36	68	125	177	389	503	--	--	--	--	--	--
77W Series	--	--	16	36	68	125	177	389	--	--	--	--	--	--	--
77-100/200 Series	8.1	15	15	51	68	125	177	389	503	--	--	--	--	--	--
79 Series	8.5	8.5	9.8	32	44	66	148	218	440	390	--	--	--	--	--
80 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
82-100/200 Series	8.1	14	26	51	68	120	170	376	510	996	1893	--	--	--	--
83A/83B Series	8.1	14	26	51	68	120	170	376	--	--	--	--	--	--	--
83R-100/200 Series	--	--	--	--	--	--	170	376	--	996	1893	--	--	--	--
86A/86B Series	8.1	14	26	51	68	120	170	376	--	--	--	--	--	--	--
86R-100/200 Series	--	--	--	--	--	--	170	376	--	996	1893	--	--	--	--
87A-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87A-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87A-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87A-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87A-F00 Series	--	--	--	--	75	--	195	410	545	1021	2016	4837	--	--	--
87B-100 Series	--	--	--	--	--	--	--	--	--	375	673	1099	1902	3890	--
87J-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87J-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87J-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87J-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87K-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87K-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87K-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87K-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
88A-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
88A-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
88A-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
88A-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
88A-F00 Series	--	--	--	--	75	--	195	410	545	1021	2016	4837	--	--	--
88B-100 Series	--	--	--	--	--	--	--	--	--	375	673	1099	1902	3890	--
89-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
9A-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
90-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
92-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
93-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
94A-100/200 Series	6	7	19	34	50	104	268	309	629	1018	1622	--	--	--	--
96-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
399-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
489-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--

**CLASS 300**

**(CS) ASTM A216-WCB**

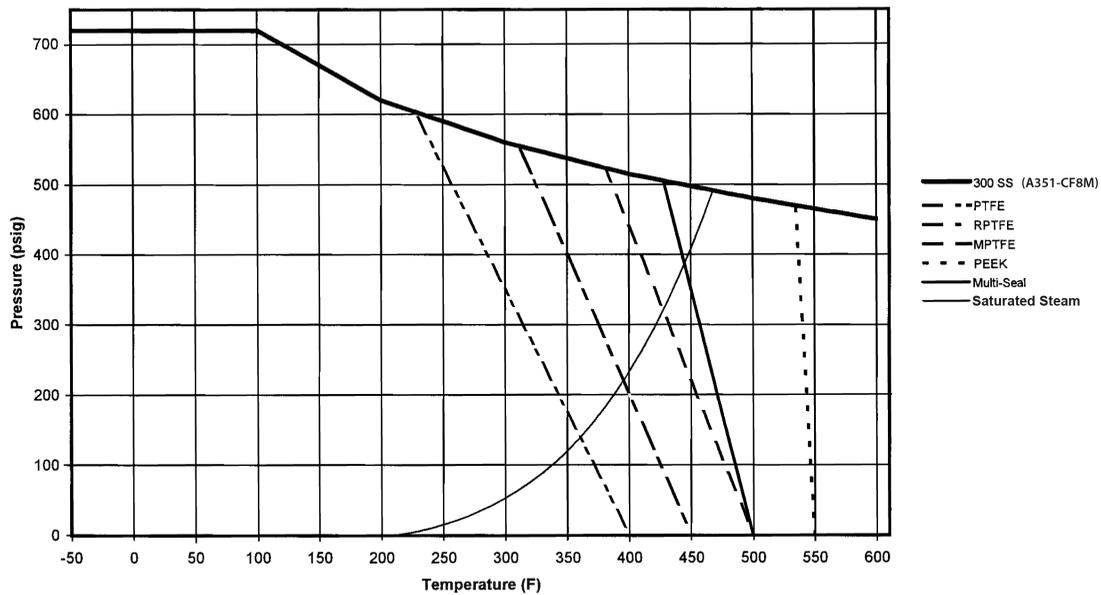
**GRAPH 5**



**CLASS 300**

**(SS) ASTM A351-CF8M**

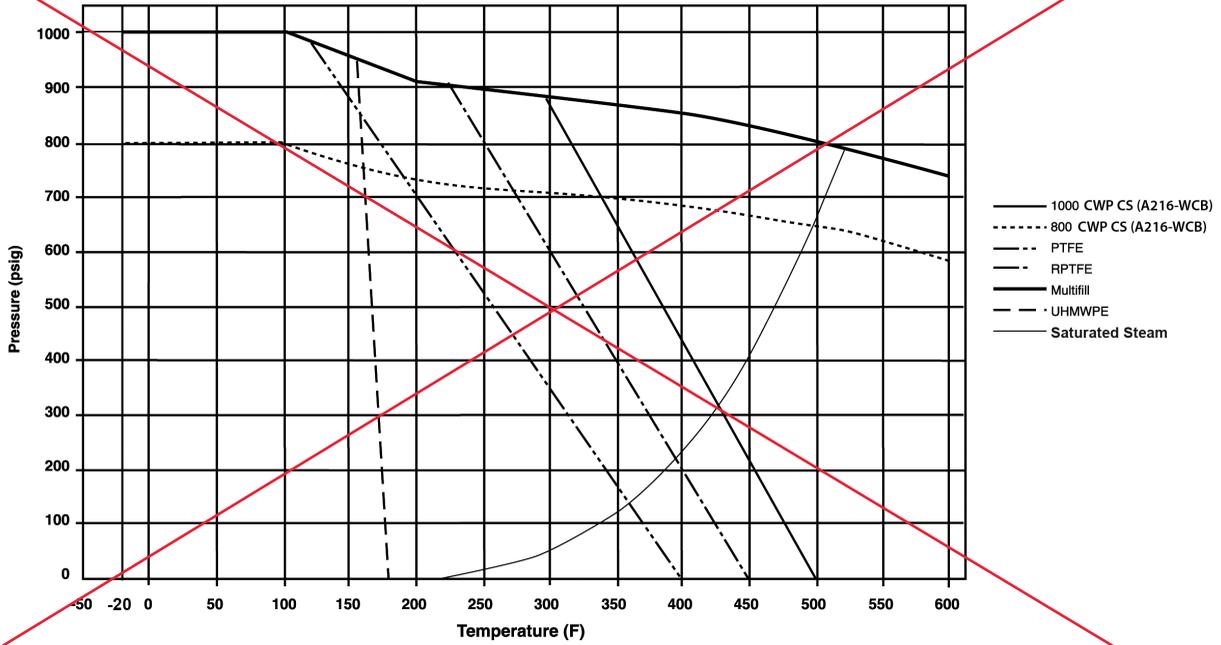
**GRAPH 6**



1000 CWP

(CS) ASTM A216-WCB

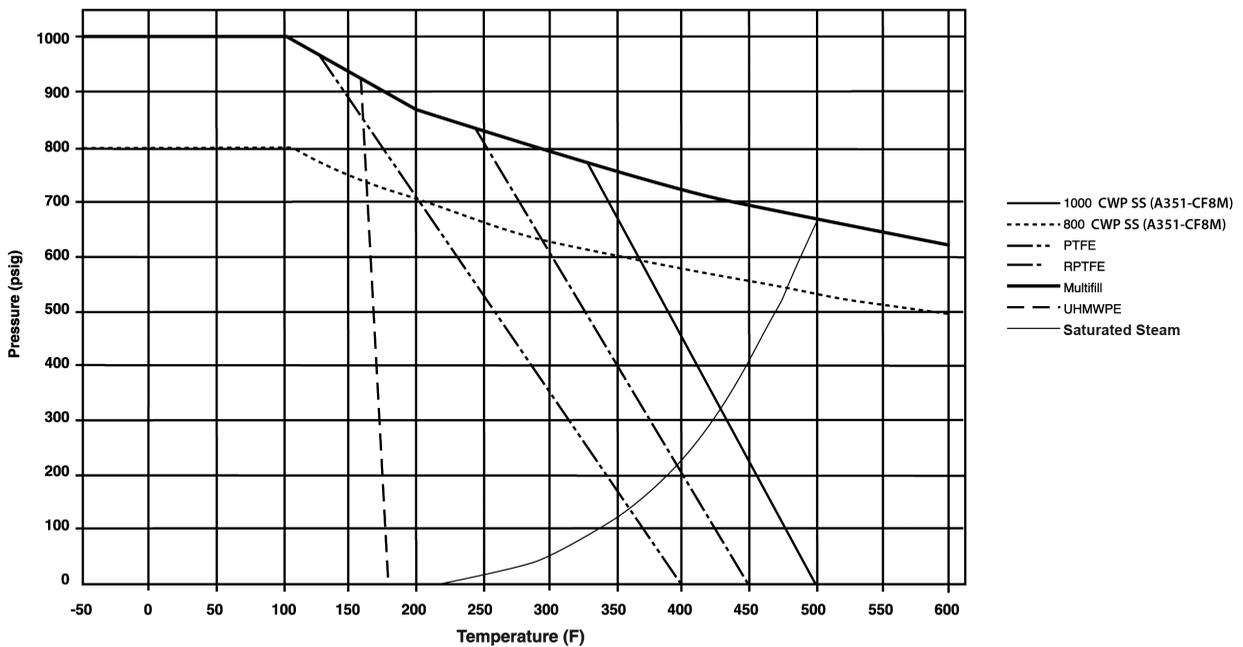
GRAPH 7



1000 CWP

(SS) ASTM A351-CF8M

GRAPH 8





# Model HBV2/HBVAF2/HBDUC HOSE CONNECTION VACUUM BREAKERS

(38-300/400 SERIES)

Job Name:	Contractor:
Job Location:	P.O. Number:
Engineer:	Representative:
Tag:	Wholesale Distributor:

## DESCRIPTION

The Apollo® Models HBV2, HBVAF2 and HBDUC Hose Connection Vacuum Breakers are designed to prevent cross-connection caused by back-siphonage. The Apollo® Model HBDUC Hose Bibb Dual Check Backflow Preventer also prevents backflow due to low head back-pressure.

## FEATURES

### HBV2 (38-314)

- Tamper-proof protection
- Corrosion resistant
- Manual drain feature

### HBVAF2 (38-414)

- For wall and yard hydrant application
- Tamper-proof protection
- Corrosion resistant
- Anti-Freeze automatic drain feature

### HBDUC (38-304-02)

- Corrosion resistant body and checks
- Low head loss
- Easy to install with break-away set screw

## MATERIAL SPECIFICATIONS

Part Name (HBV2/HBVAF2)	Material
Body	Brass
Check Disc/Diaphragm	Buna-N
Spring	Stainless Steel

Part Name (HBDUC)	Material
Body	Brass
Seats	EPDM
Check Components	Stainless Steel
Check Guide	Acetal

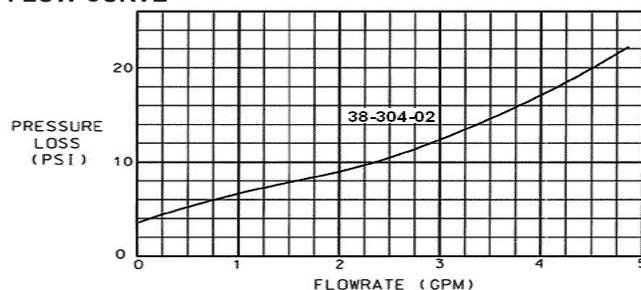
## PERFORMANCE RATING

Maximum Supply Pressure 125 psi  
Temperature Range 33 °F – 180 °F

## APPROVALS

ASSE® 1011, CSA® B64.2 and IAPMO® listed (38-314/414)  
ASSE® 1052 (38-304-02); CSA® and IAPMO® pending

## FLOW CURVE



## ORDERING INFORMATION (HOSE BIBB VACUUM BREAKERS)

3 8 - X 1 4 - X X

SERIES \_\_\_\_\_  
FINISH \_\_\_\_\_

## SERIES

- 3 – 300 Series (3/4" Hose Connection)
- 4 – 400 Series (3/4" Hose Connection)

## FINISH

- AS – Satin Brass
- CS – Satin Chrome \*HBV2 Only\*

Example: 38-414-AS = 3/4" Satin Brass Anti-Freeze Hose Connection Vacuum Breaker

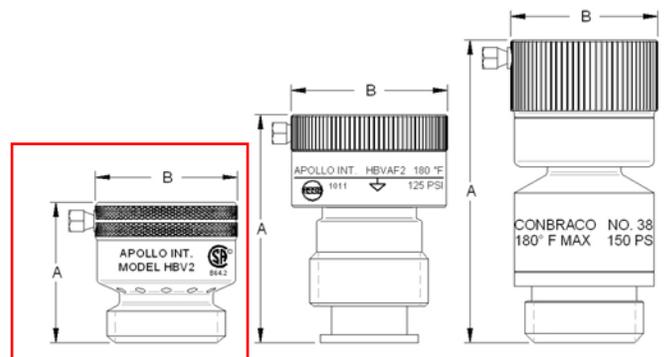
## ORDERING INFORMATION (HOSE BIBB DUAL CHECK)

3 8 - 3 0 4 - 0 2

\*Satin Brass Finish Only\*

## DIMENSIONS (in.)

Model No.	HBV2-34	HBVAF2-34	HBDUC-34
Item No.	38-314-AS	38-414-AS	38-304-02
A	1-1/4	2	2-11/16
B	1-1/4	1-3/8	1-5/16
Wt. (lbs)	0.15	0.25	0.46



Conbraco Industries, Inc. 701 Matthews Mint Hill Rd. Matthews NC 28105 USA; [www.apollovalves.com](http://www.apollovalves.com); 704-841-6000

This specification is provided for reference only. Conbraco reserves the right to change any portion of this specification without notice and without incurring obligation to make such changes to Conbraco products previously or subsequently sold.

**ELECTRONIC PRESSURE MEASUREMENT PRODUCTS****Model 88 Pressure Transmitter****5-Year  
Warranty****DESCRIPTION**

The Model 88 is the most durable, accurate and cost-effective pressure transmitter presently available. A full-featured, all stainless steel transmitter, it is designed for years of stable performance in even the toughest environmental and media conditions. Approvals include ratings for CSA, for both intrinsic safety and explosion-proof, and FM for explosion-proof only. The Model 88 also meets NACE standards for offshore applications. A five year warranty is standard for the 88C.

The small size and light weight of the Model 88 transmitter eliminates the need for complicated mounting hardware and mechanical supports, thereby reducing installation time substantially. The integral junction box permits simple field wiring without the need for additional hardware, adding to the speed and ease of installation.

A 4 to 20 mA output is standard with a 12 to 40 VDC power supply. With all 316 stainless steel welded construction, the Model 88 is compatible with corrosive media and hazardous environments. With the cover retained by a stainless steel chain and no internal jumpers for span turndown, losses due to misplaced or dropped parts are eliminated.

**FEATURES**

- A miniature, low-priced, full-featured transmitter – just 1.67 lb.
- All welded 316 stainless steel construction and wetted parts (no aluminum)
- Ranges from 0 to 3 through 0 to 5000 psig (0 to 0.2 to 0 to 350 bar)
- 0.25% accuracy
- Zero and span adjustability
- Full 5:1 range turndown
- Integral junction box
- FM for explosion-proof; CSA for explosion-proof and intrinsically safe
- 4 to 20 mA output at 12 to 40 VDC
- 5-year warranty

**OPERATION**

The heart of the Model 88 pressure transmitter is a silicon piezoresistive sensing chip. This miniature microetched semiconductor gives a voltage output proportional to the applied pressure. The chip is isolated from the process media by a stainless steel diaphragm. A silicone oil or other specified fill fluid is used to transmit the process pressure to the sensor.

An amplifier PCB enclosed in a sealed chamber is used to convert the millivolt signal from the sensor to a calibrated 4 to 20 mA transmitter output. Feedthroughs for EMI and RF protection are used between the amplifier board and the terminal housing.

Each transmitter is tested over both pressure and temperature ranges. A compensator circuit is used to bring the output of the sensor into specification. After compensation, every transmitter is tested a second time for pressure and temperature effects to ensure that it meets performance and specifications.





## ELECTRONIC PRESSURE MEASUREMENT PRODUCTS

# Model 88 Pressure Transmitter

### SPECIFICATIONS

#### Functional Specifications

**Service:** Liquid, gas or vapor

**Range Limits:**

- 0/3 to 0/6 psi (0/0.2 to 0/0.4 bar) consult factory
- 0/6 to 0/15 psi (0/0.4 to 0/1 bar)
- 0/15 to 0/30 psi (0/1 to 0/2 bar)
- 0/20 to 0/100 psi (0/1.4 to 0/7 bar)
- 0/60 to 0/300 psi (0/4 to 0/20 bar)
- 0/200 to 0/1000 psi (0/14 to 0/70 bar)
- 0/600 to 0/3000 psi (0/40 to 0/200 bar)
- 0/1000 to 0/5000 psi (0/70 to 0/350 bar)

**Output:** 4 to 20 mA DC, limited to 30 mA DC

**Power Supply:** 12 to 40 VDC with reverse polarity protection

**Loop Resistance:** 1400 ohms maximum at 40 volts

**Turndown:** 5:1

**Zero Adjust:** ±10%

**Span Adjust:** ±10%

**Temperature Limits:**

- Electronics (Ambient): -40° to 140° F (-40° to 60° C)
- Process Interface: -40° to 212° F (-40° to 100° C)
- Storage: -40° to 212° F (-40° to 100° C)

**Overrange:** 300% upper range limit

**Humidity Limits:** 0 to 100% RH

#### Performance Specifications

**Accuracy:** ±0.25% of calibrated span including linearity, hysteresis and repeatability

**Response Time:** Time constant of 20 milliseconds

**Stability:** ±0.5% of upper range limit for six months

**Temperature Effect (includes zero and span):**

- Compensated: -20° to 180° F (-29° and 82° C)
- Between 30° and 130° F (-1° and 54° C): ±1% of URL per 50° F (28° C)
- Between -20° and 180° F (-29° and 82° C): ±1.6% of URL per 50° F (28° C)

**Power Supply Effect:** ±0.005 full scale per volt

**Surge Protection:** Standard

**Vibration Effect:** ±0.1% of upper range limit for 3 g to 200 Hz

**Position Effect:** 0.05%/90° tilt

**Overrange Effect:** ±0.15% full scale per 200% of maximum range

#### Physical Specifications

**Process Wetted Parts:** 316 stainless steel

**NonWetted Parts:** 316 stainless steel

**Cast Head:** CF-8M (316 cast stainless steel)

**O-ring:** BUNA-N

**Fill Fluid:** DC 200 silicone (standard)

**Process Connection:** 1/2 NPTF

**Electrical Connection:** 1/2 NPTF

**Weight:** 1.67 lbs.

#### Classifications

**Model 88C**

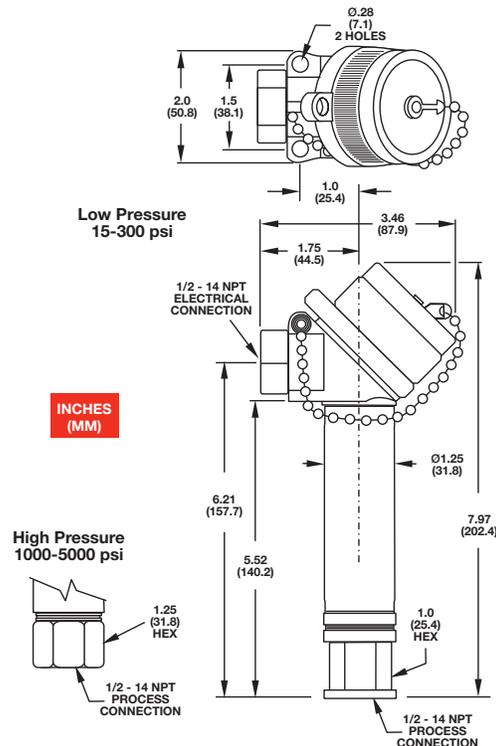
**Factory Mutual:**

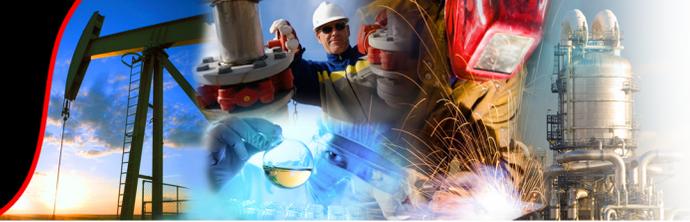
Explosion-proof for Class I, II, III, Division 1, Groups B, C, D, E, G for hazardous locations. NEMA 4 Enclosure.

**Canadian Standards Association:**

Exia-intrinsically safe for Class I, Division 1 and 2, Groups A, B, C, D; Class II, Groups E, F, G when connected per AMETEK Dwg. BK750483.

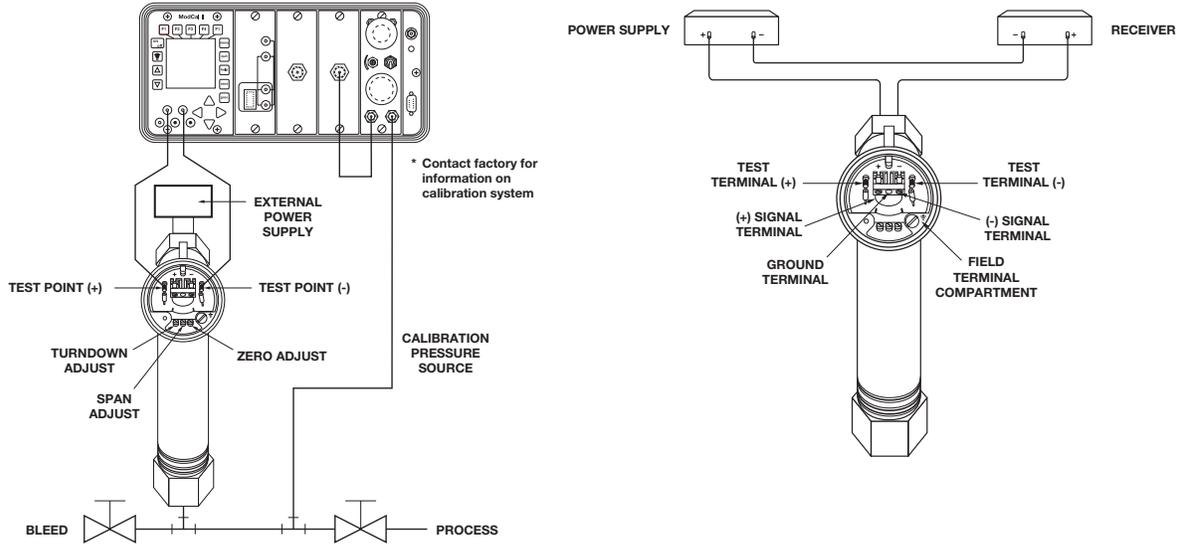
Explosion-proof for Class I, Division 1, Groups B, C, D; Class II, Groups E, F, G; Class III for hazardous locations. Enclosure 4, temperature Code T3C (160° C)





## ELECTRONIC PRESSURE MEASUREMENT PRODUCTS

# Model 88 Pressure Transmitter



Model Numbering:					
●	<b>88 Pressure Transmitter</b>				
88	Pressure transmitter				
●	<b>Approvals</b>				
C	FM certified for explosion-proof and CSA certified for explosion-proof and intrinsic safety				
●	<b>Pressure ranges</b>				
001	3 to 15 psi (21 to 104 kPa)				
002	0/6 to 0/15 psi (0/0.4 to 0/1 bar)				
003	0/15 to 0/30 psi (0/1 to 0/2 bar)				
004	0/20 to 0/100 psi (0/1.4 to 0/7 bar)				
005	0/60 to 0/300 psi (0/4 to 0/20 bar)				
006	0/200 to 0/1000 psi (0/14 to 0/70 bar)				
007	0/600 to 0/3000 psi (0/40 to 0/200 bar)				
008	0/1000 to 0/5000 psi (0/70 to 0/350 bar)				
Non-std.	0/3 to 0/6 psi (0.2 to 0/0.4 bar) Consult factory				
●	<b>Material</b>				
A	316 SS (base), 316 SS (diaphragm), silicone (liquid fill)				
	Other Consult factory				
●	<b>Output</b>				
2	4 to 20 mADC				
●	<b>Calibration ranges</b>				
	Will be calibrated at maximum range in psi if not specified				
88	C	004	A	2	0-50 psi

\* Consult factory for additional options

**MODEL 88C PIPING**

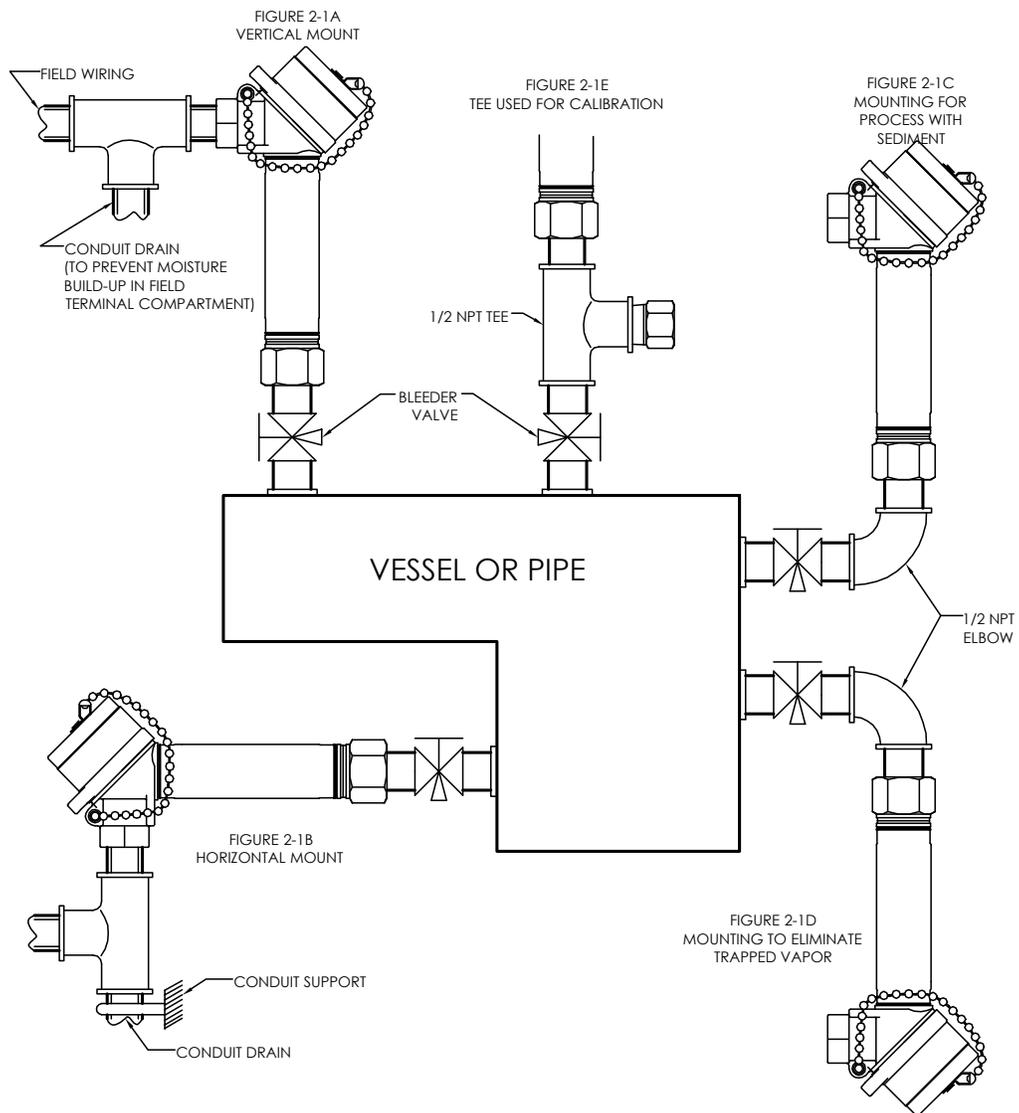
Transmitter mounting is shown in Figure 2-1A and 2-1B of Figure 2-1 below.

Conduit drain should be provided to prevent moisture buildup in the conduit compartment.

Figure 2-1C shows a transmitter mounting with an elbow used to prevent sediment in the process from clogging the line.

Figure 2-1D shows a transmitter mounting with an elbow used to eliminate trapped vapor.

Figure 2-1E shows a tee which can be used for calibration.



**FIGURE 2-1  
MODEL 88C/D PIPING**

## SECTION II

## INSTALLATION

### WIRING

**WARNING:** Power must be off while connections are made to the field terminals.

There are two field terminals (+ Signal & - Signal) located on the terminal board in the field terminal compartment. (The circuit is protected from reversing polarity).

To wire the transmitter to receiver and power supply:

1. The field terminal will accept a stripped wire lead from No. 14 AWG to No. 22 AWG.
2. Install wire between the negative terminal of the transmitter and the positive terminal of the receiver, see figure 2-3.
3. Install wire between the positive terminal of the transmitter and the positive terminal of the power supply, see figure 2-3.

4. Install wire between the negative terminal of the receiver and the negative terminal of the power supply, see figure 2-3.

5. The transmitter housing should be connected to earthground for safety reasons. Figure 2-3 shows the case ground screw that is to be used to attach a properly grounded safety wire.

6. Seal wires entering the housing with sealing compound to prevent water from entering the field terminal compartment.

There are two test terminals (TP+ & TP-) located on the terminal board in the field terminal compartment.

Test terminals have the same output signal (4 to 20mADC) as the signal terminals and are provided as an in-circuit monitor, see Figure 2-3.

**NOTE:** The cover must be closed tightly to ensure explosion proof design.

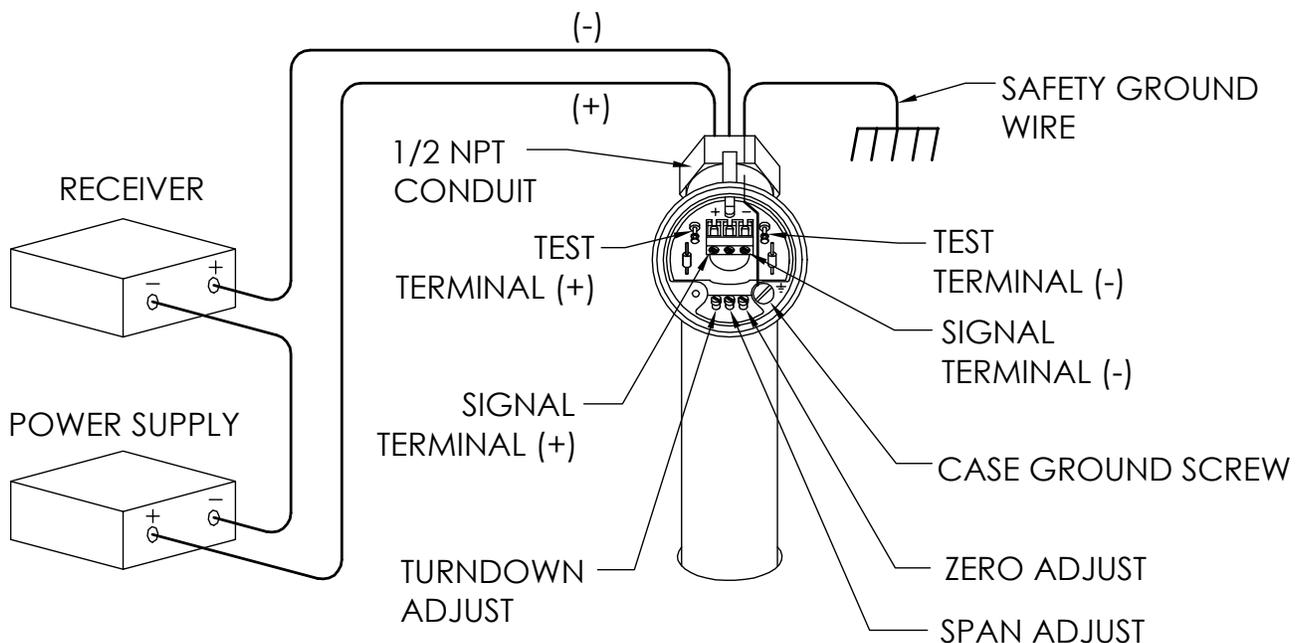
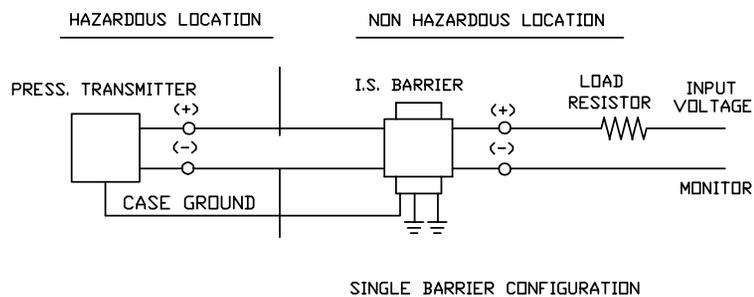
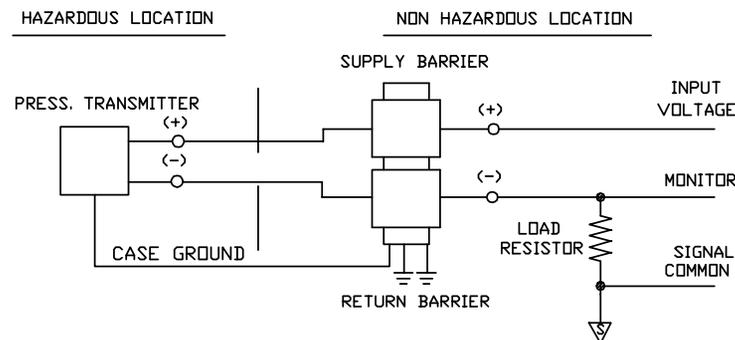


FIGURE 2-3  
MODEL 88F WIRING

BASIC INSTALLATION CIRCUIT DIAGRAM



SINGLE BARRIER CONFIGURATION



TWO BARRIER CONFIGURATION

SUGGESTED LIST OF CSA APPROVED BARRIERS:

MANUFACTURER	MODEL NO.	PUBLICATION NO.
STAHL	8901/31-280/100/70	8901603310
STAHL	8903/31-315/050/70	8903601310
HONEYWELL	38545-0000-0110-113-F585	S-385-22
MTL	728+	PS700-10
MTL	708	PS700-10

SUGGESTED LIST OF CSA APPROVED BARRIERS:

MANUFACTURER	MODEL NO.	PUBLICATION NO.
STAHL	8901/31-280/100/70 (SUPPLY)	8901603310
STAHL	8901/33-086/000/00 (RETURN)	8901603310
STAHL	8903/31-315/050/70 (SUPPLY)	8903601310
STAHL	8901/33-086/000/00 (RETURN)	8901603310
MTL	787 OR 787S (SUPPLY + RETURN)	PS700-10

NOTES :

- 1) USE ANY CSA CERTIFIED SINGLE CHANNEL ZENER DIODE BARRIER, HAVING SAFETY PARAMETERS OF 28 V MAX/290 OHM MIN., FOR THE SINGLE BARRIER CONFIGURATION OR FOR THE SUPPLY BARRIER IN THE 2 BARRIER CONFIGURATION. FOR THE RETURN BARRIER, IN THE 2 BARRIER CONFIGURATION, USE ANY CSA CERTIFIED DIODE-RETURN BARRIER.
- 2) TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS.
- 3) INTRINSICALLY SAFE FOR HAZARDOUS LOCATIONS, CLASS I; GROUPS A,B,C,D, CLASS II; GROUPS E,F,G, AND CLASS III

FIGURE 2-4  
WIRING INTRINSICALLY SAFE (CSA)

# XSEL® Process Gauge - Stainless Steel

## Type 232.34 - Dry Case

## Type 233.34 - Liquid-filled Case

WIKA Datasheet 23X.34

### Applications

- For applications with high dynamic pressure pulsations or vibration a liquid filled case and socket restrictor are available
- Suitable for corrosive environments and gaseous or liquid media that will not obstruct the pressure system
- Process industry: chemical/petrochemical, power stations, mining, on and offshore, environmental technology, mechanical engineering and plant construction

### Product features

- Excellent load-cycle stability and shock resistance
- Solid front thermoplastic case
- Positive pressure ranges to 30,000 psi (2,000 bar)
- XSEL® Process Gauge with 5 year warranty on gauge and 10 year warranty on pressure system (see terms and condition)
- All lower mount connection gauges are factory prepared for liquid filling

(LBM: must install membrane prior to field filling)

### Specifications

#### Design

ASME B40.100

#### Sizes

4½" & 6" (115 & 160 mm) dial size

#### Accuracy class

± 0.5% of span (ASME B40.100 Grade 2A)

± 1.0% of span (ASME B40.100 Grade 1A)

for ≥ 20,000 psi (1,600 bar) range and above

#### Ranges

Vacuum / Compound to 400 psi (25 bar)

Pressure from 15 psi (1 bar) to 30,000 psi (2,000 bar)

or other equivalent units of pressure or vacuum

#### Working pressure

Steady: full scale value

Fluctuating: 0.9 x full scale value

Short time: 1.5 x full scale value

#### Operating temperature

Ambient: -40°F to +140°F (-40°C to +60°C) - dry

-4°F to +140°F (-20°C to +60°C) - glycerine filled

-40°F to +140°F (-40°C to +60°C) - silicone filled

Medium: max. +212°F (+100°C)



Bourdon Tube Pressure Gauge Model 232.34

#### Temperature error

Additional error when temperature changes from reference temperature of 68°F (20°C) ±0.4% of span for every 18°F (10°K) rising or falling.

#### Weather protection

Weather resistant (NEMA 3 / IP54) - without membrane  
Weather tight (NEMA 4X / IP65) - dry case or filled case with membrane installed

#### Pressure connection

Material: 316L stainless steel

Lower mount (LM) or lower back mount (LBM)

1/4" or 1/2" NPT with M4 internal tap

#### Restrictor

Material: Stainless steel (0.6 mm), standard

#### Bourdon tube

Material: 316L stainless steel

≤ 1,000 psi (69 bar): C-shape

≥ 1,500 psi (100 bar): Helical

#### Movement

Stainless steel

Internal overload stop set at 1.1x full scale

Underload stop-optional

Dampened movement-optional

#### Dial

White aluminum with black lettering, stop pin at 6 o'clock

Standard WIKA psi single scales (4½" only) with large figures at beginning and end for quick and easy identification.

#### Pointer

Black aluminum, adjustable

#### Case

Black fiberglass-reinforced thermoplastic (POCAN)

Solid front, blowout back

Turret-style case with built in rear flange lugs

## Window

Clear acrylic with Buna-N gasket

## Case filling Type 233.34

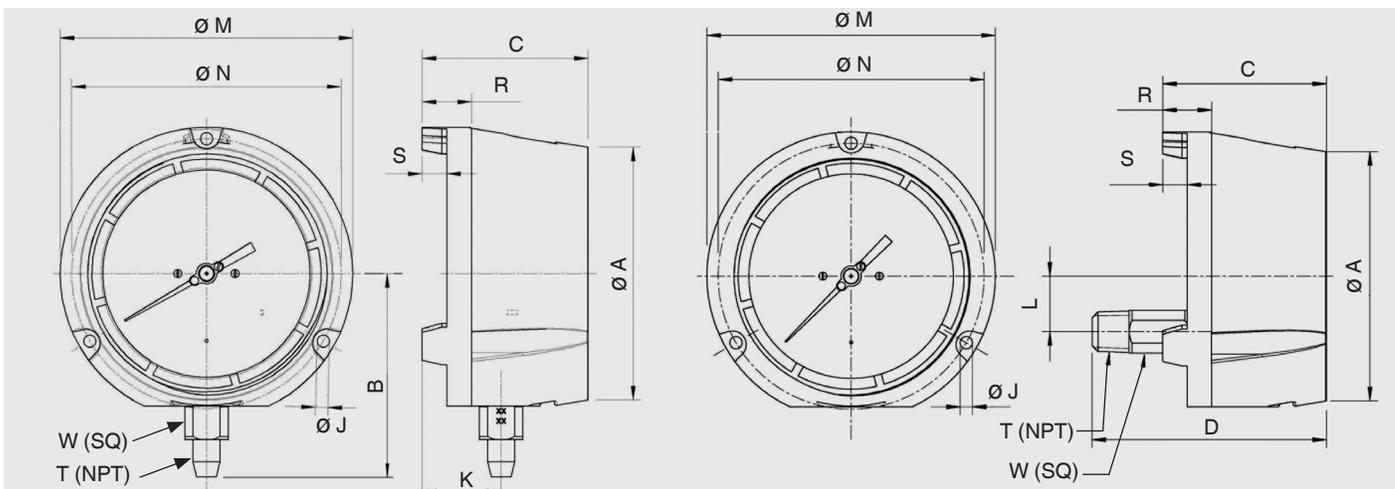
Glycerine 99.7% and  $\geq 40$  psi (2.5 bar)

Glycerine 86.5%/Water 13.5% -  $< 40$  psi (2.5 bar)

## Optional extras

- Silicone dampened movement
- Panel mounting adaptor kit (field assembled)
- Silicone case filling
- Halocarbon case filling
- Cleaned for oxygen service
- Instrument glass or safety glass window
- Drag pointer (maximum reading indicator)
- Alarm contacts switches (magnetic or inductive)
- Special process connections
- Custom dial layout
- External zero adjustment (4.5" size only)
- Case and ring in red or yellow thermoplastic (4½" LM only)
- Insight® reflective dial options available in white, fluorescent yellow, fluorescent orange or glow-in-the-dark

## Dimensions



Size		A	B	C	D	J	K	L	M	N	R	S	T	W	Weight <sup>1</sup>
4.5"	mm	128	103	84	120.3	6.3	40	28.5	148	136.5	25	12.5		22	2 lb. dry
	in	5	4.06	3.31	4.74	0.248	1.57	1.12	5.83	5.37	0.99	0.49	1/2"	0.87	3 lb. filled
6"	mm	164	122.5	88	123.4	7.1	40.2	28.5	190	177.8	25.4	12.7		22	3 lb. dry
	in	6.46	4.82	3.46	4.86	0.28	1.58	1.12	7.5	7	1	0.5	1/2"	0.87	4 lb. filled

<sup>1</sup> Weight without optional accessories



The DVAKS100CG is a versatile vaporproof fixture for ceiling mounting with a natural aluminum finish. The DVAKS100CG is made of die cast aluminum.



### APPLICATIONS

**Ideal for industrial and commercial applications.**

<b>Project</b>	
<b>Type</b>	
<b>Date</b>	
<b>Notes</b>	

### SPECIFICATIONS

**Box**  
Precision die cast aluminum with four 1/2" NPT plugs installed and one open 1/2" threaded conduit opening on the top. One brass ground screw installed.

**Gasket**  
Silicone gasket between the wiring box and the fitter.

**Fitter**  
Threaded Precision die cast aluminum with a silicone gasket.

**Globe**  
Clear glass threaded. Replacement glass part is GL100.

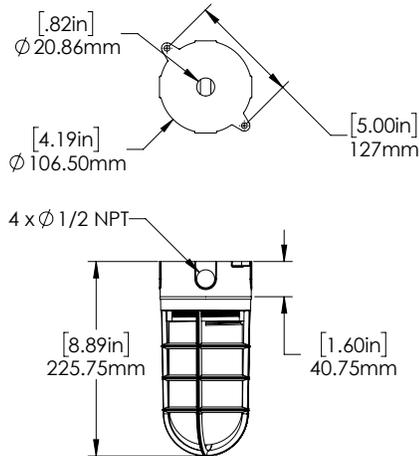
**Socket**  
Porcelain, medium base, 4KV pulse rated socket with a nickel-plated screw shell and a spring-loaded center contact.

**Guard**  
Threaded die cast aluminum with a set screw for locking the guard in place.

**Hardware**  
All brass hardware.

<b>Max Wattage</b>	<b>100 watts</b>
<b>Approval</b>	<b>cULus for wet locations</b>
<b>Lamp</b>	<b>Not included</b>
<b>Finish</b>	<b>Natural aluminum</b>

### DIMENSIONAL DATA



**DVAKS100CG**  
Ceiling mount



OTHER MOUNTING OPTIONS



AVAILABLE OPTIONS (SOLD SEPARATELY)



**The DVAKS100CG is also available as an LED fixture.**

ORDERING GUIDE - FIXTURE

**DVAKS100CG**

ORDERING GUIDE - ACCESSORIES  
(SOLD SEPARATELY)

[Empty box for accessories]

**GLOOPR PRISMATIC GLASS**

**GL100F FROSTED GLASS**

**GL100 CLEAR GLASS**

**RGL100A (AMBER)**

**RGL100B (BLUE)**

**RGL100G (GREEN)**

**RGL100R (RED)**

**GL100PGO (POLYCARBONATE WHITE)**

**GD100CGS - GUARD**

\* Standard configuration



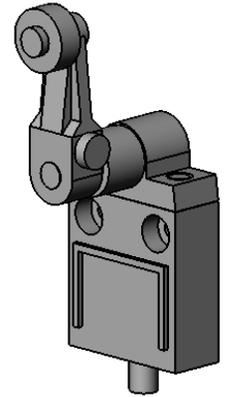
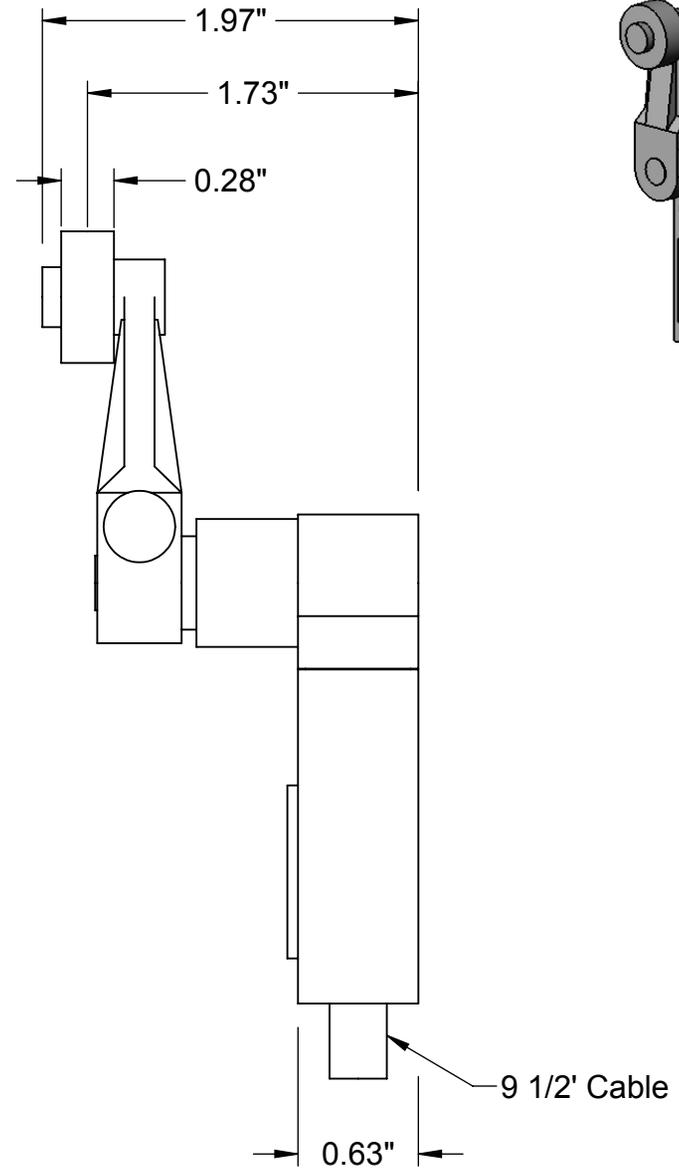
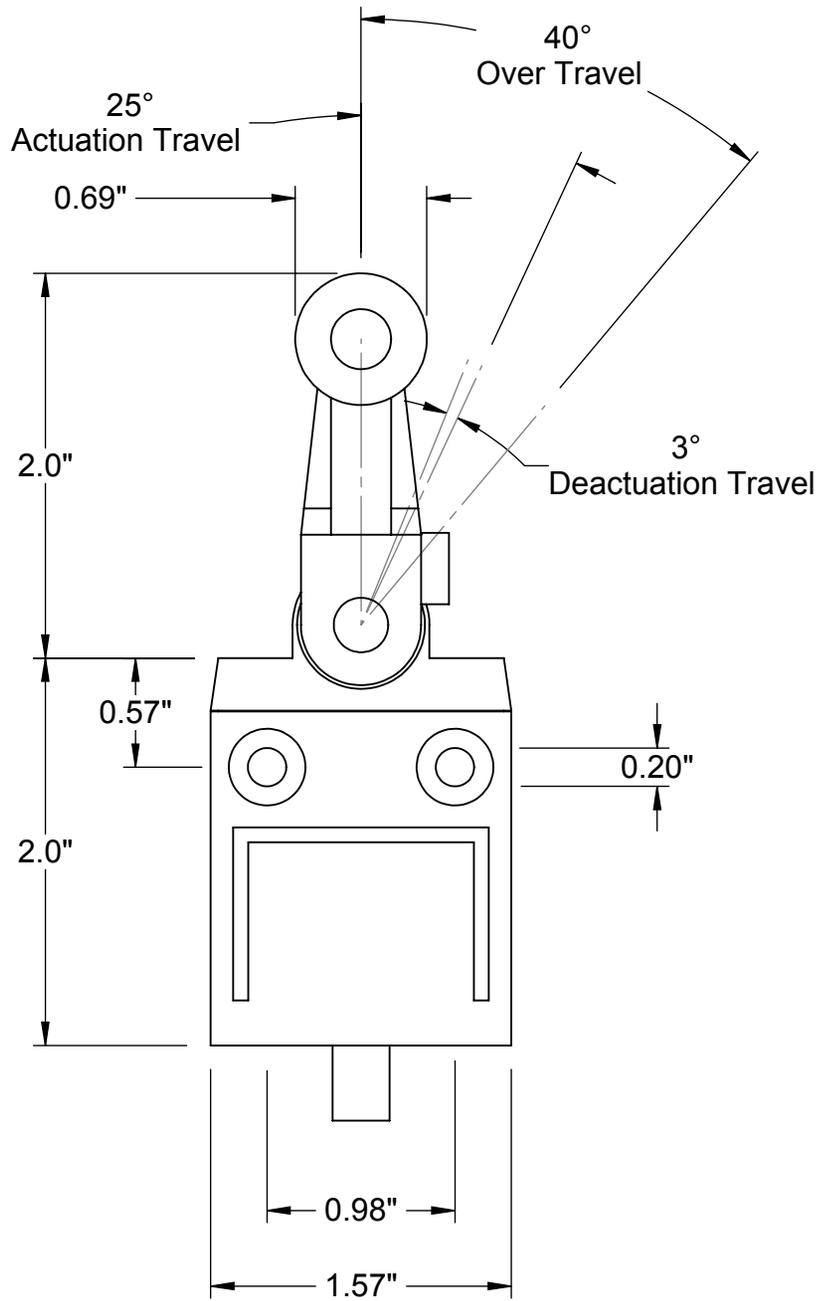
## Low-Profile Washdown Limit Switch

Roller Lever Actuator with Wire Leads, 250V AC



Application	Power
Switch Type	Limit
Actuator Style	Roller Lever
Number of Circuits Controlled	1
Switch Starting Position	1 Off (Normally Open) or 1 On (Normally Closed)
Switch Action	Springs Back (Momentary)
Industry Designation	SPDT
Switching Current	5A
Switching Voltage	250V AC
Maximum Voltage	250V AC/DC
Actuator Height	2"
Housing	
Length	1.6"
Height	2"
Depth	0.6"
Housing Material	Aluminum
Mounting Fasteners Included	No
Mounting Holes	
Number of	2
Diameter	0.2"
Electrical Connection Type	Hardwire
Wire Connection Type	Wire Leads
Wire Leads	
Number of	4
Length	9 1/2 ft.
Cable Insulation Industry Designation	SJTO
Environment	Oily, Washdown
Environmental Rating	NEMA 4, NEMA 13, IP67
Specifications Met	UL Listed, CSA Certified
RoHS	Not Compliant

With a slim design, these switches can be stacked together or fit into narrow spaces. They're rated NEMA 4 and 13 and IP67 for protection from washdowns and oil/coolant spraying. When an object comes into contact with them, it sends a signal to open or close a circuit. They're often used on conveyor systems and bin filling operations.



**McMASTER-CARR** CAD

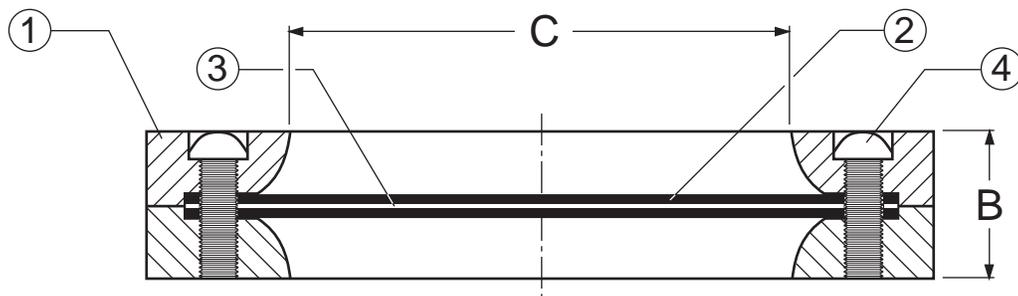
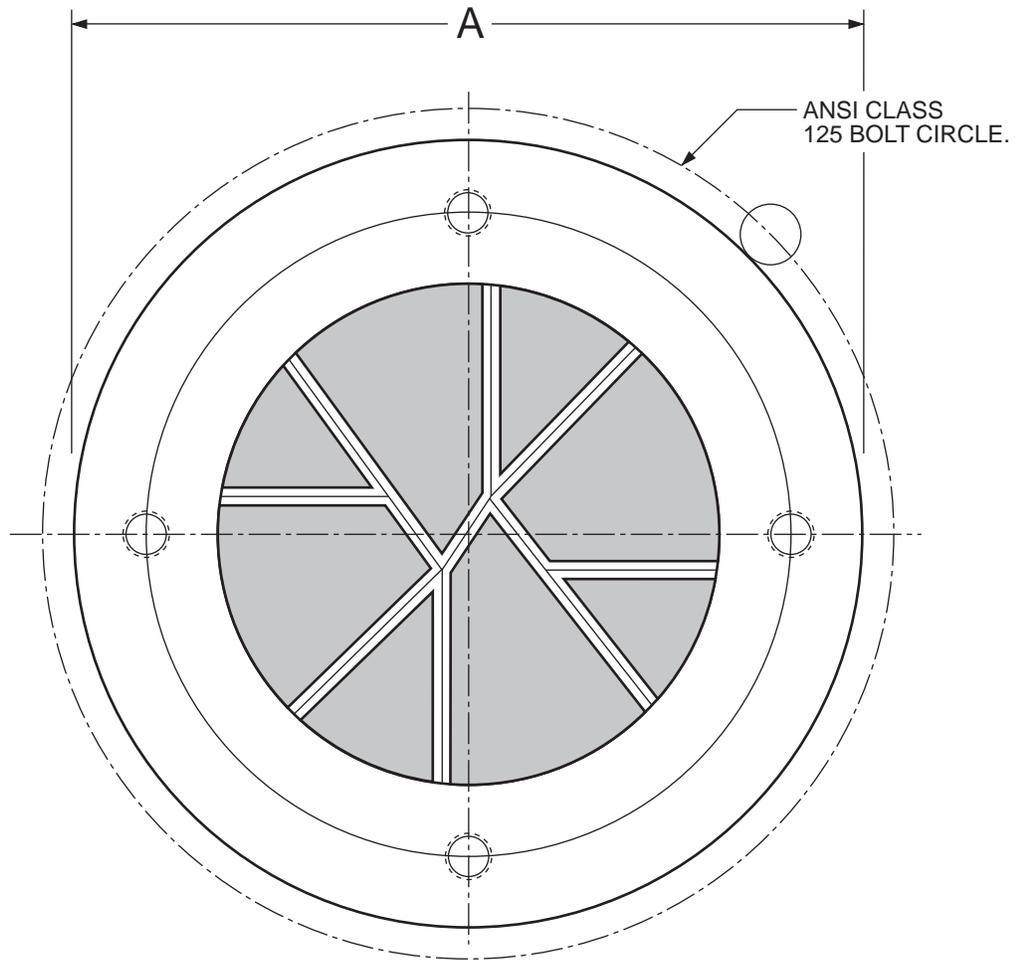
PART NUMBER

**7628K77**

<http://www.mcmaster.com>  
 © 2018 McMaster-Carr Supply Company

Low-Profile Washdown Roller Lever  
 Limit Switch with Cable

Information in this drawing is provided for reference only.



INSTALLATION DIMENSIONS, INCHES ANSI CLASS 125				
SIZE	MODEL NO.	A	B	C
4	1504	6.75	0.75	4.00
6	1506	8.88	1.00	6.00
8	1508	10.88	1.25	8.00
12	1512	16.00	2.00	12.00

Revised 8-6-07

FROSTSAFE TWO-WAY DAMPER

DATE 11-7-05

**VAL-MATIC**<sup>®</sup> VALVE AND MANUFACTURING CORP.

DRWG. NO.

VM-1500

# 4", 6, 8",12" FROSTSAFE TWO-WAY DAMPER

SERIES NO. 1500

## STANDARD MATERIALS OF CONSTRUCTION

<u>PART NO.</u>	<u>PART NAME</u>	<u>MATERIAL</u>
1	BODY	HIGH DENSITY POLYETHYLENE (HDPE)
2	RUBBER MEMBRANE	NYLON REINFORCED HIGH GRADE NEOPRENE
3	DAMPER SEAL	PETG
4	BODY BOLT	316 STAINLESS STEEL

NOTE: ALL SPECIFICATIONS AS  
LAST REVISED.

Revised 8-6-07

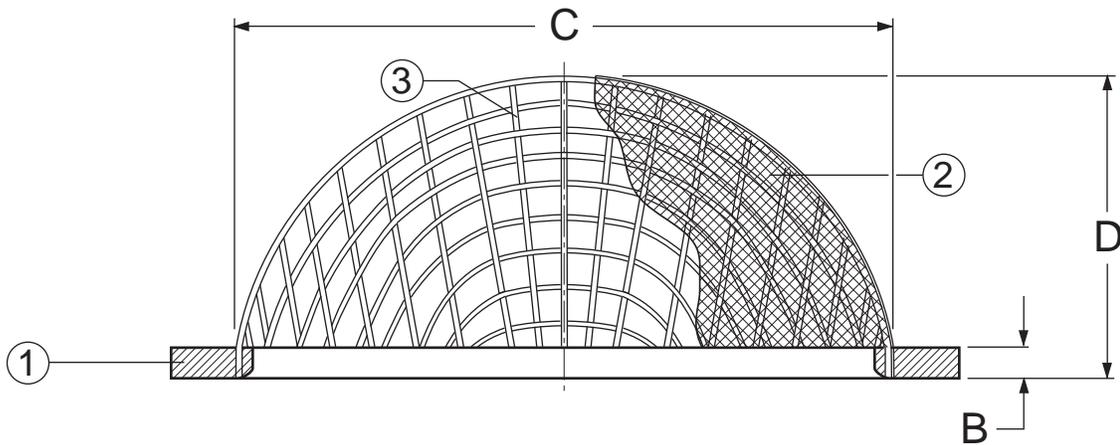
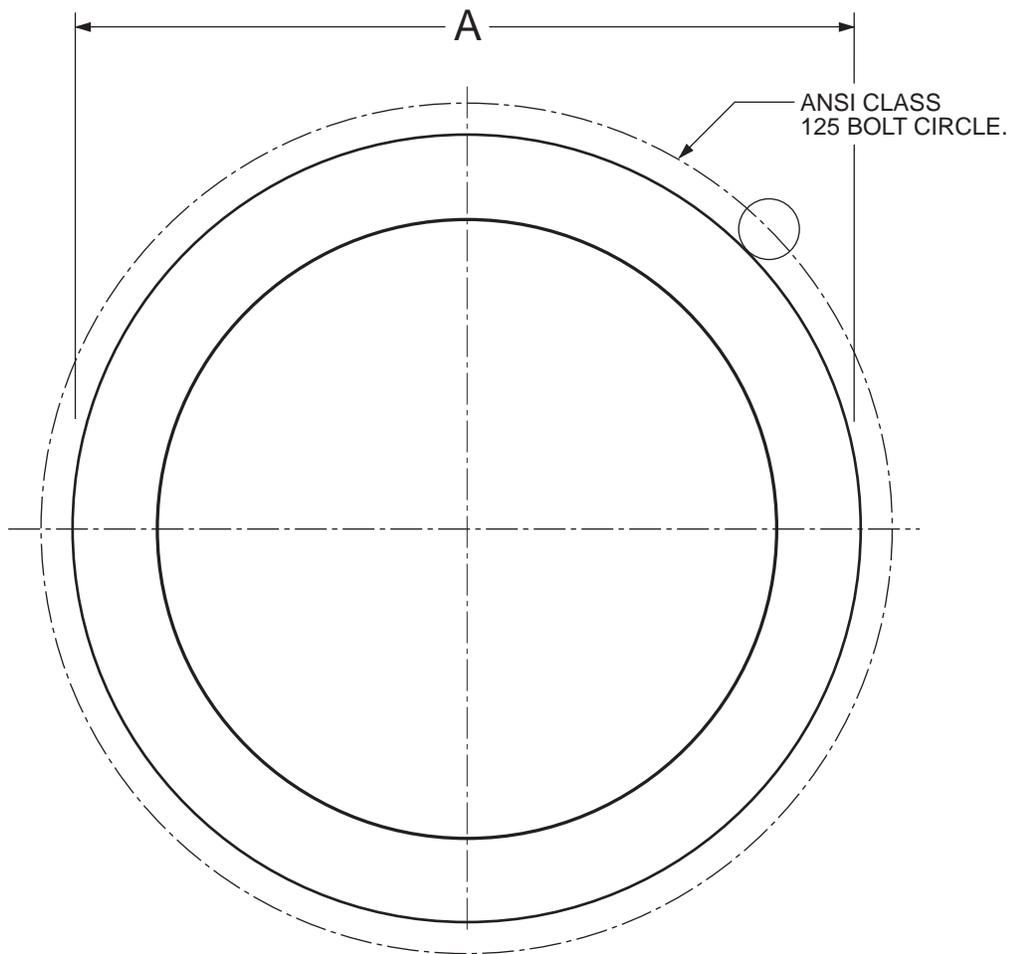
MATERIALS OF CONSTRUCTION

DATE 11/7/05

**VAL-MATIC**<sup>®</sup> VALVE AND MANUFACTURING CORP.

DRWG. NO.

VM-1500-M



INSTALLATION DIMENSIONS, INCHES ANSI CLASS 125					
SIZE	MODEL NO.	A	B	C	D
4	1604	6.75	.375	3.76	2.37
6	1606	8.63	.375	5.75	3.37
8	1608	10.88	.375	7.77	4.37
12	1612	16.00	.375	11.75	6.00

Revised 8-6-07

VENTSAFE SECURITY CAGE®

DATE 11-7-05

**VAL-MATIC®** VALVE AND MANUFACTURING CORP.

DRWG. NO.

VM-1600

VENTSAFE SECURITY CAGE®

SERIES NO. 1600

STANDARD MATERIALS OF CONSTRUCTION

<u>PART NO.</u>	<u>PART NAME</u>	<u>MATERIAL</u>
1	BODY	45 SHORE D PVC
2	SCREEN, 20 MESH	304 STAINLESS STEEL
3	CAGE, 2 MESH	304 STAINLESS STEEL

NOTE: ALL SPECIFICATIONS AS  
LAST REVISED.

Revised 6-8-06

MATERIALS OF CONSTRUCTION

DATE 11/7/05

**VAL-MATIC®** VALVE AND MANUFACTURING CORP.

DRWG. NO.

VM-1600-M

## Pipe Penetration Seals

PROCO's PEN-SEAL Pipe Penetration Seals have been designed to assist in achieving an efficient, low-cost mechanical seal between any Electrical Conduit, Concrete, Cast Iron, Steel, Copper, or PVC/CPVC pipes passing through Walls, Floors, Tanks, Pipeline Casings, and Vaults. The PEN-SEAL, while being used to seal the gap in electrical conduit lines, will also act as an insulator.

The PEN-SEAL has been designed to provide a gas and watertight seal. All sizes have been tested to withstand a hydrostatic seal up to 20 psig or 40 feet of head pressure in addition to withstanding temperatures up to 250° F.

PEN-SEAL's standard elastomer material is EPDM, which is suitable for temperatures ranging from -40° F to 250° F. EPDM is suitable for most applications in water—above ground and direct burial—and will provide the electrical insulation where cathodic protection is required. Silicone material is also available for higher temperature applications up to 400° F.

Where the PEN-SEAL may come in contact with Hydrocarbons, Oil, Gas, Jet Fuel, and miscellaneous solvents, a Nitrile material is available with temperatures ranging from -40° F to 210° F.

The PEN-SEAL utilizes glass-reinforced plastic for the pressure plates and all hardware is manufactured from Steel Zinc Dichromate. For corrosion resistance, 316 Stainless Steel hardware is also available.

Various applications for the PROCO PEN-SEAL:

- Wall Sleeves
- Floor Sleeves
- Interior Piping
- Noise Dampener
- Electrical Contractors
- Precast Concrete
- Mining
- Marine
- Water & Wastewater
- HVAC
- Valve Pits
- Offshore Oil Platforms
- Telecommunications
- Dual Containment Seal
- Underground Steel Tanks
- Coal Preparation Plants
- Pulp & Paper
- Power Generation



# Sizing Tables

## Sizing for Standard Weight Steel, PVC and CPVC Pipe

Table 1		Standard Weight Steel or PVC Pipe Sleeve <sup>1</sup>				Cast or Core Bit Drilled Hole <sup>1</sup>		
NOMINAL PIPE SIZE (Inches)	ACTUAL PIPE O.D. (Inches)	SLEEVE NOMINAL PIPE SIZE (Inches)	SLEEVE ACTUAL I.D. (Inches)	PEN-SEAL PART NUMBER	REQUIRED NUMBER OF LINKS	HOLE I.D. (Inches)	PEN-SEAL PART NUMBER	REQUIRED NUMBER OF LINKS
0.5	0.840	2.000	2.067	PS-200	4	2.000	PS-200	4
0.75	1.050	2.500	2.469	PS-275	6	2.500	PS-275	6
1	1.315	2.500	2.469	PS-200	5	3.000	PS-315	4
1.25	1.660	3.000	3.068	PS-275	8	3.000	PS-275	8
1.5	1.900	3.000	3.068	PS-200	7	3.500	PS-300	5
2	2.375	3.500	3.548	PS-200	8	4.000	PS-300	6
2.5	2.875	4.000	4.026	PS-200	9	4.000	PS-200	9
3	3.500	5.000	5.047	PS-300	8	5.000	PS-300	8
3.5	4.000	6.000	6.065	PS-315	10	6.000	PS-315	10
4	4.500	6.000	6.065	PS-300	10	6.000	PS-300	10
5	5.563	8.000	7.981	PS-340	13	8.000	PS-340	13
6	6.625	10.000	10.020	PS-475	10	10.000	PS-475	10
8	8.625	12.000	12.000	PS-475	12	12.000	PS-475	12
10	10.750	14.000	13.250	PS-425	10	14.000	PS-475	14
12	12.750	16.000	15.250	PS-425	12	16.000	PS-475	17
14	14.000	18.000	17.250	PS-475	18	18.000	PS-575	16
16	16.000	20.000	19.250	PS-475	21	20.000	PS-575	18
18	18.000	22.000	21.250	PS-475	23	22.000	PS-575	20
20	20.000	24.000	23.250	PS-475	25	24.000	PS-575	22
22	22.000	26.000	25.250	PS-475	28	26.000	PS-575	24
24	24.000	28.000	27.250	PS-475	30	28.000	PS-575	26
26	26.000	30.000	29.250	PS-475	33	30.000	PS-575	28
28	28.000	32.000	31.250	PS-475	35	32.000	PS-575	30
30	30.000	34.000	33.250	PS-475	37	34.000	PS-575	32
32	32.000	36.000	35.250	PS-475	40	36.000	PS-575	34
34	34.000	40.000	39.250	PS-500	29	38.000	PS-575	36
36	36.000	42.000	41.250	PS-500	31	40.000	PS-575	38
42	42.000	48.000	47.250	PS-500	36	46.000	PS-575	44
48	48.000	54.000	53.250	PS-500	41	52.000	PS-575	50

- Notes:**
1. Minimum recommended sleeve length or wall thickness is 4" for PEN-SEAL Model PS-325 and smaller and 6" for Models PS-400 and larger.
  2. PEN-SEAL sets are sold in belts of ten (10) links.

# Sizing Tables

## Sizing for Intermediate Metal Conduit (IMC)

Table 7		Standard Weight Steel or PVC Pipe Sleeve <sup>1</sup>				Cast or Core Bit Drilled Hole <sup>1</sup>		
NOMINAL PIPE SIZE (Inches)	ACTUAL PIPE O.D. (Inches)	SLEEVE NOMINAL PIPE SIZE (Inches)	SLEEVE ACTUAL I.D. (Inches)	PEN-SEAL PART NUMBER	REQUIRED NUMBER OF LINKS	HOLE I.D. (Inches)	PEN-SEAL PART NUMBER	REQUIRED NUMBER OF LINKS
0.5	0.815	2.000	2.067	PS-200	4	2.000	PS-200	4
0.75	1.029	2.000	2.067	PS-200	4	2.500	PS-275	6
1	1.290	2.500	2.469	PS-275	6	3.000	PS-300	4
1.25	1.638	3.500	3.548	PS-315	5	3.000	PS-275	7
1.5	1.883	3.500	3.548	PS-300	5	3.500	PS-300	5
2	2.360	4.000	4.026	PS-300	6	4.000	PS-300	6
2.5	2.857	4.000	4.026	PS-200	9	4.000	PS-200	9
3	3.476	5.000	5.047	PS-300	8	5.000	PS-300	8
3.5	3.971	6.000	6.065	PS-325	5	6.000	PS-325	5
4	4.466	6.000	6.065	PS-300	10	6.000	PS-300	10

## Sizing for Rigid Steel Conduit (RSC)

Table 8		Standard Weight Steel or PVC Pipe Sleeve <sup>1</sup>				Cast or Core Bit Drilled Hole <sup>1</sup>		
NOMINAL PIPE SIZE (Inches)	ACTUAL PIPE O.D. (Inches)	SLEEVE NOMINAL PIPE SIZE (Inches)	SLEEVE ACTUAL I.D. (Inches)	PEN-SEAL PART NUMBER	REQUIRED NUMBER OF LINKS	HOLE I.D. (Inches)	PEN-SEAL PART NUMBER	REQUIRED NUMBER OF LINKS
0.5	0.840	2.000	2.067	PS-200	4	2.000	PS-200	4
0.75	1.050	2.500	2.469	PS-275	6	2.500	PS-275	6
1	1.315	2.500	2.469	PS-200	5	3.000	PS-300	4
1.25	1.660	3.500	3.548	PS-315	5	3.000	PS-275	7
1.5	1.900	3.500	3.548	PS-300	5	3.500	PS-200	5
2	2.375	4.000	4.026	PS-300	6	4.000	PS-300	6
2.5	2.875	4.000	4.026	PS-200	9	4.000	PS-200	9
3	3.500	5.000	5.047	PS-300	8	5.000	PS-300	8
3.5	4.000	6.000	6.065	PS-325	5	6.000	PS-325	5
4	4.500	6.000	6.065	PS-300	10	6.000	PS-300	10
5	5.563	8.000	7.981	PS-425	6	8.000	PS-425	6
6	6.625	8.000	7.981	PS-300	15	10.000	PS-475	10

- Notes:**
1. Minimum recommended sleeve length or wall thickness is 4" for PEN-SEAL Model PS-325 and smaller and 6" for Models PS-400 and larger.
  2. PEN-SEAL sets are sold in belts of ten (10) links.

# ALPHA™ RESTRAINED JOINT RESTRAINED FLANGED COUPLING

## SUBMITTAL INFORMATION



### USE

Provides a Restrained Joint for multi-purpose use from IPS PVC through Cast iron to flanged fittings. The ALPHA FC can accommodate up to 4 degrees of deflection. The XL may have limited deflection at the top of the range (2 degrees max.).

### FLANGE

Compatible with ANSI Class 125 and 150 bolt circles.

### MATERIALS

#### CASTINGS

All cast components (end rings, center ring, and bolt guides) are ductile iron, meeting or exceeding the requirements of ASTM A 536, grade 65-45-12.

#### GRIPPERS

Ductile (nodular) iron, meeting or exceeding ASTM A 536, Grade 65-45-12. Machine sharpened and heat treated. Xylan 1424 coated for superior corrosion resistance.

#### GASKETS

SBR compounded for water and sewer service per ASTM D2000, classified by UL to meet NSF61 or NBR compounded for water and sewer service per ASTM D2000, NSF61 Certified. O-Ring style flange gasket is NBR in accordance with ASTM D2000, NSF61 Certified. Other compounds available upon request.

#### DRAW HOOKS

Uncoated 304 stainless steel.

#### RAMP RUNNERS

Nylon 66, Black, 14% Glass filled

#### BOLTS AND NUTS

5/8-11 bolts with heavy hex nuts. E-coated nuts, 304 stainless steel. Fasteners provided with anti-galling protection.

#### COATINGS

Flanged coupling body is Romacoat fusion bonded epoxy, NSF 61 Certified. End rings are Romabond polyester.

### PRESSURE

When properly installed, the Romac ALPHA coupling can be used at a working pressures equal to the rating of the installed pipe up to 350 psi.

### PIPE MATERIALS

The Romac ALPHA series couplings can be used on DI, Oversized Cast Iron, PVC (IPS, C900, C909), and HDPE (SDRs 9, 11, 13.5 and 17). Stiffener not required.

### SIZES & RANGES

See catalog.

*This information is based on the best data available at the date printed above. Please check with Romac for any updates or changes.*

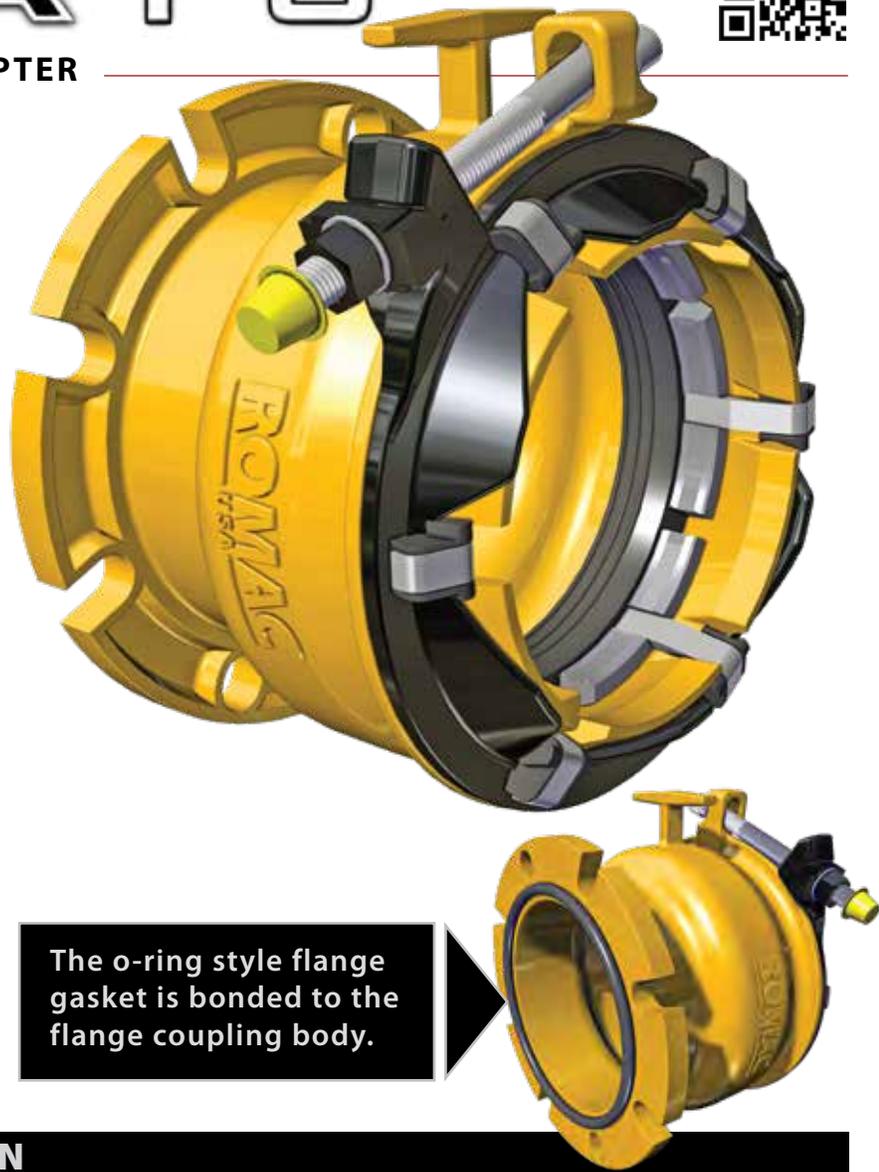
# ALPHA™ FC



## RESTRAINED FLANGE COUPLING ADAPTER

The Alpha FC provides the quickest way to adapt plain end pipe to flanged fittings.

- Once you've assembled the flanged joint, installation is simply inserting the plain end pipe and tightening one nut.
- Flange is compatible with flat face flanges with ANSI Class 125 and 150 bolt circles.
- Standard Alpha Flanged Couplings fit IPS PVC through Ductile Iron pipe diameters.
- Alpha XL Flanged Couplings fit Ductile Iron through Oversize Cast Iron pipe diameters.
- One nut dismantling allows for quick and easy access of valves and other fittings.
- The Alpha Flanged Coupling also accommodates flanged spool pieces for mating to valves and other fittings.
- US Patent: 8,894,100



The o-ring style flange gasket is bonded to the flange coupling body.

## SIMPLE AND FAST INSTALLATION



**STEP 1:** Assemble the flange joint using flange bolts.



**STEP 2:** Insert pipe and tighten nut.



ALPHA FC is the fast way to connect and restrain plain end pipe to a flanged connection



## RESTRAINED FLANGE COUPLING ADAPTER

### MATERIAL SPECIFICATIONS

**CASTINGS:** All cast components (end ring, center ring and bolt guide) are ductile iron, meeting or exceeding the requirements of ASTM A 536, grade 65-45-12.

**FLANGE:** Compatible with flat face flanges with ANSI Class 125 and 150 bolt circles.

**GRIPPERS:** Ductile (nodular) iron, meeting or exceeding ASTM A 536, grade 65-45-12. Machine sharpened and heat treated. Xylan 1424 coated for enhanced corrosion protection.

**GASKET:** SBR compounded for water and sewer service per ASTM D2000 - classified by UL to meet NSF61, or NBR compounded for water and sewer service in accordance with ASTM D2000 and NSF61 Certified. Other compounds available upon request. Flange gasket is o-ring style (NBR is standard).

**DRAW-HOOK FASTENERS:** 304L stainless steel.

**RAMP RUNNERS:** Reinforced nylon.

**BOLT & NUT:** 304 stainless steel, 5/8-11 bolt with heavy hex e-coated nut. Fasteners provided with anti-galling protection.

**COATINGS:** Flange coupling body is Romacoat fusion bonded epoxy. End ring is Romabond Polyester.

**WORKING PRESSURE:** up to 350 PSI.

### GASKET RANGE CONFIGURATIONS

Alpha Flange Couplings are available in two configurations.



#### STANDARD ALPHA FLANGED COUPLING

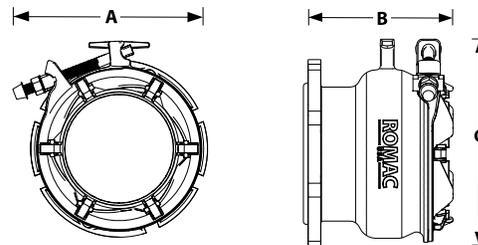
Alpha Flanged Coupling accommodate IPS PVC pipe through Ductile Iron pipe diameters.



#### ALPHA XL FLANGED COUPLING

Alpha XL Flanged Coupling covers Ductile Iron through Oversize Cast Iron pipe diameters.

### DIMENSIONS



NOMINAL PIPE SIZE	ALPHA FC GASKET RANGES		DIMENSIONS			APPROXIMATE WEIGHT (lbs.)
	ALPHA RANGE	GASKET RANGE	A	B	C	
			O.D.	LENGTH	HEIGHT	
4"	STD. ALPHA	4.50 - 4.90	11.20	8.15	10.25	29
	ALPHA XL	4.80 - 5.10				
6"	STD. ALPHA	6.60 - 7.00	11.35	8.24	12.45	40
	ALPHA XL	6.90 - 7.20				
8"	STD. ALPHA	8.60 - 9.10	13.40	9.96	15.55	57
	ALPHA XL	9.05 - 9.40				
10"	STD. ALPHA	10.75 - 11.20	15.45	10.18	17.65	82
	ALPHA XL	11.10 - 11.45				
12"	STD. ALPHA	12.75 - 13.30	17.50	10.28	19.70	105
	ALPHA XL	13.20 - 13.60				

Information contained in this document is subject to change. Contact Romac Industries for any updates.