



TETRA TECH

Rev 1 – 7/6/2016

SURFACE WATER METERING PLAN FOR SWATARA CREEK

ATLANTIC SUNRISE PROJECT

**East Hanover Township,
Lebanon County, Pennsylvania**

Prepared For:

**TRANSCONTINENTAL GAS PIPE LINE
COMPANY, LLC
HOUSTON, TEXAS**

Prepared By:

**TETRA TECH, INC.
PITTSBURGH, PENNSYLVANIA**

March 2016

SRBC Surface Water Withdrawal Application Metering Plan

A. Intake Design

The surface water withdrawal location on Swatara Creek is located along the proposed gas pipeline route where the water will be required for hydrostatic testing. Water will be transferred from Swatara Creek directly to the pipeline and/or hydrotest equipment for hydrostatic testing. This water source will only be used to supply water during pipeline construction and testing. Transcontinental Gas Pipe Line, LLC (Transco) proposes to use two (2), 4.5-foot long, 6.75-inch radius aluminum screens with slot-size openings of 0.125-inch that are manufactured by Sure-Flo™ to withdraw water from Swatara Creek. Each 4.5-foot long screen will be connected with a T fitting as a single assembly from the manufacturer. The intake structure will include a foot valve which will maintain a flooded suction line and prevent backflow. The intake screen will be connected to a 12-inch diameter flexible hose or HDPE suction pipe. The intake screen will be a floated intake submerged in the approximate location of the creek's thalweg (lowest point of creek channel) in close proximity to the project site. The approximate water depth at the point of withdrawal is 4 feet. The slot openings were sized to avoid potential aquatic impacts associated with impingement and entrainment. Calculations for the intake's through-screen approach velocity (provided in Attachment A-1) show the screen entrance velocity to be less than 0.5 feet per second (ft/s). Manufacturer information for the intake screens is included in Attachment A-2.

Transco proposes to use one 6" by 6" Pioneer Prime Series PP66C14 vacuum assisted, end suction centrifugal pump. This pump is mechanically driven and operates at a maximum of 2,200 revolutions per minute. Pump specification sheets and head curves are included in Attachments A-3 and A-4, respectively. Transco will limit the instantaneous pumping rate by using a Cla Val Combination Rate of Flow Controller & Solenoid Shut-off Valve (Model 43-01)) on the discharge end of the pump. Specifications are included in Attachment A-5. This valve will be locked to prevent unintentional changes to the flow rate. Transco's staff will be prepared to comply with monthly passby rates and withdrawal rates. To protect aquatic resources and downstream users, Transco will cease withdrawals from Swatara Creek when the creek flow rate at the assigned reference gage is at or falls below prescribed passby flow rates.

Transco will ensure that the intake screen is regularly maintained and free of debris. Specifically, to ensure that the screen area is open and not clogged, prior to each operating event, Transco will retrieve the screen intake apparatus from the creek and inspect it for any debris or material that could clog the intake and reduce pumping efficiencies. In addition, the flow rate will be monitored during operation. If the pumping flow rate decreases by 20% or more during operation, the pump will be turned off and the screen intake assembly will be retrieved from the creek and inspected to ensure the screen is not clogged which could result in increased entrance velocities. If debris is present in and around the screen opening, the screen will be cleaned prior to being put back into operation.

Water will be conveyed to the pipeline for hydrostatic testing from the skid/trailer-mounted pump through a combination of 6-inch steel and 8-inch flexible hose or HDPE pipe. This pipe was sized to accommodate a flow rate up to 2,000 gpm (see Attachment A-6 for basis). Water used for the pipeline hydrostatic testing will be discharged at a Pennsylvania Department of Environmental

Protection permitted location (i.e., PAG-10 permit). The main pipeline hydrostatic testing is scheduled for May 2017.

A wetland study was completed for the area on June 24, 2014. No wetlands were identified in the vicinity of the proposed intake. The intake pump will be located within the Federal Emergency Management Agency (FEMA) floodplain and floodway. The slope of the creek bank at the proposed location is gradual. All equipment will be temporary and removable, minimizing impact to riparian vegetation. Portable secondary containment will be utilized around the pump. It should also be noted that the pump will be located within the Transco project right-of-way and limit-of-disturbance.

Transco intends to put in place protective controls at its withdrawal site to enforce the passby requirements set by the SRBC with the intent to protect the stream during low-flow periods. For this project, flow rates at the proposed withdrawal point will be estimated by proportioning based on the drainage area ratio method from a selected USGS gaging station on Swatara Creek. At the proposed withdrawal location, Swatara Creek has a drainage area of 311 square miles (mi²). Based on that drainage area, the Aquatic Resource Class (ARC) of Swatara Creek is classified as ARC 4, which represents a medium tributary. Creeks classified as ARC 4 are likely to be moderately sensitive to potential impacts from withdrawals due to their size, position in the landscape, and flow volumes.

Transco will stop or decrease withdrawals during low flow periods to avoid negatively impacting the quality of Swatara Creek. Flow rate data for a SRBC-selected stream or river located near Swatara Creek that has an active USGS gaging station will be used to estimate the flow rate of Swatara Creek during surface water withdrawal operations.

B. Metering

To meter the volume of water withdrawn at the surface water withdrawal location, a 6-inch Seametrics AG2000 Irrigation Magmeter will be used (see manufacturer information in A-7). This spool-type electromagnetic flow meter and totalizer has no moving parts and minimal straight pipe requirements both above (i.e., 12 inches, minimum) and below (i.e., 6 inches, minimum) the meter. This allows unobstructed flow and makes it an ideal choice for use in surface water withdrawal applications where debris may cause damage to the equipment. This model is capable of displaying up to 5 digits for flow rate and 8 digits for the totalizer. The minimum flow rate for this model of flow meter is 32 gpm; the maximum rate is 2,400 gpm. The proposed withdrawal rate of 2,000 gpm is within this range. The meter is accurate to within +/-1% for flows between 240 gpm and 2400 gpm and +/- 2% for flows under 240 gpm. The flow meter will be installed so that it cannot be bypassed, zeroed, or reset.

Transco will check the totalizer daily prior to pumping water from Swatara Creek and at the end of each day to ensure that the proposed 2.880 MGD maximum daily withdrawal is not exceeded. Transco will maintain daily records of the project's withdrawal and consumptive water use and shall report the data to the SRBC on a quarterly and annual basis or as prescribed. Transco will also ensure that the meter readout will be accessible for SRBC staff at all times without locks, keys or other special access requirements.

C. Plans, Details, and Maps

A site plan, cross-section, details, and location map can be found in Attachment A-8. Site Photographs are included in Attachment A-9.

A-1 Intake Screen Calculations

CLIENT:	TRANSCO		JOB NUMBER:	212C-PB-00282	
SUBJECT:	SWATARA CREEK SCREENED INTAKE EVALUATION				
BASED ON:	Sure-Flo® Suction Line Fittings Catalog			DRAWING NUMBER:	
BY:	DTK	CHECKED BY:	LMH	APPROVED BY:	CAR
DATE:	10/27/2015	DATE:	10/29/15	DATE:	11/9/2015

PURPOSE:

The purpose of this calculation is to evaluate the minimum number of intake screens necessary to meet the requirement of maximum intake velocity of 0.5 feet per second.

APPROACH:

Use typical industry equations to calculate the minimum number of modified Sure-Flo® J-Series Double Decked intake screens necessary to allow a flow rate of 2,000 gallons per minute. Assume multiple intake screens with perforated 1/8-inch holes.

CALCULATIONS:

- (1) Data was obtained from the Sure-Flo® Fittings.

d	=	0.125	=	Maximum perforation diameter, inches
V	=	0.5	=	Maximum intake velocity, feet per second
Q	=	2,000	=	Maximum flow (withdrawal) rate, gallons per minute
r	=	6.75	=	Radius of perforated intake pipe, inches
b	=	4.5	=	length of perforated intake pipe, feet
n	=	unknown	=	number of screens
A _s	=	2,290	=	Area of screen (A _s = 2πrb), square inches
A _o	=	942	=	Open area of screen, square inches (see attached)
P	=	41.1%	=	Open area of perforated intake pipe (P = A _o /A _s)

- (2) Use the following equation from the Handbook of Groundwater Development, Roscoe Moss Company, to calculate first the minimum number of Sure-Flo® J-Series Double Decked intake screens necessary for a withdrawal of 2,000 gallons per minute.

$$V = \frac{Q / n}{235 \times r \times b \times P}$$

$$n = \frac{Q}{235 \times r \times b \times P \times V}$$

$$n = \frac{2,000}{235 \times 6.75 \times 4.5 \times 0.411 \times 0.5}$$

$$n = 1.36$$

$$n = 2 \quad (\text{round up})$$

The minimum number of modified Sure-Flo® J-Series Double Decked intake screens necessary to allow for a total flow of 2,000 gpm to be withdrawn is 2. Standard 3-foot screens do not provide sufficient area, so a intake apparatus needs to be modified with additional 18" length of screen (for a total length of 4.5', per screen section), as per factory.

- (3) Using the equation from Step 2, calculate the entrance velocity when 2 modified Sure-Flo® J-Series Double Decked intake screens are used.

$$V = \frac{Q / n}{235 \times r \times b \times P}$$

$$V = \frac{2,000 / 2}{235 \times 6.75 \times 4.5 \times 0.411}$$

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DATE: 10/27/2015	DATE: 10/29/15	DATE: 11/9/2015	

$$V = 0.341 \text{ feet per second}$$

CONCLUSION:

Two modified Sure-Flo® J-Series Double Decked intake screens provide an intake flow capacity of 2,000 gallons per minute with a maximum screen entrance velocity of 0.341 feet per second, which is well below the required maximum intake velocity of 0.5 feet per second. Therefore, Tetra Tech believes that the resulting velocity will minimize impingement and entrainment of aquatic organisms during operation. Additionally, to minimize sediment uptake, the submerged pump and intake screen will be floated to elevate the intake screen off of the creek bed.

A-2 Intake Manufacturer Information

SURE-FLO®

Suction Line Fittings



Foot Valves	2-8
Self-Cleaners	9
Strainers	10-15
Adapters	16
Couplers	16
Elbows	17
Misc Items	18-19

Quality and Service Since 1932

Phone 734-761-5110

Sure-Flo Fittings
2077 S. State St. P.O. Box 1363
Ann Arbor, MI. USA 48106

Fax 734-761-8659

www.sure-flo.com

Foot Valves Information

- Sure-Flo foot valves combine an attachment coupling, a foot valve, and a strainer screen, all in one rugged and long-lasting unit.
- Made entirely of aluminum except for the bolts, rubber gaskets, and valve flapper, these valves are light in weight yet sturdy and efficient. The durable rubber flapper seats on a machined aluminum surface and provides a tight seal which minimizes leakage.
- Ample space is provided for the flapper to fold back out of the liquid stream, thus keeping friction loss to a minimum.
- Stainless steel hardware is available for all foot valves, and stainless steel screens are available for most foot valves.

Body Type

OD Tubing: Compression gasket attachment for OD tubing, such as aluminum irrigation tubing.

Female Thread: For attachment to a NPT thread end, hose, steel pipe, or PVC.

Companion Flange: Matches the bolt pattern of a standard 125-pound cast iron companion flange or a schedule 80 PVC flange.

45° Valves



OD Tubing



Female Thread



Companion Flange

Vertical Valves



OD Tubing



Female Thread



Companion Flange

Series

Basic Series: Our most popular valves, great combination of price and performance.

X-Series: Provides larger screen open areas than the basic series.

J and JD-Series: Provides much larger open areas and the greatest selection of screen options.

Horizontal Series: Excellent for shallow water applications, very large screen open areas.



Basic Series



X-Series



J-Series



JD-Series



Horizontal Series

Screen Options for Foot Valves

Basic Series

Hole	Thickness	Material
1/8"	.080	aluminum
1/4"	.050	aluminum <u>standard</u>
1/4"	.080	aluminum
1/2"	.080	aluminum
1/4"	18 ga	stainless steel

J and JD-Series

Hole	Thickness	Material
1/8"	.080	aluminum
1/4"	.080	aluminum <u>standard</u>
1/2"	.080	aluminum
3/4"	.125	aluminum
1"	.125	aluminum
1/4"	18 ga	stainless steel

X-Series

Hole	Thickness	Material
1/8"	.080	aluminum <u>standard</u>
1/4"	.080	aluminum

Information Foot Valves

Additional Options

Stainless steel bolts- Stainless steel bolts, nuts, and washers are available upon request for all Sure-Flo foot valves for an additional charge.

Foot valve drain kit- All Sure-Flo foot valves larger than 3" are provided with a tapped and plugged outlet on the side of the body. By replacing this plug with the optional drain kit, suction line removal becomes much easier. One end of an inexpensive garden hose is attached to the drain fitting, and the other end is capped, with the provided hose cap, and secured near the pump. When ready to remove the suction line, simply remove the cap, and place the hose in the water. This will allow the suction line to drain down to the water surface.

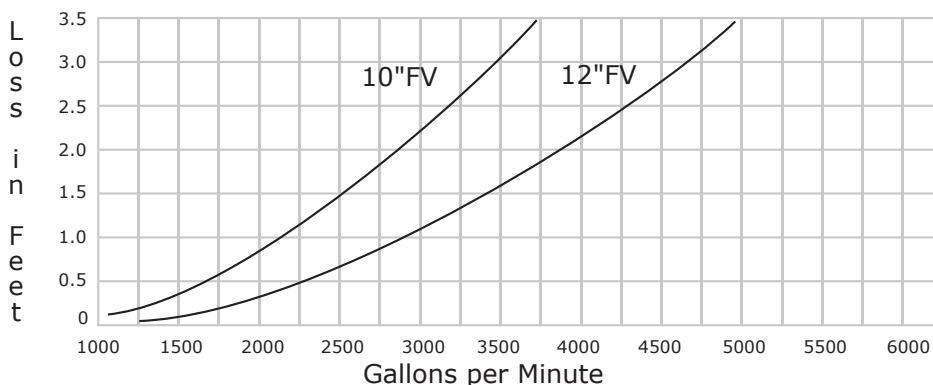
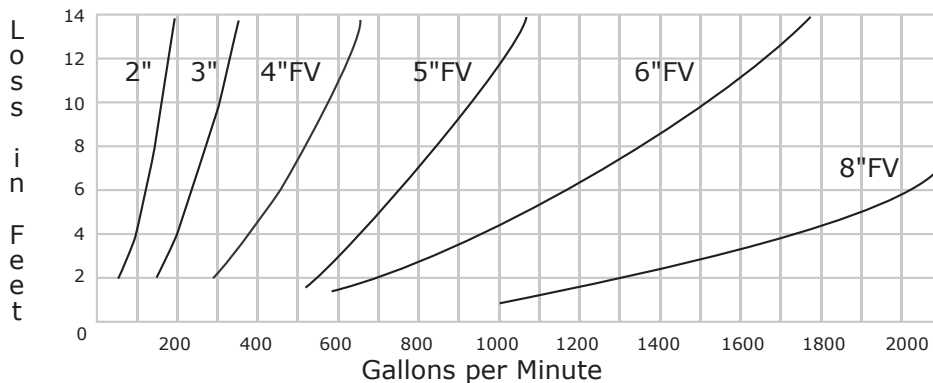


Klamplox flange-



Designed for Sure-Flo OD compression type foot valves and fittings, Klamplox flanges provide an extra secure connection. The flange is made as a two-piece unit, which clamps on the tubing and prevents it from being pushed out of the fitting under pressure. A separate aluminum gasket seal-ring assures uniform pressure against the gasket to prevent leakage.

Foot Valve Loss Curves



* Foot Valve Installation *

When installing Sure-Flo foot valves, it is important that the foot valve be in the proper position. The hump on the body is where the flapper is hinged and swings out of the liquid flow. This hump should be in the uppermost position, aimed towards the surface of the water source. The flapper is not spring loaded and requires a small amount of suction head (vertical distance from the water surface to the pump centerline), usually 4 feet is sufficient.



Foot Valves



SFV6



SFV6FP



SFV6CF



Basic 45°

OD Tubing

Part No.	OD Tubing Size	Weight lbs.	Screen Open Area
SFV2	2"	5.0	17 sq. in.
SFV3	3"	7.0	34 sq. in.
SFV4	4"	11.0	59 sq. in.
SFV5	5"	14.0	78 sq. in.
SFV6	6"	17.0	97 sq. in.
SFV8	8"	26.5	191 sq. in.
SFV10	10"	46.0	360 sq. in.

Female Thread

Part No.	Thread Size	Weight lbs.	Screen Open Area
SFV2FP	2"	5.0	17 sq. in.
SFV3FP	3"	7.5	34 sq. in.
SFV4FP	4"	11.0	59 sq. in.
SFV5FP	5"	13.5	78 sq. in.
SFV6FP	6"	17.0	97 sq. in.
SFV8FP	8"	27.0	191 sq. in.
SFV10FP	10"	47.5	360 sq. in.

Companion Flange

Part No.	Companion Flange Size	Weight lbs.	Screen Open Area
SFV2CF	2"	6.0	17 sq. in.
SFV3CF	3"	8.0	34 sq. in.
SFV4CF	4"	13.5	59 sq. in.
SFV5CF	5"	17.0	78 sq. in.
SFV6CF	6"	20.5	97 sq. in.
SFV8CF	8"	34.0	191 sq. in.
SFV10CF	10"	59.0	360 sq. in.

Screen Dimensions	Height	Diameter
2" basic valves	2-5/8"	5"
3" basic valves	4-1/2"	6"
4" basic valves	6-1/2"	7-1/4"
5" basic valves	7-3/8"	8-3/8"
6" basic valves	8-3/8"	9-1/4"
8" basic valves	13-1/2"	11-1/4"
10" basic valves	21"	13-5/8"
12" basic valves	36"	22"

Basic Vertical

OD Tubing

Part No.	OD Tubing Size	Weight lbs.	Screen Open Area
SFVV3	3"	8.5	34 sq. in.
SFVV4	4"	13.0	59 sq. in.
SFVV5	5"	17.0	78 sq. in.
SFVV6	6"	23.0	97 sq. in.
SFVV8	8"	33.0	191 sq. in.
SFVV10	10"	51.0	360 sq. in.

Female Thread

Part No.	Thread Size	Weight lbs.	Screen Open Area
SFVV2FP	2"	4.0	17 sq. in.
SFVV3FP	3"	6.5	34 sq. in.
SFVV4FP	4"	10.0	59 sq. in.
SFVV5FP	5"	15.0	78 sq. in.
SFVV6FP	6"	21.0	97 sq. in.
SFVV8FP	8"	32.0	191 sq. in.
SFVV10FP	10"	51.0	360 sq. in.

Companion Flange

Part No.	Companion Flange Size	Weight lbs.	Screen Open Area
SFVV2CF	2"	5.0	17 sq. in.
SFVV3CF	3"	8.5	34 sq. in.
SFVV4CF	4"	15.5	59 sq. in.
SFVV5CF	5"	18.5	78 sq. in.
SFVV6CF	6"	27.0	97 sq. in.
SFVV8CF	8"	38.0	191 sq. in.
SFVV10CF	10"	61.0	360 sq. in.

12" foot valve

Part No.	Companion Flange Size	Weight lbs.	Screen Open Area
SFVV12CF	12"	132	972 sq. in.

The 12" foot valve is available only in the vertical companion flange body type.

Foot Valves



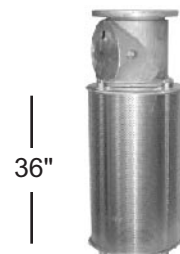
SFVV6



SFVV6FP



SFVV6CF



SFVV12CF

Foot Valves

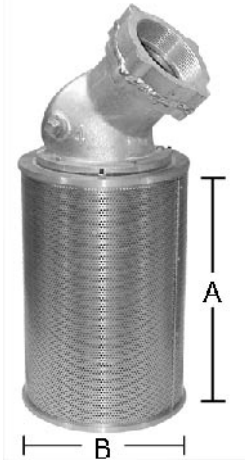
X-Series

Greater Screen Length

Two screen lengths for each size foot valve are available.

Larger Screen Diameter

Greater screen area is also provided by increasing the diameter of the screen compared with basic Sure-Flo foot valves. Each X-Series screen is about 2" larger in diameter than the basic foot valve screen.



SFV4FPX14

Screen Options

Valve Size	Dimension A	Dimension B	Screen Open Area
2"	9"	7.25"	82 sq. in.
2"	14"	7.25"	128 sq. in.
3"	9"	8.50"	96 sq. in.
3"	14"	8.50"	150 sq. in.
4"	9"	9.25"	105 sq. in.
4"	14"	9.25"	163 sq. in.
5"	11"	10.50"	145 sq. in.
5"	18"	10.50"	237 sq. in.
6"	11"	11.25"	155 sq. in.
6"	18"	11.25"	254 sq. in.

Standard screen: 1/8" hole size, .080" thick, aluminum
Optional screen: 1/4" hole size, .080" thick, aluminum
Optional bolts: stainless steel

Body Types



Valve Size	45° OD Tubing	45° Female Thread	45° Companion Flange	Vertical OD Tubing	Vertical Female Thread	Vertical Companion Flange
2"	SFV2X 9	SFV2FPX 9	SFV2CFX 9	SFVV2X 9	SFVV2FPX 9	SFVV2CFX 9
2"	SFV2X14	SFV2FPX14	SFV2CFX14	SFVV2X14	SFVV2FPX14	SFVV2CFX14
3"	SFV3X 9	SFV3FPX 9	SFV3CFX 9	SFVV3X 9	SFVV3FPX 9	SFVV3CFX 9
3"	SFV3X14	SFV3FPX14	SFV3CFX14	SFVV3X14	SFVV3FPX14	SFVV3CFX14
4"	SFV4X 9	SFV4FPX 9	SFV4CFX 9	SFVV4X 9	SFVV4FPX 9	SFVV4CFX 9
4"	SFV4X14	SFV4FPX14	SFV4CFX14	SFVV4X14	SFVV4FPX14	SFVV4CFX14
5"	SFV5X11	SFV5FPX11	SFV5CFX11	SFVV5X11	SFVV5FPX11	SFVV5CFX11
5"	SFV5X18	SFV5FPX18	SFV5CFX18	SFVV5X18	SFVV5FPX18	SFVV5CFX18
6"	SFV6X11	SFV6FPX11	SFV6CFX11	SFVV6X11	SFVV6FPX11	SFVV6CFX11
6"	SFV6X18	SFV6FPX18	SFV6CFX18	SFVV6X18	SFVV6FPX18	SFVV6CFX18

J-Series

Greater Screen Size

All J-Series screens are 18" in height and 13.5" in diameter.

Double Decked Screen Units Available

Greater screen area is also provided by an available double decked screen configuration.

Screen Options

Hole	Thickness	Material	Open Area*
1/8"	.080"	aluminum	314 sq. in.
1/4"	.080"	aluminum	314 sq. in.
1/2"	.080"	aluminum	314 sq. in.
3/4"	.125"	aluminum	236 sq. in.
1.0"	.125"	aluminum	223 sq. in.
1/4"	18 ga	stainless steel	314 sq. in.

* Open area given is for single screen units. Double decked units have twice the open area.

Standard screen: 1/4" hole size, .080" thick, aluminum

Optional bolts: stainless steel

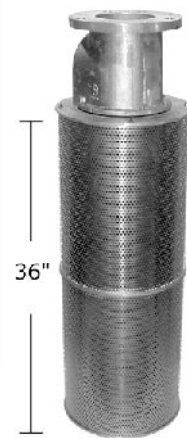
Foot Valves

Single



SFVJ6FP

Double Decked



SFVVJ6CF-D

Body Types



45°



45°



45°



Vertical



Vertical



Vertical

Valve Size	OD Tubing	Female Thread	Companion Flange	OD Tubing	Female Thread	Companion Flange
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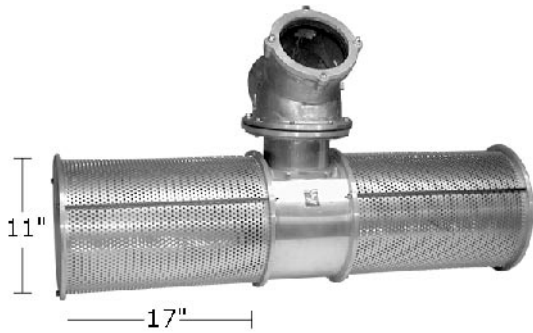
Single Screen

4"	SFVJ4	SFVJ4FP	SFVJ4CF	SFVVJ4	SFVVJ4FP	SFVVJ4CF
5"	SFVJ5	SFVJ5FP	SFVJ5CF	SFVVJ5	SFVVJ5FP	SFVVJ5CF
6"	SFVJ6	SFVJ6FP	SFVJ6CF	SFVVJ6	SFVVJ6FP	SFVVJ6CF
8"	SFVJ8	SFVJ8FP	SFVJ8CF	SFVVJ8	SFVVJ8FP	SFVVJ8CF

Double Decked

4"	SFVJ4-D	SFVJ4FP-D	SFVJ4CF-D	SFVVJ4-D	SFVVJ4FP-D	SFVVJ4CF-D
5"	SFVJ5-D	SFVJ5FP-D	SFVJ5CF-D	SFVVJ5-D	SFVVJ5FP-D	SFVVJ5CF-D
6"	SFVJ6-D	SFVJ6FP-D	SFVJ6CF-D	SFVVJ6-D	SFVVJ6FP-D	SFVVJ6CF-D
8"	SFVJ8-D	SFVJ8FP-D	SFVJ8CF-D	SFVVJ8-D	SFVVJ8FP-D	SFVVJ8CF-D

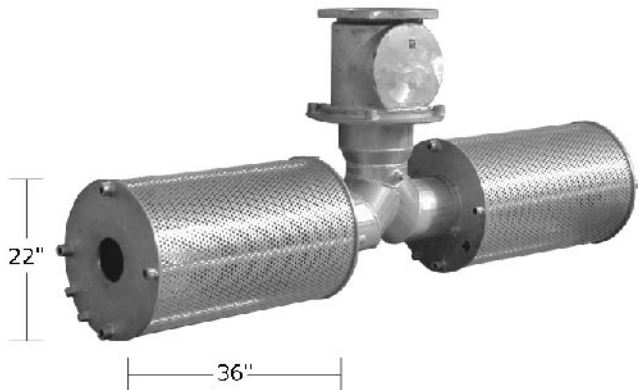
Foot Valves



SFHV6



SFHV10



SFHV12



Horizontal-Series

Horizontal-Basic

4", 6", and 8" foot valves:
Any body type.

Screen size: 11" wide, 17" long
1/8", 1/4", or 1/2" hole size

Total open area: 470 sq. in.

Horizontal-JD

10" foot valves:
Any body type.

As per manufacturer, modify assembly to include additional 18" screen length on each lateral, for a total length of 4.5' on each end

Screen size: 13.5" wide, 36" long
any JD-series screen type available

Total open area: 1256 sq. in.

Horizontal-XL

12" foot valve:
Vertical companion flange only.

Screen size: 22" wide, 36" long
1/8", 1/4", 1/2" or 1" hole size

Total open area: 1944 sq. in.

Foot valve with slide

4", 6", and 8" foot valves:
Any body type.

Can be combined with basic strainers to create foot valves with slides.

Self-Cleaning

Rotating screen with stationary spray nozzles

Uses a small amount of pressurized discharge water to continually rotate the screen and blast the screen clean.

•**Single Drive Models:** For typical applications. Requires from 60-65 psi and 8-77 gpm for cleaning.

•**Dual Drive Models:** For lower pressure or especially heavy cleaning requirements. Requires from 45-55 psi and 14-96 gpm for cleaning.

Single Drive

Part No.	Capacity gpm
SCS2	50
SCS3	160
SCS4	325
SCS6	625
SCS8	1150
SCS10	1500
SCS10BB	1900
SCS10XL	2500
SCS12XL	2500

Dual Drive

Part No.	Capacity gpm
SCS3-DD	200
SCS4-DD	400
SCS6-DD	725
SCS8-DD	1450
SCS10-DD	1875
SCS10BB-DD	2350
SCS10XL-DD	2950
SCS12XL-DD	2950

Screens:

SCS2:	high-density polyethylene, .075" hole size
SCS2-A:	epoxy-coated aluminum, .062" hole size
3"-12" standard:	epoxy-coated aluminum, 3/32" hole size
3"-12" optional:	standard screen wrapped with ss 18 mesh
3"-12" optional:	standard screen wrapped with ss 32 mesh
3"-12" optional:	perforated stainless steel screen
	.117" perf 16GA 316SS

Strainers



Can be used with any Sure-Flo foot valve



SCS2 and SCS2A 50 GPM
Requires 35 psi

Shallow Water

Stationary screen with rotating spray-bar

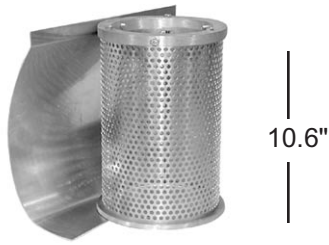
Part No.	Strainer Capacity gpm	Screen Open Area	Backwash Pressure Required
SWS6	625	270 sq. in.	60
SWS8	975	442 sq. in.	60

Screen: epoxy-coated aluminum, 3/32" hole size

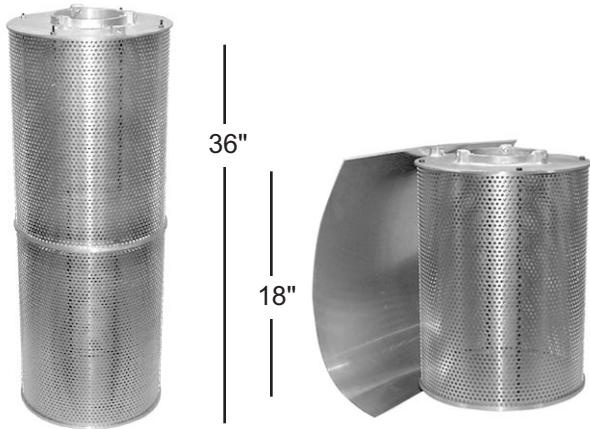


*** See the Sure-Flo self-cleaning catalog for more information. ***

Strainers



SFS6



SFSJ6-D

SFSJ6



SFS8XL



SFSH6

OD Tubing

Basic

Part No.	OD Tubing Size	Weight lbs.	Screen Open Area
SFS2	2"	1.5	15 sq. in.
SFS3	3"	2.0	24 sq. in.
SFS4	4"	3.5	42 sq. in.
SFS5	5"	4.5	66 sq. in.
SFS6	6"	6.0	97 sq. in.
SFS8	8"	11.0	192 sq. in.
SFS10	10"	15.0	332 sq. in.
SFS12XL	12"	See XL strainer section below.	

J and JD

Part No.	OD Tubing Size	Weight lbs.	Screen Open Area
Single Screen			
SFSJ4	4"	14.5	314 sq. in.
SFSJ5	5"	14.5	314 sq. in.
SFSJ6	6"	14.5	314 sq. in.
SFSJ8	8"	14.0	314 sq. in.
SFSJ10	10"	13.5	314 sq. in.
Double Decked			
SFSJ4-D	4"	21.5	628 sq. in.
SFSJ5-D	5"	21.5	628 sq. in.
SFSJ6-D	6"	21.5	628 sq. in.
SFSJ8-D	8"	21.0	628 sq. in.
SFSJ10-D	10"	21.0	628 sq. in.

Available with or without slide. Screen options Pg. 11

XL

Part No.	OD Tubing Size	Weight lbs.	Screen Open Area
SFS6XL	6"	52.0	972 sq. in.
SFS8XL	8"	51.5	972 sq. in.
SFS10XL	10"	51.0	972 sq. in.
SFS12XL	12"	53.5	972 sq. in.

Available with or without slide. Screen options Pg. 11

Horizontal

Part No.	OD Tubing Size	Weight lbs.	Screen Open Area
SFSH4	4"	20.5	470 sq. in.
SFSH6	6"	22.0	470 sq. in.
SFSH8	8"	23.5	470 sq. in.

Available with or without slide. Screen options Pg. 11

PVC Pipe

Basic

Part No.	PVC Pipe Size	Weight lbs.	Screen Open Area
SPVC4	4"	4.0	61 sq. in.
SPVC6	6"	5.5	97 sq. in.
SPVC8	8"	8.0	190 sq. in.
SPVC10	10"	12.0	314 sq. in.

J and JD

Part No.	PVC Pipe Size	Weight lbs.	Screen Open Area
Single Screen			
SPVCJ6	6"	19.5	314 sq. in.
SPVCJ8	8"	19.0	314 sq. in.
Double Decked			
SPVCJ6-D	6"	27.0	628 sq. in.
SPVCJ8-D	8"	27.0	628 sq. in.

XL

Part No.	PVC Pipe Size	Weight lbs.	Screen Open Area
SPVC12	12"	53.5	972 sq. in.
SPVC15	15"	46.0	972 sq. in.
SPVC16	16"	45.5	972 sq. in.

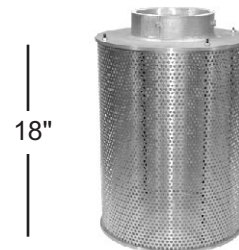
Opening Size:

SPVC12: 12.875" SPVC15: 15.375" SPVC16: 16.25"

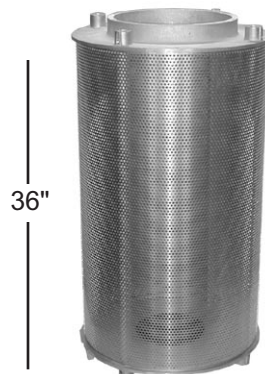
Strainers



SPVC6



SPVCJ8

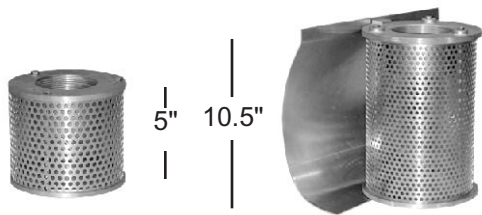


SPVC12

Screen Options for Strainers

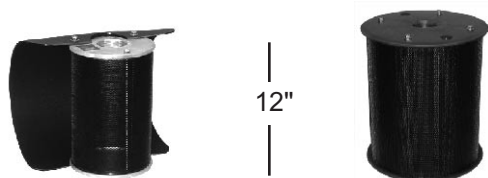
Basic Series			J and JD-Series		
Hole	Thickness	Material	Hole	Thickness	Material
1/8"	.080	aluminum	1/8"	.080	aluminum
1/4"	.050	aluminum <u>standard</u>	1/4"	.080	aluminum <u>standard</u>
1/4"	.080	aluminum	1/2"	.080	aluminum
1/2"	.080	aluminum	3/4"	.125	aluminum
			1"	.125	aluminum
			1/4"	18 ga	stainless steel
XL-Series			Horizontal Series		
Hole	Thickness	Material	Hole	Thickness	Material
1/8"	.080	aluminum	1/4"	.050	aluminum <u>standard</u>
1/4"	.080	aluminum <u>standard</u>	1/8"	.080	aluminum
1/2"	.080	aluminum	1/4"	.080	aluminum
1.0"	.125	aluminum			

Strainers



SFS3P

SFS4P

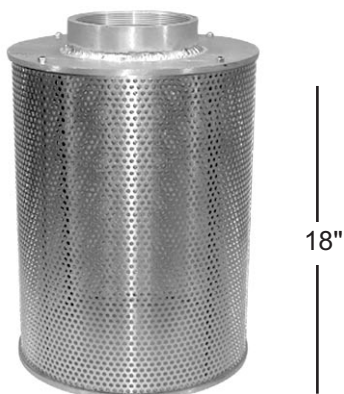


PLS2

PLS2-OS



PLS3



SFSJ6FP

Threaded

Basic

Part No.	Thread Size	Weight lbs.	Screen Open Area
SFS2P	2"	2.0	15 sq. in.
SFS25P	2.5"	2.0	23 sq. in.
SFS3P	3"	2.5	38 sq. in.
SFS4P	4"	6.5	97 sq. in.

Slide available on SFS4P only.

PLS

Part No.	Thread Size	Weight lbs.	Screen Open Area
PLS2	2"	4.0	97 sq. in.
PLS2-OS	2"	3.5	193 sq. in.
PLS3	3"	13.0	197 sq. in.

For ponds, lakes, and streams

Screens: .075 hole, epoxy-coated aluminum
.125 hole, aluminum (PLS3)

Slide: High-density polyethylene (PLS2 only)

Slide: Aluminum (PLS3 only)

J and JD

Part No.	Thread Size	Weight lbs.	Screen Open Area
Single Screen			
SFSJ4FP	4"	17.0	314 sq. in.
SFSJ5FP	5"	17.5	314 sq. in.
SFSJ6FP	6"	17.5	314 sq. in.
SFSJ8FP	8"	18.0	314 sq. in.
SFSJ10FP	10"	21.5	314 sq. in.
Double Decked			
SFSJ4FP-D	4"	24.5	628 sq. in.
SFSJ5FP-D	5"	25.0	628 sq. in.
SFSJ6FP-D	6"	25.0	628 sq. in.
SFSJ8FP-D	8"	25.5	628 sq. in.
SFSJ10FP-D	10"	29.0	628 sq. in.

Available with or without slide.

* For strainer screen options see page 11. *

Companion Flange

Matches the bolt pattern of a standard 125-pound cast iron companion flange or a schedule 80 PVC flange.

Basic

Part No.	Companion Flange Size	Weight lbs.	Screen Open Area
SFSF2	2"	3.5	44 sq. in.
SFSF3	3"	5.5	54 sq. in.
SFSF4	4"	6.5	81 sq. in.
SFSF6	6"	9.0	160 sq. in.
SFSF8	8"	16.0	250 sq. in.



11.25"

SFSF6

J and JD

Part No.	Companion Flange Size	Weight lbs.	Screen Open Area
Single Screen			
SFSFJ4	4"	16.5	314 sq. in.
SFSFJ6	6"	15.5	314 sq. in.
Double Decked			
SFSFJ4-D	4"	24.0	628 sq. in.
SFSFJ6-D	6"	22.5	628 sq. in.



18"

SFSFJ6

XL

Part No.	Companion Flange Size	Weight lbs.	Screen Open Area
SFSF10	10"	50.5	972 sq. in.
SFSF12	12"	54.5	972 sq. in.



36"

SFSF12

* For strainer screen options see page 11. *

Strainers

Specialty

Submersible Pump

A flow-inducer sleeve is used to direct water past a submersible pump motor when pumping conditions fail to provide adequate cooling. Sure-Flo strainers easily bolt on the end of a PVC (IPS) induction tube. **Sure-Flo does not supply the PVC tube.**

Pump Support Plugs

Part No.	PVC Pipe Size	Discharge Pipe Size	Weight lbs.
PSP 4-1	4" IPS	1.0"	2.0
PSP 4-1¼	4" IPS	1.25"	1.5
PSP 6-1	6" IPS	1.0"	3.5
PSP 6-1¼	6" IPS	1.25"	3.5
PSP 6-1½	6" IPS	1.5"	3.5
PSP 6-2	6" IPS	2.0"	3.5
PSP 8-1	8" IPS	1.0"	6.0
PSP 8-2½	8" IPS	2.5"	6.0
PSP 8-3	8" IPS	3.0"	5.5
PSP 8-4	8" IPS	4.0"	5.0

The pump support plug has a compression gasket that holds the plug in the PVC tube and secures the pump discharge pipe. This is accomplished by tightening four compression bolts. An electrical wire clamp comes in each plug.

Motor Support Pads

There are three adjustable, rubber, motor support pads which are included when purchasing the 6" pump support plugs and four pads with 8" pump support plugs.

Three Pad Set- MSP3
 Four Pad Set- MSP4
 Sets may be purchased separately.

Submersible Pump Strainer

Part No.	PVC Pipe Size	Weight lbs.	Screen Open Area
SPS4	4"	4.0	118 sq. in.
SPS6	6"	6.0	185 sq. in.
SPS8	8"	8.5	350 sq. in.

Screen: epoxy-coated aluminum, .075" hole size



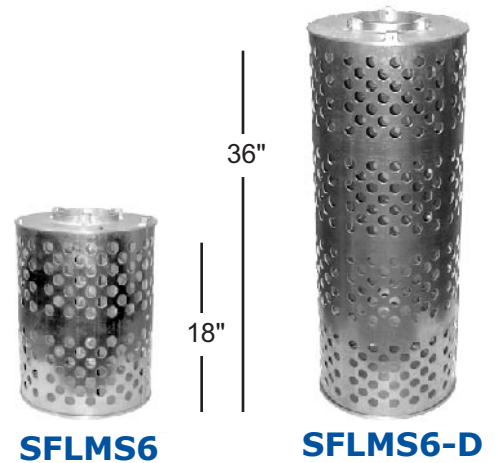
Specialty

Strainers

Liquid Manure

Part No.	OD Tubing Size	Weight lbs.	Screen Open Area
Single Screen			
SFLMS4	4"	17	236 sq. in.
SFLMS5	5"	17	236 sq. in.
SFLMS6	6"	17	236 sq. in.
SFLMS8	8"	17	236 sq. in.
Double Decked			
SFLMS4-D	4"	25	472 sq. in.
SFLMS5-D	5"	25	472 sq. in.
SFLMS6-D	6"	25	472 sq. in.
SFLMS8-D	8"	25	472 sq. in.

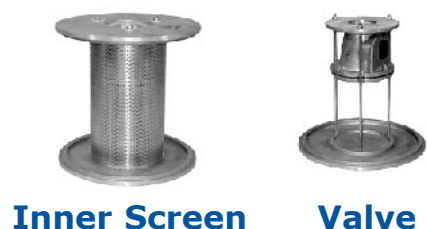
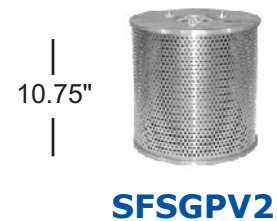
This rugged aluminum strainer quickly bolts on the end of an aluminum suction line. It will hold the weight of a man standing on the screen, yet it weighs only 20 pounds. Positioning the 284 1" holes in the 1/8" thick screen, is the secret to its ability to resist collapse. Available in a double-decked model for extra open area. Made from aluminum castings and a screen of high strength, corrosion resistant alloy and stainless steel bolts and nuts. It is designed for this demanding job.



Gravel Pack

Part No.	Type and Thread Size	Weight lbs.
SFSGPV2	2" with foot valve	12.5
SFSGP2	2" without foot valve	9.5
SFSGP25	2.5" without foot valve	9.5
SFSGP3	3" without foot valve	10.0

Gravel Pack strainers are made with an inner screen of 1/8" perforated aluminum and an outer screen of 1/4" perforated aluminum. The space between these screens may be filled with pea gravel to provide a very effective filter for fine material in the water, including troublesome algae.



Fittings

Eccentric



SFA68

Concentric



SFA66

Pump Adapters

PIPE THREADS to TUBING. These fittings permit the use of Sure-Flo suction fittings on any pump with threaded intakes from 2" to 10". Made from new standard pipe with heavy gauge steel tubing welded to it. The fitting is then hot dipped galvanized. Frequently the suction line should be at least one size larger than the pump inlet. When the tubing size is more than 1" greater than pipe size, the fitting is eccentric. **Eccentric** adapters should be installed straight side up, as pictured, to avoid air pockets from forming.

Part No.	Male Pipe Size	OD Tube Size	Concentric (C) Eccentric (E)	Weight lbs.
SFA152	1½"	2"	C	1.5
SFA22	2"	2"	C	2.5
SFA23	2"	3"	C	2.0
SFA253	2½"	3"	C	3.0
SFA33	3"	3"	C	4.0
SFA24	2"	4"	E	3.0
SFA254	2½"	4"	E	3.5
SFA34	3"	4"	C	3.5
SFA44	4"	4"	C	4.5
SFA35	3"	5"	E	5.5
SFA45	4"	5"	C	4.5
SFA55	5"	5"	C	8.0
SFA36	3"	6"	E	6.5
SFA46	4"	6"	E	8.0
SFA56	5"	6"	C	8.0
SFA66	6"	6"	C	9.0
SFA48	4"	8"	E	10.5
SFA58	5"	8"	E	11.5
SFA68	6"	8"	E	13.5
SFA88	8"	8"	C	14.5
SFA610	6"	10"	E	18.5
SFA810	8"	10"	E	19.5
SFA1010	10"	10"	C	24.5

Couplers

For joining two pieces of irrigation tubing with an air tight suction joint. This fitting is made from three aluminum castings and is sealed by the compression of two rubber gaskets. Easily and quickly tightened without damage to the tubing. Light in weight and free from rust. Tubing must be supported on both sides of the coupler.



SFC6

Part No.	OD Tube Size	Weight lbs.
SFC2	2"	2.5
SFC3	3"	3.0
SFC4	4"	4.0
SFC5	5"	5.0
SFC6	6"	5.5
SFC8	8"	7.0
SFC10	10"	9.5

Elbows

Sure-Flo aluminum elbows are sealed by the compression of a rubber gasket which is ample in size to assure a seal without excessive tightening. The elbow may be connected and disconnected repeatedly without replacement of the gasket.

Part No.	OD Tubing Size	Type	Weight lbs.
SFE92	2"	90°	4.0
SFE93	3"	90°	5.0
SFE94	4"	90°	7.0
SFE95	5"	90°	8.5
SFE96	6"	90°	10.5
SFE98	8"	90°	14.5
SFE910	10"	90°	23.0
SFE42	2"	45°	3.5
SFE43	3"	45°	4.5
SFE44	4"	45°	6.0
SFE45	5"	45°	7.0
SFE46	6"	45°	9.0
SFE48	8"	45°	12.0
SFE410	10"	45°	17.0

Fittings



SFE94



SFE44

Klamplox

Designed for Sure-Flo OD compression type foot valves and fittings, Klamplox flanges provide an extra secure connection. The flange is made as a two piece unit which clamps on the tubing and prevents it from being pushed out of the fitting under pressure. A separate aluminum gasket-seal-ring assures uniform pressure against the gasket to prevent leakage. Not more than 10 foot pounds of torque should be applied to the clamp bolts or flange bolts to prevent breakage of the aluminum castings



Maximum Pressure Ratings:

4"-150 PSI 5"- 125 PSI 6"-100 PSI 8"-100 PSI

Foot Valves



SFKV6

Couplers



SFKC6

Elbows



SFKE44

Fittings



5-48GO



4-48GO Assy



SFTP6

Gun Outlets

Universal Attachable Outlets

Available with 2½" riser pipe threads and for 4", 5", or 6" O.D. pipe. Simply clamp on the pipe with Permatex under the top half and then cut out the pipe with a hole saw.

Small "Guns" may be used on this sturdy outlet. The base is drilled for attaching a board for support of the sprinkler. If the gun has a larger opening than 2½", this may be bushed down to fit.

The usual procedure is to provide a number of outlets, each with a gate valve, and then to move the gun or guns from outlet to outlet along the line. This method saves much time and labor and permits continuous operation of the pump, if one extra gun is available.

May be attached to full lengths of pipe, thus, less expensive than special short lengths with outlets.

For use with tall risers, as for corn, the riser may be supported by a tripod attached to a support board under the outlet and to a band around the pipe.

Part No.	OD Tube Size	Weight lbs.
4-48GO	4"	3.5
5-48GO	5"	4.5
6-48GO	6"	5.5

2½" x 2" cadmium plated steel reducing nipple 7" long

Tubing Plugs

Cast aluminum plugs which can be inserted into aluminum irrigation tubing to make a closure. May be pressed into the tubing, welded into it, riveted, or pinned into place, depending on the requirements. Also may be turned down to provide a looser fit if required.

These castings permit the use of tubing for many special products such as water tanks, fishing rod cases, etc.

Part No.	OD Tube Size	Weight lbs.
SFTP2	2"	.1
SFTP3	3"	.2
SFTP4	4"	.4
SFTP5	5"	.4
SFTP6	6"	.5
SFTP8	8"	2.0

Companion Flanges

Fittings

Sure-Flo companion flanges are made with the same dimensions and bolt holes as standard 125-pound cast iron flanges used in the plumbing and pump trades.

They are not threaded, but are bored so that aluminum irrigation pipe can be fitted into the opening and welded in place.

These flanges permit the use of irrigation tubing in pipe lines and in pump connections. They are useful in food processing pipe lines and in industrial piping where low weight is important.



SFCF6

Part No.	Companion Flange Size	OD	Weight lbs
SFCF2	2"	6.0	1.5
SFCF3	3"	7.0	2.5
SFCF4	4"	9.0	5.0
SFCF5	5"	10.0	5.5
SFCF6	6"	11.0	6.0
SFCF8	8"	13.5	12.5
SFCF10	10"	16.0	13.0
SFCF12	12"	19.0	18.5

Aluminum Tube Tees & Els

Sure-Flo offers a variety of aluminum tube tees and elbows which can be welded to foot valve seat rings or companion flanges, for increased screen capacities or for custom configurations.



12x10x10



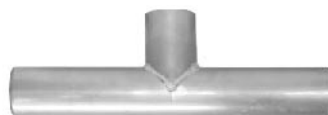
6x4x4



8" 90°



10x10x10

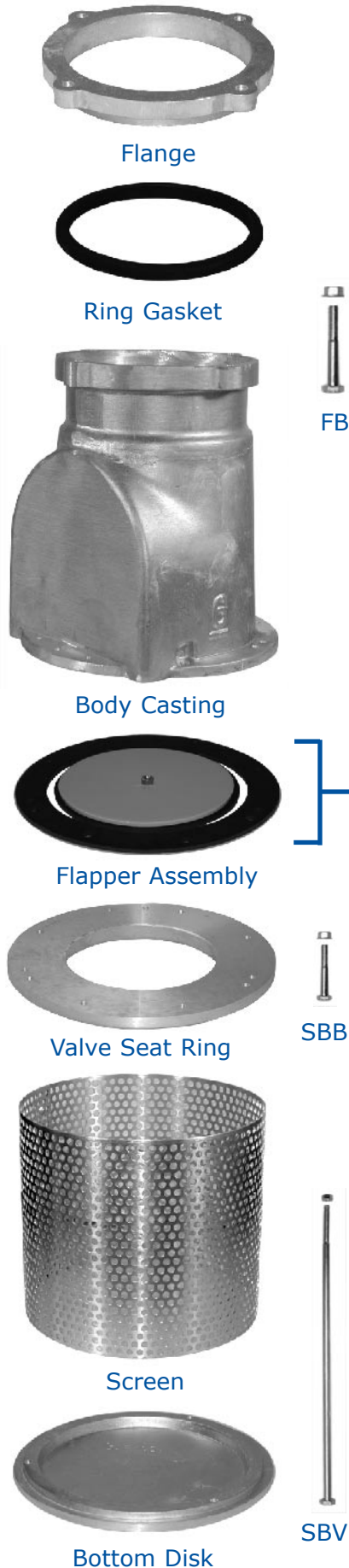


4x4x4

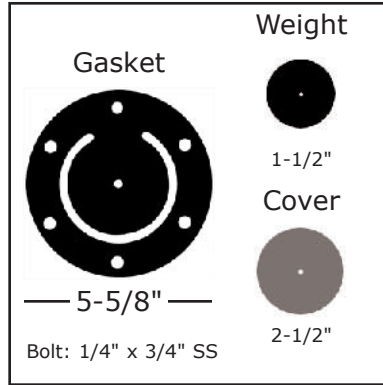


6" 90°

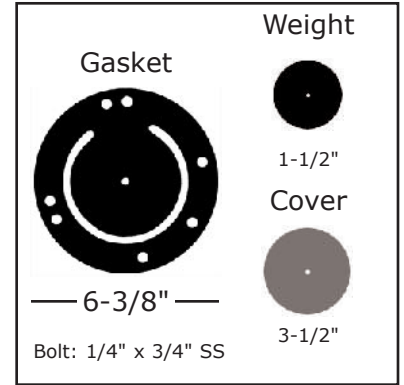
Foot Valve Parts and Flapper Dimensions



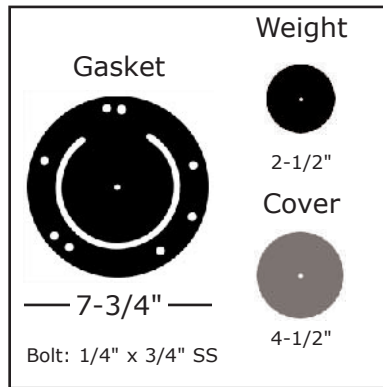
2" Flapper Assembly



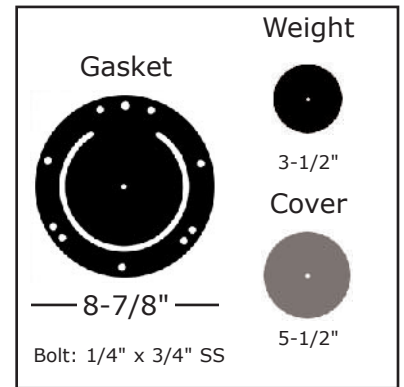
3" Flapper Assembly



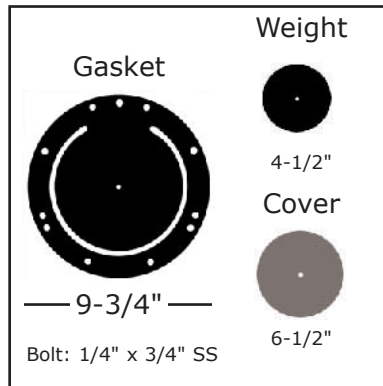
4" Flapper Assembly



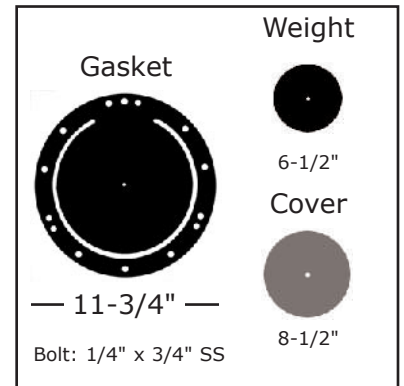
5" Flapper Assembly



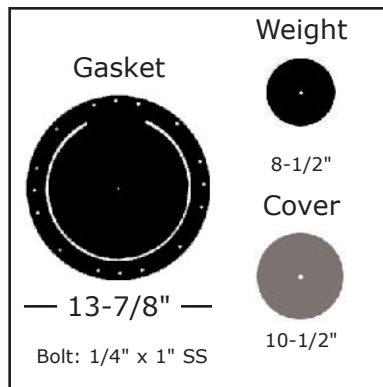
6" Flapper Assembly



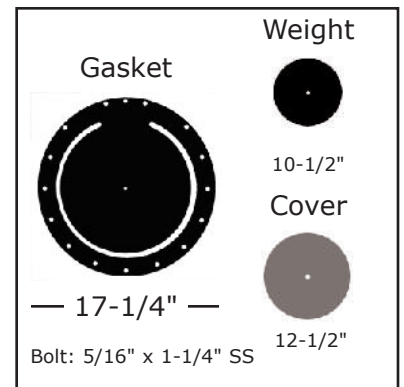
8" Flapper Assembly



10" Flapper Assembly



12" Flapper Assembly



A-3 Pump Specification

Pioneer Prime

PP66C14L71



Typical Pump Configuration

Performance

Pioneer Prime series - vacuum assisted, end suction centrifugal pump

Bare shaft, frame mounted, fully automatic dry priming, vacuum assisted, run dry, heavy duty pump

Size	6" x 6" 150 x 150 mm
Flow, Max	2,825 USgpm 660 m ³ /h 180 l/s
Head, Max	320 feet 100 meters
Flow at BEP	2,625 USgpm 600 m ³ /h 170 l/s
Efficiency at BEP	81%
Solids Handling, Max	1.0" 25 mm
Operating Speed, Max	2200 rpm
Suction Connection	6" (150 mm) 150 ANSI Flanges
Delivery Connection	6" (150 mm) 150 ANSI Flanges
Bearing Lubrication	Oil STD Grease optional
Fasteners	Imperial

Applications

Oil & Gas	Construction
Industrial	Mining
Petrochemical	Rental
Agriculture	Irrigation

High flow, heavy duty pump

The PP66C14 is a high flow, ruggedized pump designed to run over a broad range of performance and deliver outstanding suction lift. The rugged construction and modular design provide proven reliability and flexibility in the most demanding applications.

UltraPrime™ Priming System

Priming System	Mechanically Driven Diaphragm Style Vacuum Pump
Air Removal Capability	50 CFM
Priming Chamber	Single chamber with positive sealing air separation PosiValve™ with stainless steel float ball & linkage.
Discharge Check Valve	Swing Style - ductile iron with Buna-n Disc Valve

Other Specifications

Mechanical Seal	Single seal w/ tungsten carbide vs. silicon carbide seal faces, Viton® elastomers, 300 series stainless steel hardware and spring, designed for indefinite dry running	
Pump End Bearing	Single Row Ball	
Drive End Bearing	Single Row Ball	
Shaft	17-4 PH Stainless Steel	

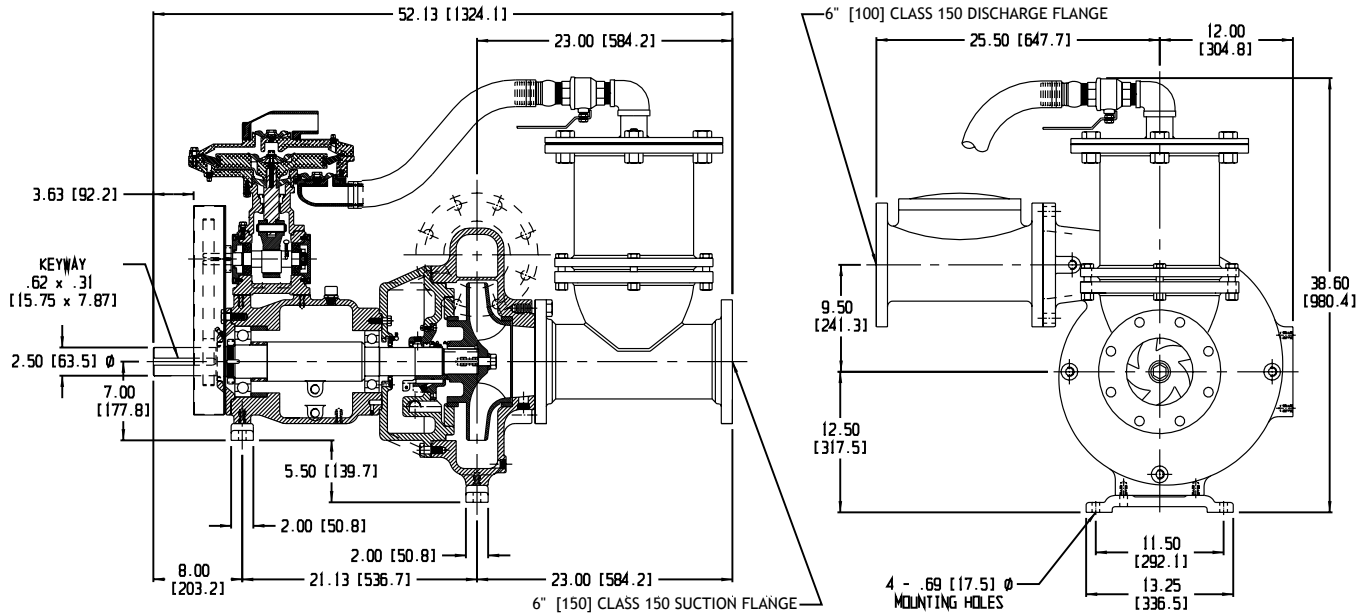
Construction Materials

	Standard Construction	CD4MCu Stainless Steel
Impeller	CA6NM SS	CD4MCu
Volute	Ductile Iron ASTM A536 65-45-12	CD4MCu
Wear Ring	ASTM A48 Class 40 Gray Iron	316 SS
Suction Cover	Ductile Iron ASTM A536 65-45-12	CD4MCu
Brac-plate	Ductile Iron ASTM A536 65-45-12	CD4MCu

Mechanical Dimensions

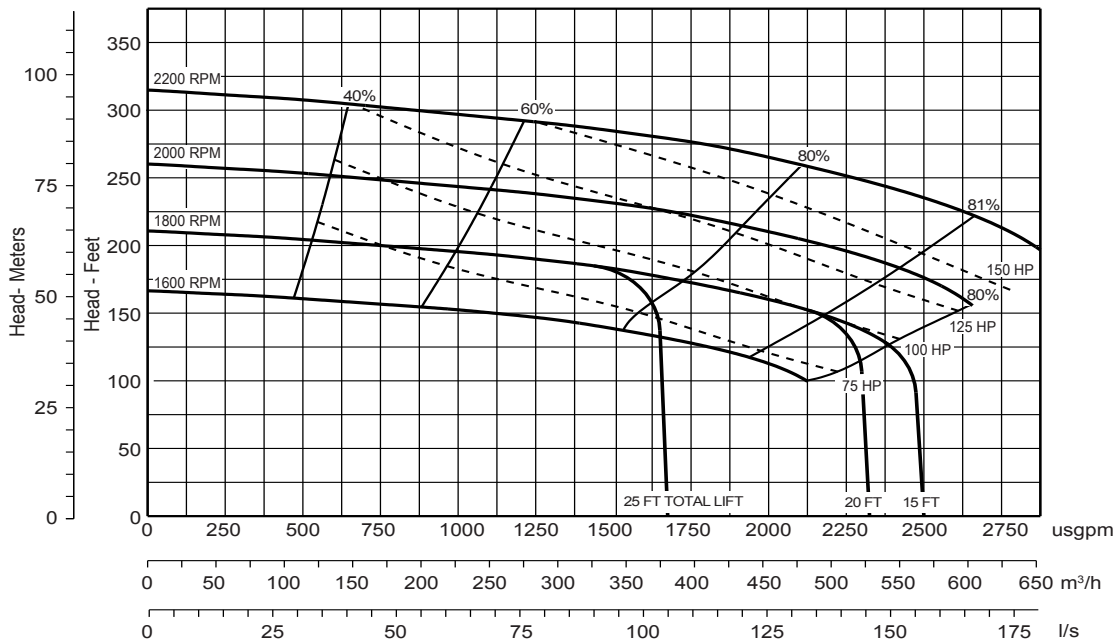


PP66C14



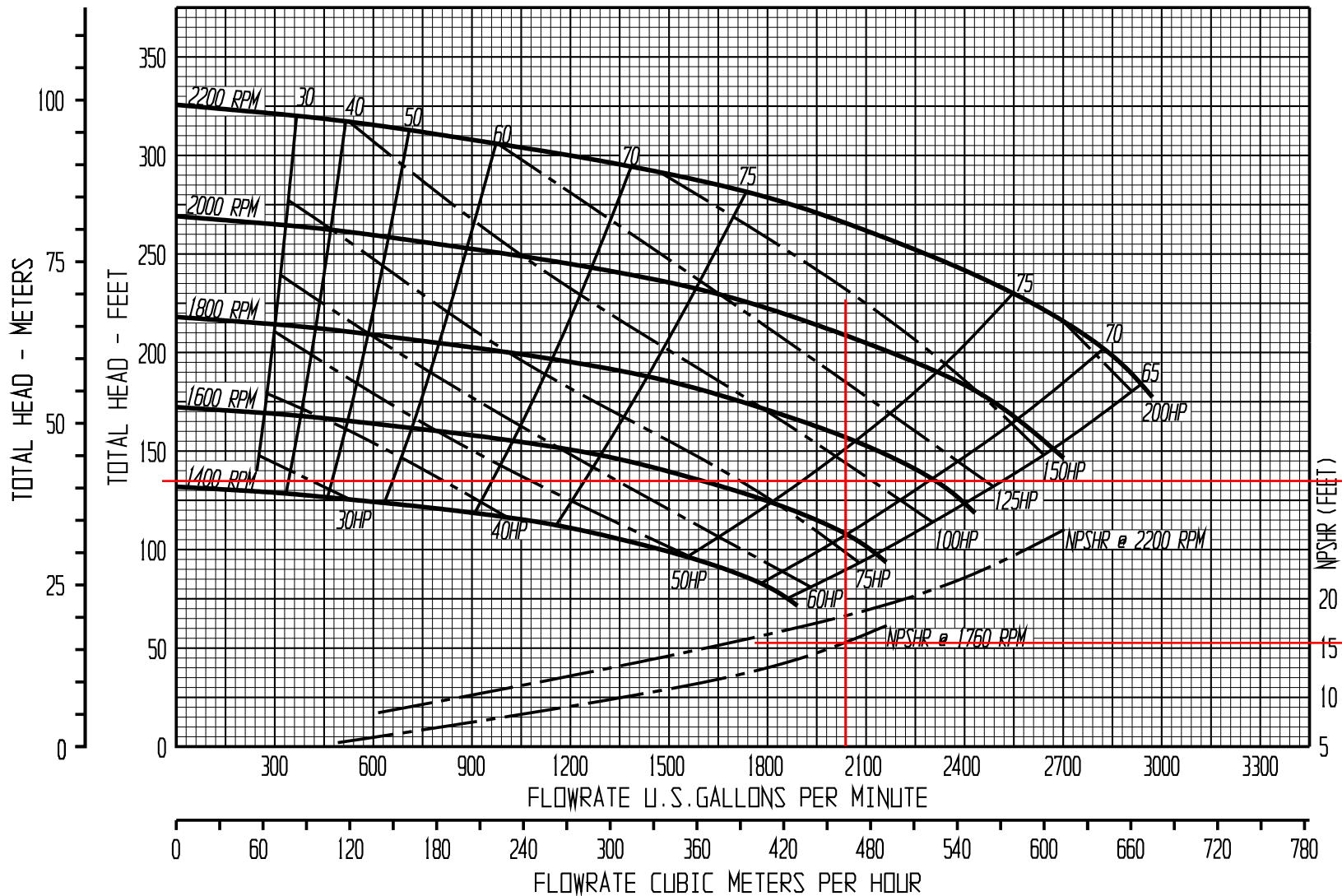
Performance Curve

Model: PP66C14	Impeller Dia: 14"	Speed: Variable	Solids Size: 1.0"	Curve #A2578HQ
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Note: Losses from priming system not shown

A-4 Pump Head Curves and Pump Selection Justification



NOTES:
 CURVE ACCOUNTS FOR
 LOSSES FROM CHECK
 VALVE, PRIMING
 SYSTEM, AND OPEN
 CLEARANCE WEAR RING

135 ft
TDH

15.5 ft
NPSHr



MODEL: PP66C14

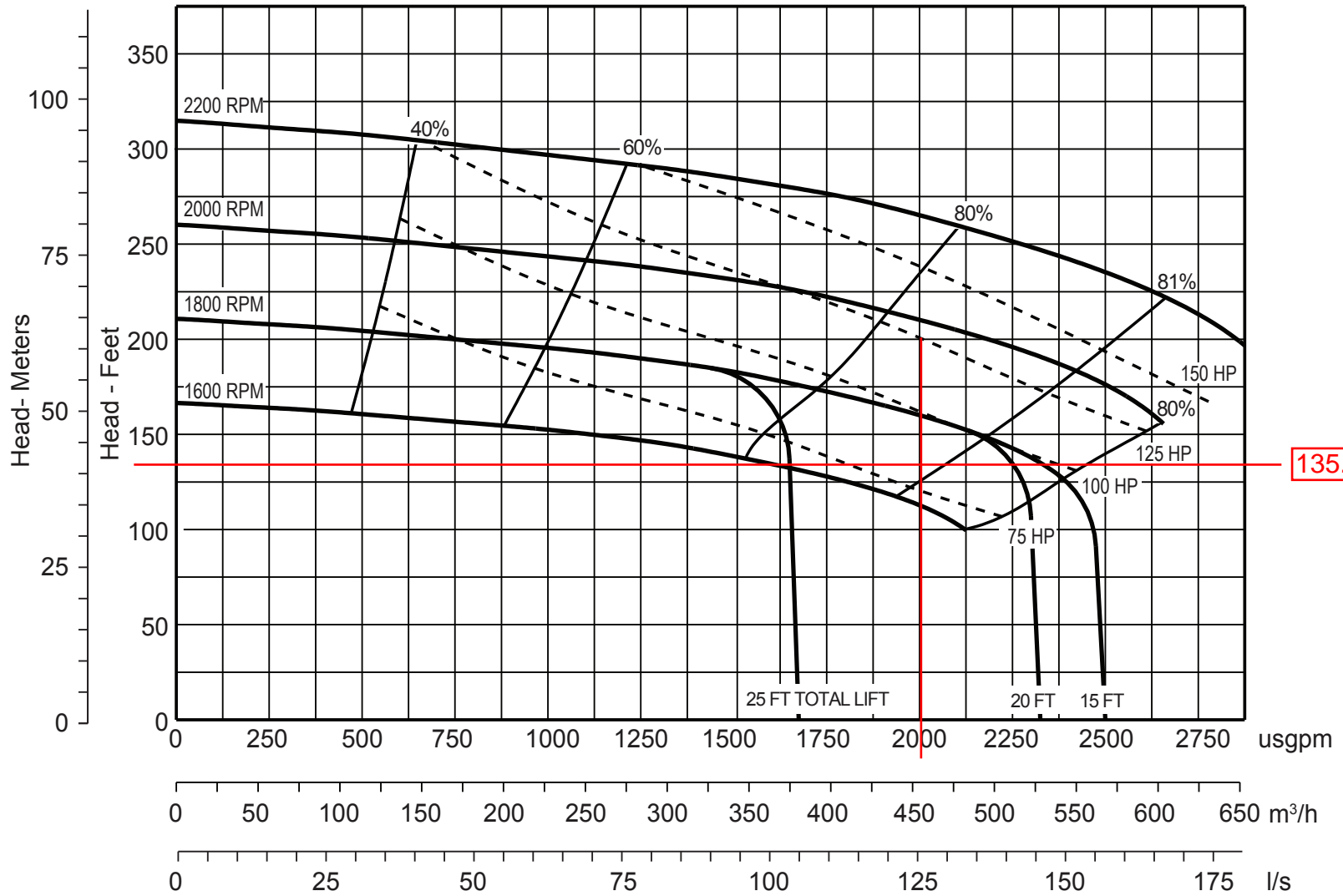
IMPELLER DIA. 14.0"

SIZE: 6" x 6"

SOLIDS SIZE: 1.0"

DWG NO. A7524HQ
 REVISION: 001
 DRAWN BY: DAP
 DATE: 09/16/2010

Note: Losses from priming system not shown



Model	PP66C14	
Size	6" x 6"	150 mm x 150 mm
Impeller Diameter	14.0"	356 mm
Solids Handling Size	1.38"	35 mm

DWG No. A2578HQ
Revision 001
Drawn By DAP
Date 23 Jul 2010

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ex: 37 25.818' N, 122 05.36' W

Get Directions History

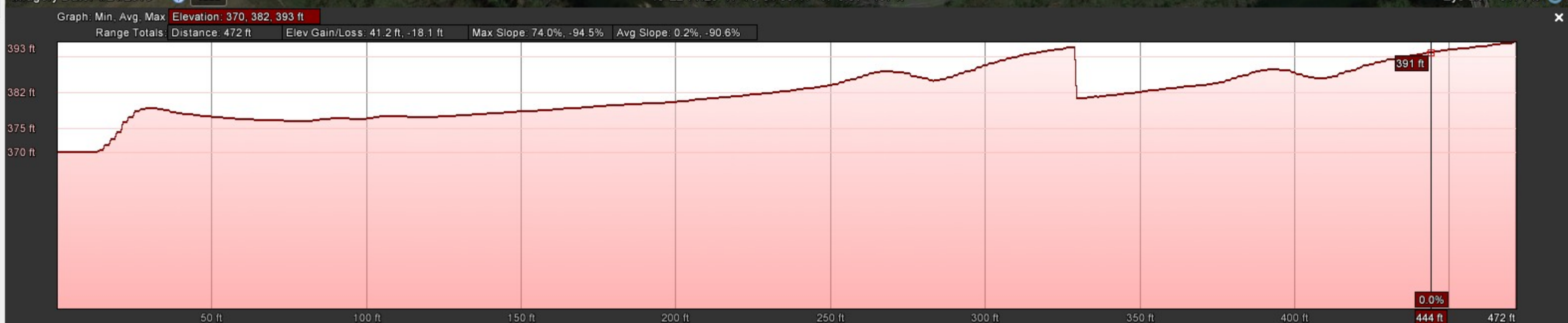
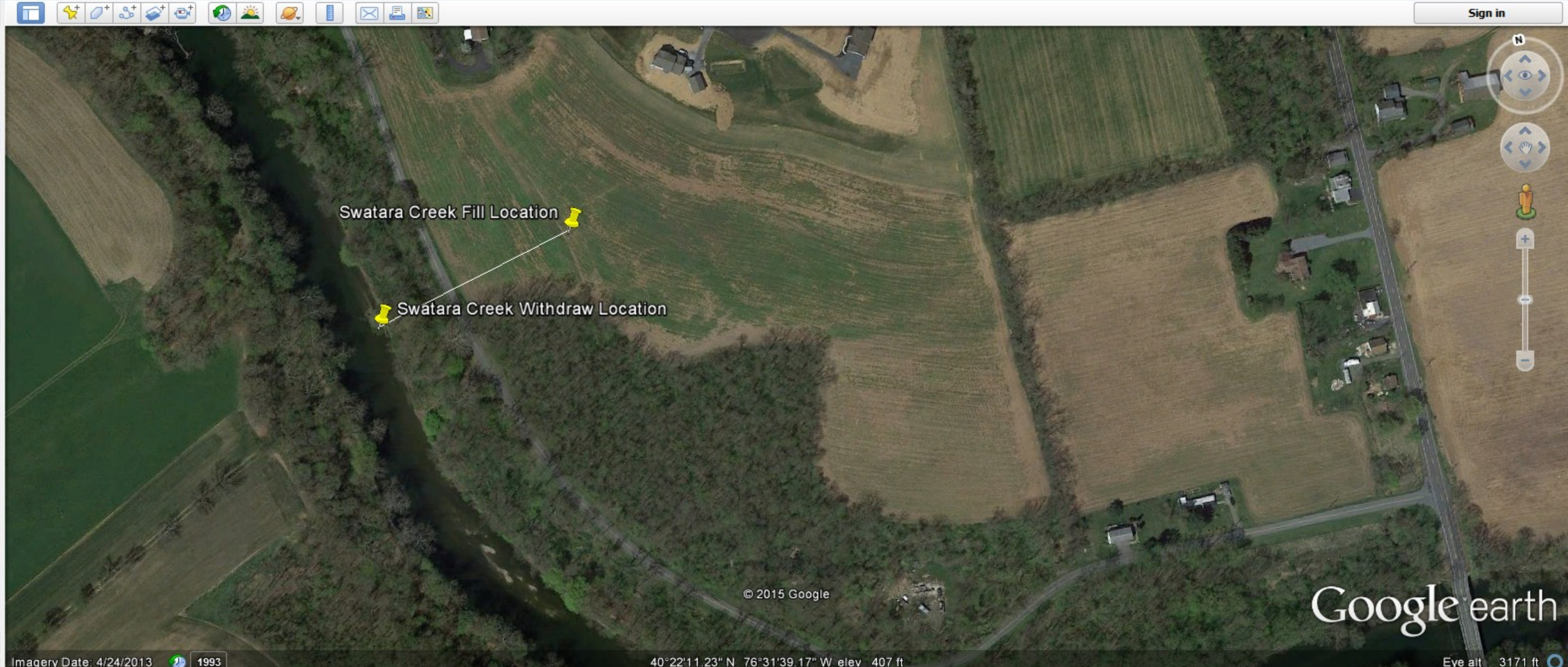
41 28 47.88, -75 54 22.56

Places

- ASR- Hydrotest Withdraw and Fill Location
 - CPLN
 - CPLS
 - Pequea Creek Withdraw Location
 - Pequea Creek
 - Pequea Creek Fill Location
 - Chickies Creek Withdraw Location
 - Chiques Creek
 - Chickies Creek Fill Location
 - Swatara Creek Withdraw Location
 - Swatara Creek
 - Swatara Creek Fill Location
 - Deep Creek Withdraw Location
 - Deep Creek Fill Location
 - Little Fishing Creek Withdraw Location
 - Little Fishing Creek Fill Location

Layers

- Primary Database
- Earth Pro (US)
- Voyager New!
- Happy 10th Birthday, Google Earth!
- Edition 1
 - Highlight tour
 - Street View highlights
 - Earth View landscapes
 - 3D cities
 - Satellite imagery updates
- Download
- Borders and Labels
- Places
- Photos
- Roads
- 3D Buildings
- Ocean



A-5 Flow Control Valve Specification

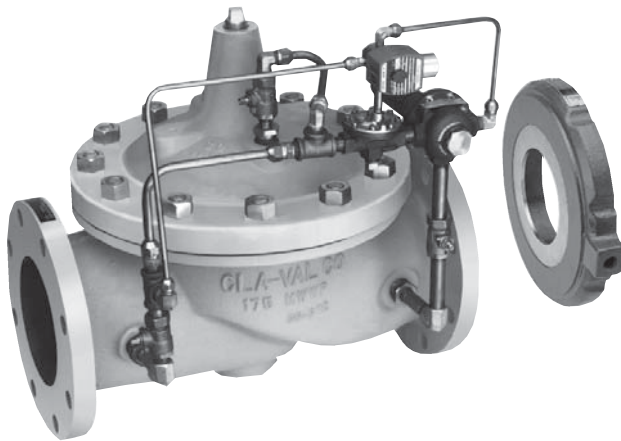


43-01
(Full Internal Port)

MODEL

643-01
(Reduced Internal Port)

Combination Rate of Flow Controller & Solenoid Shut-Off Valve



- Multi-functional Capability
- Includes Orifice Plate with Holder
- Optional Check Feature
- Easily Adjusted
- Every Valve Factory Tested

The Cla-Val Model 43-01/643-01 Combination Rate of Flow Controller and Solenoid Shut-Off Valve limits the maximum flow rate, regardless of changing line pressure. It is a hydraulically operated, pilot controlled, diaphragm valve. The pilot control is actuated by the differential pressure produced across an orifice plate installed downstream of the valve. Accurate control is assured as very small changes in the controlling differential pressure produce immediate corrective action of the main valve. A solenoid control is provided to intercept the operation of the differential control and close the main valve.

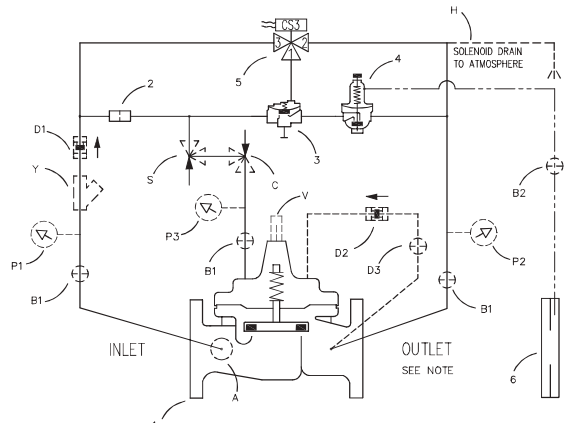
The Model 43-01/643-01 includes a orifice plate with a holder that should be installed one to five pipe diameters downstream of the main valve. If the check feature option is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes to prevent return flow.

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	X58C Restriction Fitting
3	100-01 Hytrol (Reverse Flow)
4	CDHS18 Differential Control
5	CS3 Solenoid Control
6	X52E Orifice Plate Assembly

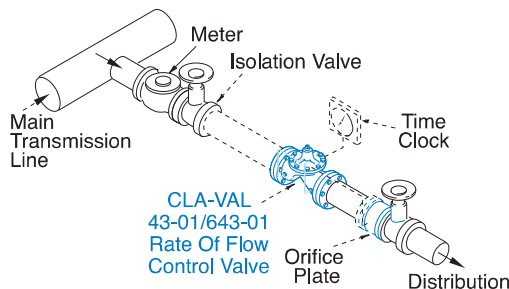
Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 (Isolation Valve)
C	CV Flow Control (Closing)
D	Check Valves with Isolation Valve
H	Solenoid Drain to Atmosphere
P	X141 Pressure Gauge
S	CV Speed Control (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

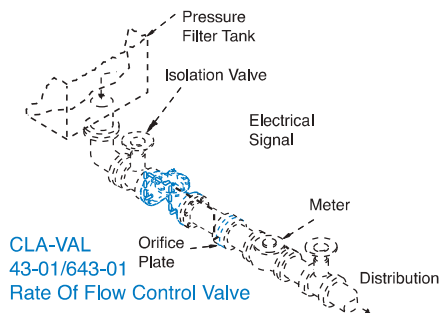


The "D" feature on a vertically installed 6" and larger valves must be horizontally installed.

Typical Applications



The 43-01/643-01 is typically installed where water supply to a system must be limited to a pre-set maximum flow rate at certain times of day. The valve is easily set to maintain the maximum allowable flow rate and is to open or close on an electrical signal.



The 43-01/643-01 is typically installed as a pressure type filter effluent control valve where a constant flow rate is maintained as head loss through the filter varies. The valve opens or closes on an electrical signal.



Model 43-01 (Uses Basic Valve Model 100-01)

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
ASTM B62	Bronze	B16.24	225	400	400	400

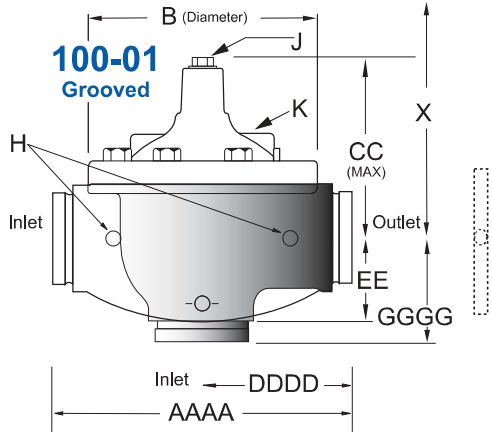
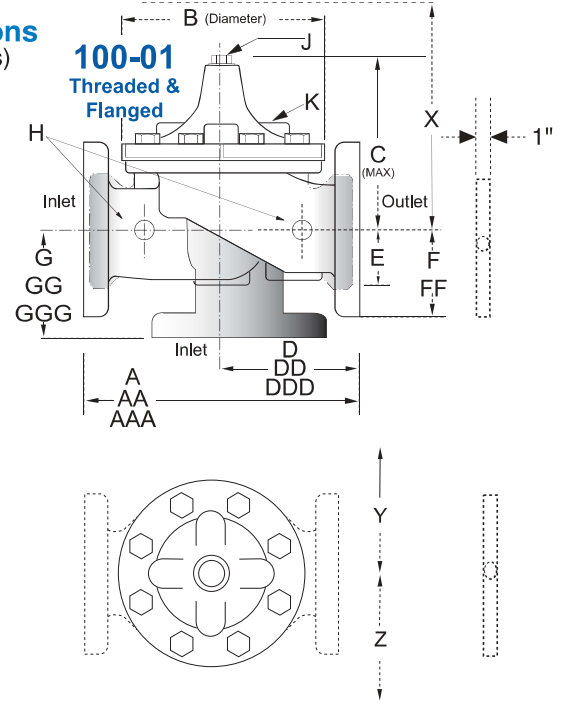
Note: * ANSI standards are for flange dimensions only.
 Flanged valves are available faced but not drilled.
 ‡ End Details machined to ANSI B2.1 specifications.
Valves for higher pressure are available; consult factory for details

Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	1-1/2" - 36"	1-1/2" - 16"	1-1/2" - 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.

Dimensions
(In inches)



Model 43-01 Dimensions (In Inches)

Valve Size (Inches)	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36
A Threaded	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	76.00
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	76.00
AAAA Grooved End	8.50	9.00	11.00	12.50	15.00	20.00	25.38	—	—	—	—	—	—	—	—	—
B Dia.	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 Max.	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	61.50
CC Max. Grooved End	4.75	5.75	6.88	7.25	9.31	12.12	14.62	—	—	—	—	—	—	—	—	—
D Threaded	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	1.50	1.69	2.06	3.19	4.31	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	25.60
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	25.60
G Threaded	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	.375	.375	.50	.50	.75	.75	1	1	1	1	1	1	1	1	2	2
J NPT Cover Center Plug	.25	.50	.50	.50	.75	.75	1	1	1.25	1.5	2	1.5	1.5	1.5	2	2
K NPT Cover Tapping	.375	.375	.50	.50	.75	.75	1	1	1	1	1	1	1	1	2	2
Stem Travel	0.4	0.6	0.7	0.8	1.1	1.7	2.3	2.8	3.4	4.0	4.5	5.1	5.63	6.75	7.5	8.5
Approx. Ship Wt. Lbs.	15	35	50	70	140	285	500	780	1165	1600	2265	2982	3900	6200	7703	11720
X Pilot System	11	13	14	15	17	29	31	33	36	40	40	43	47	68	79	85
Y Pilot System	9	9	10	11	12	20	22	24	26	29	30	32	34	39	40	45
Z Pilot System	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.

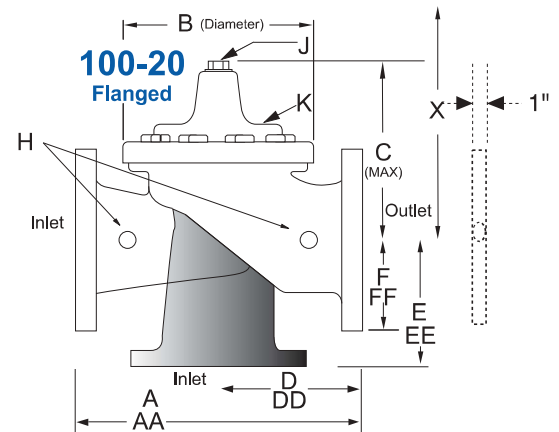
Model 643-01 (Uses Basic Valve Model 100-20)

Dimensions
(In inches)

Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class		
		Flanged		
Grade	Material	ANSI Standards*	150 Class	300 Class
ASTM A536	Ductile Iron	B16.42	250	400
ASTM A216-WCB	Cast Steel	B16.5	285	400
ASTM B62	Bronze	B16.24	225	400

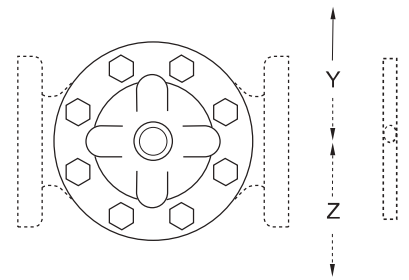
Note: * ANSI standards are for flange dimensions only.
Flanged valves are available faced but not drilled.
Valves for higher pressure are available; consult factory for details



Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	3" - 48"	3" - 16"	3" - 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.



Model 643-01 Dimensions (In Inches)

Valve Size (Inches)	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
A 150 ANSI	10.25	13.88	17.75	21.38	26.00	30.00	34.25	35.00	42.12	48.00	48.00	63.25	65.00	76.00	94.50
AA 300 ANSI	11.00	14.50	18.62	22.38	27.38	31.50	35.75	36.62	43.63	49.62	49.75	63.75	67.00	76.00	94.50
B Dia.	6.62	9.12	11.50	15.75	20.00	23.62	27.47	28.00	35.44	35.44	35.44	53.19	56.00	66.00	66.00
C Max.	7.00	8.62	11.62	15.00	17.88	21.00	20.88	25.75	25.00	31.00	31.00	43.94	54.60	61.50	61.50
D 150 ANSI	—	6.94	8.88	10.69	CF*	CF*	CF*	CF*	CF*	CF*	CF*	—	—	—	—
DD 300 ANSI	—	7.25	9.38	11.19	CF*	CF*	CF*	CF*	CF*	CF*	CF*	—	—	—	—
E 150 ANSI	—	5.50	6.75	7.25	CF*	CF*	CF*	CF*	CF*	CF*	CF*	—	—	—	—
EE 300 ANSI	—	5.81	7.25	7.75	CF*	CF*	CF*	CF*	CF*	CF*	CF*	—	—	—	—
F 150 ANSI	3.75	4.50	5.50	6.75	8.00	9.50	11.00	11.75	15.88	14.56	17.00	19.88	25.50	28.00	31.50
FF 300 ANSI	4.12	5.00	6.25	7.50	8.75	10.25	11.50	12.75	15.88	16.06	19.00	22.00	27.50	28.00	31.50
H NPT Body Tapping	.375	.50	.75	.75	1	1	1	1	1	1	1	1	2	2	2
J NPT Cover Center Plug	.50	.50	.75	.75	1	1	1.25	1.25	2	2	2	2	2	2	2
K NPT Cover Tapping	.375	.50	.75	.75	1	1	1	1	1	1	1	1	2	2	2
Stem Travel	0.6	0.8	1.1	1.7	2.3	2.8	3.4	3.4	4.5	4.5	4.5	6.5	7.5	8.5	8.5
Approx. Ship Wt. Lbs.	45	85	195	330	625	900	1250	1380	1500	2551	2733	6500	8545	12450	13100
X Pilot System	13	15	27	30	33	36	36	41	40	46	55	68	79	85	86
Y Pilot System	10	11	18	20	22	24	26	26	30	30	30	39	40	45	47
Z Pilot System	10	11	18	20	22	24	26	26	30	30	30	39	42	47	49

*Consult Factory

Note: The top two flange holes on valve sizes 36 thru 48 are threaded to 1 1/2"-6 UNC.

43-01 Valve Selection	100-01 Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Grooved (GR), Flanged (F) Indicate Available Sizes																
	Inches	1½	2	2½	3	4	6	8	10	12	14	16	18	20	24	30	36
	mm	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750	900
Basic Valve 100-01	Pattern	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G	G	G, A	G	G
	End Detail	T, F, Gr*	T, F, Gr	T, F, Gr*	T, F, Gr	F, Gr	F, Gr*	F, Gr*	F	F	F	F	F	F	F	F	F
Suggested Flow (gpm)	Maximum	125	210	300	460	800	1800	3100	4900	7000	8400	11000	14000	17000	25000	42000	50000
	Maximum Intermittent	160	260	370	580	990	2250	3900	6150	8720	10540	13700	17500	21700	31300	48000	62500
	Minimum	1	1	2	2	4	10	15	35	50	70	95	120	150	275	450	650
Suggested Flow (Liters/Sec)	Maximum	8	13	19	29	50	113	195	309	442	530	694	883	1073	1577	2650	3150
	Maximum Intermittent	10	16	23	37	62	142	246	387	549	664	863	1104	1369	1972	3028	3940
	Minimum	.03	.06	.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

100-01 Series is the full internal port Hytrol. **For Lower Flows Consult Factory** *Globe Grooved Only

643-01 Valve Selection	100-20 Pattern: Globe (G), Angle (A), End Connections: Flanged (F) Indicate Available Sizes																
	Inches	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	
	mm	80	100	150	200	250	300	350	400	450	500	600	750	900	1000	1200	
Basic Valve 100-20	Pattern	G	G, A	G, A	G, A	G	G	G	G	G	G	G	G	G	G	G	G
	End Detail	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Suggested Flow (gpm)	Maximum	260	580	1025	2300	4100	6400	9230	9230	16500	16500	16500	28000	33500	33500	33500	
	Minimum	1	2	4	10	15	35	50	50	95	95	95	275	450	450	450	
Suggested Flow (Liters/Sec)	Maximum	16	37	65	145	258	403	581	581	1040	1040	1040	1764	2115	2115	2115	
	Minimum	.06	.13	.25	.63	.95	2.2	3.2	3.2	6.0	6.0	6.0	17.4	28.4	41.0	41.0	

100-20 Series is the reduced internal port size version of the 100-01 Series. **For Lower Flows Consult Factory**

Pilot System Specifications

- Adjustment Range**
Low flow equals one-fourth maximum flow.
- Temperature Range**
Water: to 180°F
- Electrical Ratings**
24, 48, 120, 240, 480 - 60 Hz AC
6, 12, 24, 120, 240 DC

- Materials**
Standard Pilot System Materials
Pilot Control: Bronze ASTM B62
Trim: Stainless Steel 303
Orifice Plate: Stainless Steel 303
Rubber: Buna-N® Synthetic Rubber
- Optional Pilot System Materials
Pilot systems are available with optional Aluminum, Stainless Steel or Monel materials.

When Ordering, Please Specify

- Catalog No. 43-01 or No. 643-01
- Valve Size
- Pattern - Globe or Angle
- Pressure Class
- Threaded or Flanged
- Trim Material
- Adjustment Range/Orifice Bore
- Energized or De-Energized to Open
- Desired Options
- When Vertically Installed

Note: Orifice plate assembly (X52E) may be attached to the main valve outlet flange, however, better control is obtained if it is located one to five pipe diameters downstream. Orifice plate sensing connection should be located in the pipeline on the side of the orifice plate assembly. The orifice plate assembly should not be mounted directly to a butterfly valve. See E-X52E Data Sheet for Orifice Bore adjustment range.

A-6 Pipeline Sizing Justification

Title: Swatara Creek Pipe Size Calculation

Project Name: Atlantic Sunrise

Client: TRANSCO

Prepare By: DTK

Checked By: LMH

Date: 10/27/2015

Date: 11/5/2015

Design Flow Rate	2,000	gpm	
Length ¹	472	ft	
Elevation at Start ¹	370	ft MSL	
Elevation at Pump	378	ft MSL	
Elevation at End ¹	393	ft MSL	
Backpressure at Discharge	30	psig	(NOTE: to account for minor losses; throttle discharge valve as required)
Hazen-Williams Coefficient	140		
Suction Pipe Length	135	ft	

¹ design basis to transfer water to pipeline, additional equipment to be used by hydrotest contractor.

Estimate Pipe Size based on velocity

Maintain Velocity at needed area 15.0 ft/sec or less (temporary piping)
 0.30 sf or a dia. = 7.4 inches I.D.

Pressure Drop Calculations

Use: Hazen-Williams Eq.:

$$h_f = \frac{0.2083 * \left(\frac{100}{C}\right)^{1.85} * Q^{1.85} * L}{100 * D^{4.8655}}$$

Flow rate, gpm	(gpm)	2,000	2,000	2,000	
Pipe Size	(inch)	8	10	12	
Outer Diameter	(inch)	8.625	10.75	12.75	
DR rating	-	13.5	13.5	13.5	
Diameter (D)*	(inch)	7.27	9.06	10.75	
Length (L)	(feet)	472	472	135	
Friction Head Loss (dH)	(feet)	43.4	14.9	2.9	
Total Head loss	(feet)	135.38	106.85	19.5	NPSHa > NPSHr = 15.5 ft
	(psi)	59	46		

* - includes 6% safety factor on wall thickness

Horsepower Required

Determine Theoretical Hp req'd: HP	68	54
Pump Efficiency (est)	80%	80%
Motor Efficiency (est)	85%	85%
Motor Horsepower (est) HP	101	79

Design Considerations for Hydrotest

CPL Max Elevation: 1198 ft MSL
 Max Static Head: 805 ft

LOOKUP TABLE: DIAMETER	
2	2.375
3	3.5
4	4.5
6	6.625
8	8.625
10	10.75
12	12.75
14	14
16	16
18	18
20	20
22	22
24	24

DR	MAWP
7.3	317
9	250
11	200
13.5	160
17	125
21	100
26	80
32.5	63

Search

Search Google Parcel Search (APN)

Search

ex: 37 25.818' N, 122 05.36' W

Get Directions History

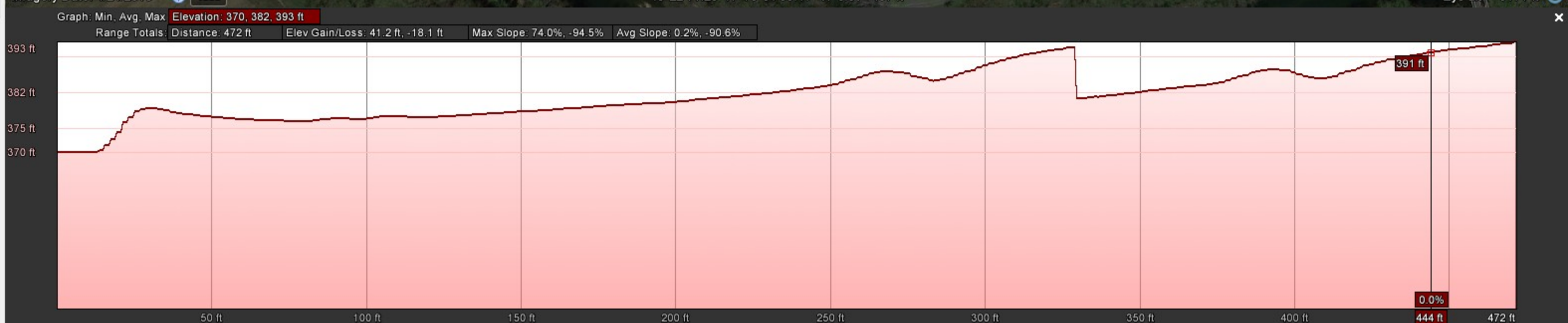
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Layers

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- Voyager New!
- Happy 10th Birthday, Google Earth!
- Edition 1
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- Roads
- 3D Buildings
- Ocean



A-7 Flow Meter Specification

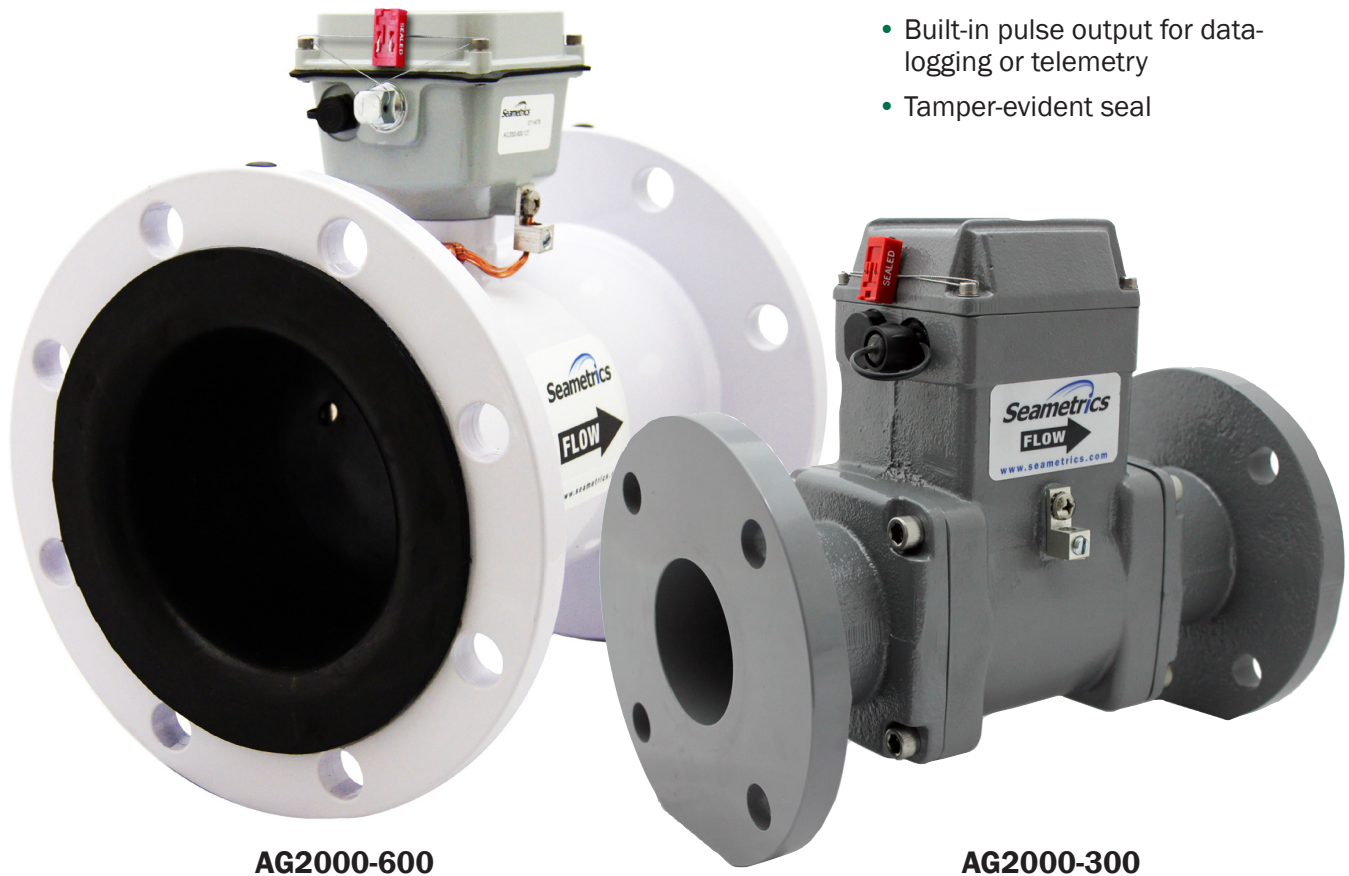


APPLICATIONS

- Irrigation
- Chemigation
- Agricultural automation
- Well usage monitoring
- Dairy Lagoons

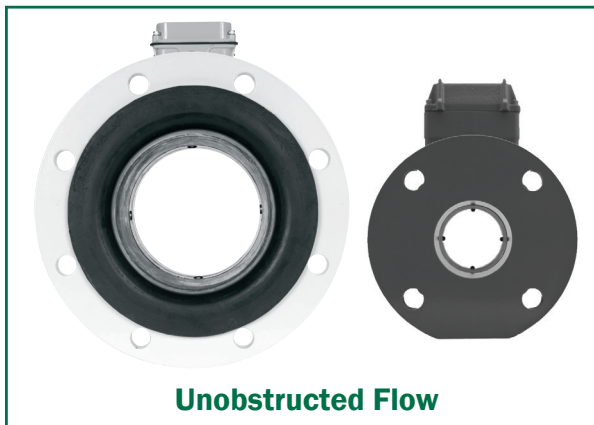
FEATURES

- Simple as a mechanical meter
- No moving parts
- Minimal straight pipe required
- Battery power standard; External power optional
- Solar compatible
- Built-in rate & total indicator
- Built-in pulse output for data-logging or telemetry
- Tamper-evident seal



AG2000-600

AG2000-300



Unobstructed Flow

Seametrics' series of standard and IP68 (submersible) flanged magmeters.

Available in sizes from 3" up to 12".

GENERAL INFORMATION

The AG2000 is a spool-type electromagnetic flowmeter for use in irrigation applications in 3" to 12" pipe. With no moving parts, these meters provide unobstructed flow and are resistant to wear from debris found in ground or surface water. Little maintenance is required because there are no bearings to wear out or propellers to stop turning. Minimal straight pipe requirements allow AG2000 meters to be used in piping configurations where there is little space between the meter and an elbow.

The standard AG2000 is battery powered. Where an external power source is available, the AG2000 can be optionally converted to 8-32 Vdc, with the batteries then serving as back-up to maintain continuous operation in case of power failure. This configuration will prolong battery life indefinitely.

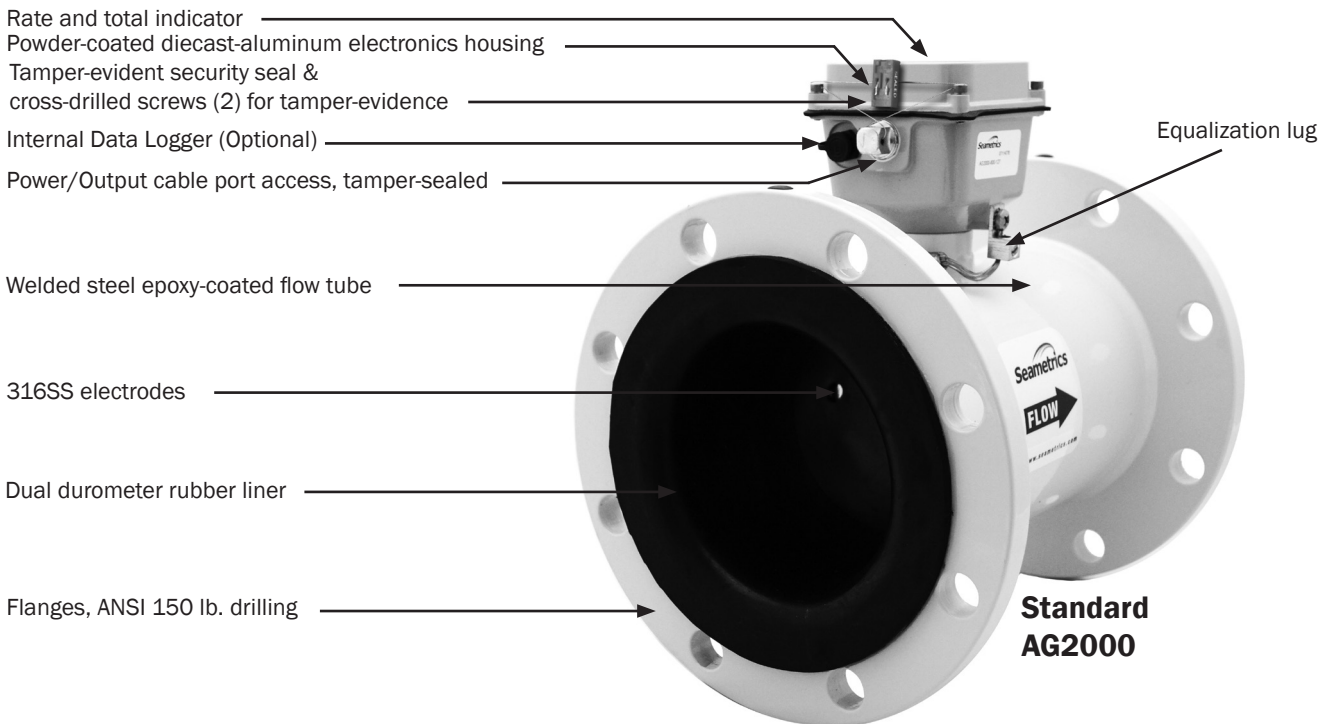
An IP68 version (-168 option) is available for burial or applications where the meter may be under water up to a depth of 3 meters for prolonged periods of time.

The meter comes with built-in pulse output (requires optional cable) for data logging or telemetry. Several pulse rates are available. An internal data logger is also available for secure flow logging (-127 option). A Seametrics FT415W or FT420W display can be added if remote rate/total reading is desired, or an AO55W if a (4-20 mA) analog signal is required. (High-frequency pulse rate is required for use with most Seametrics controllers.)

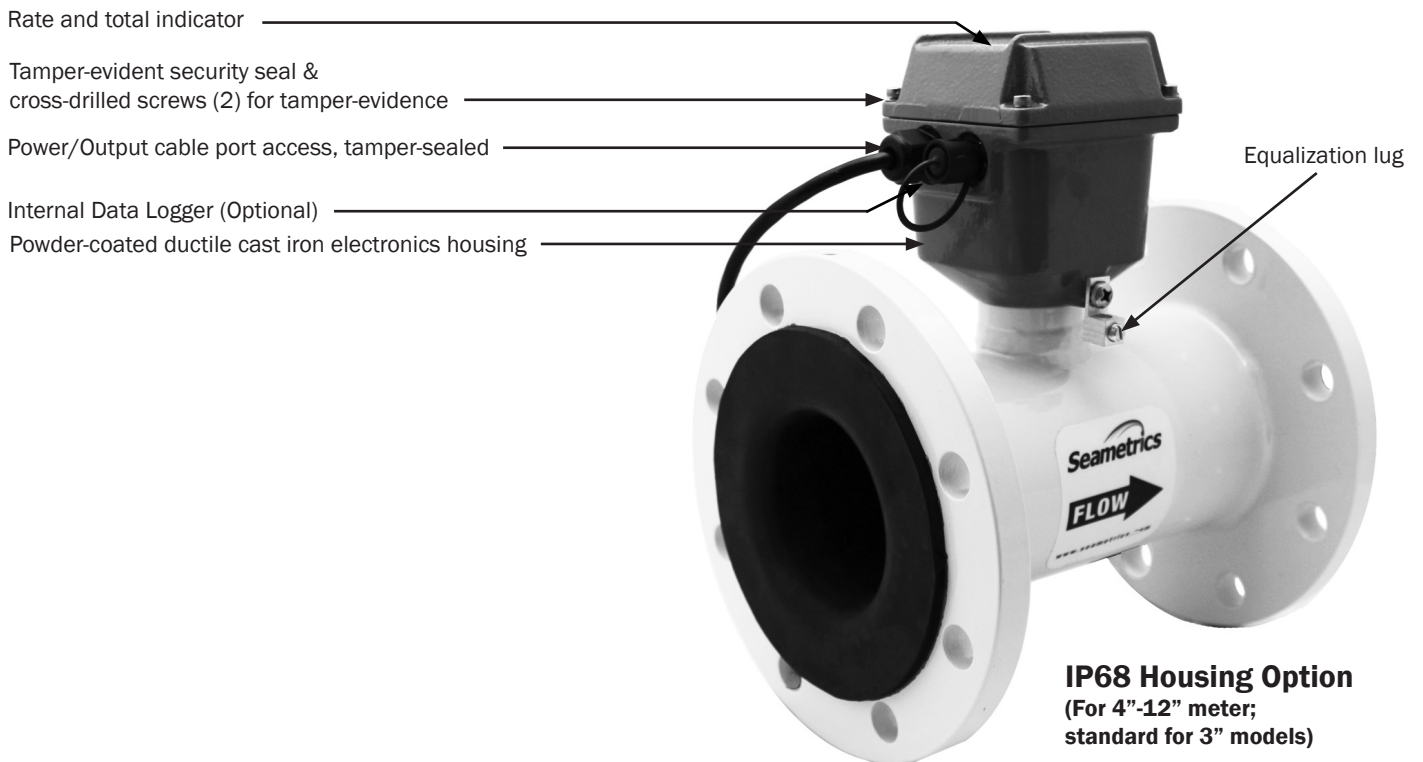
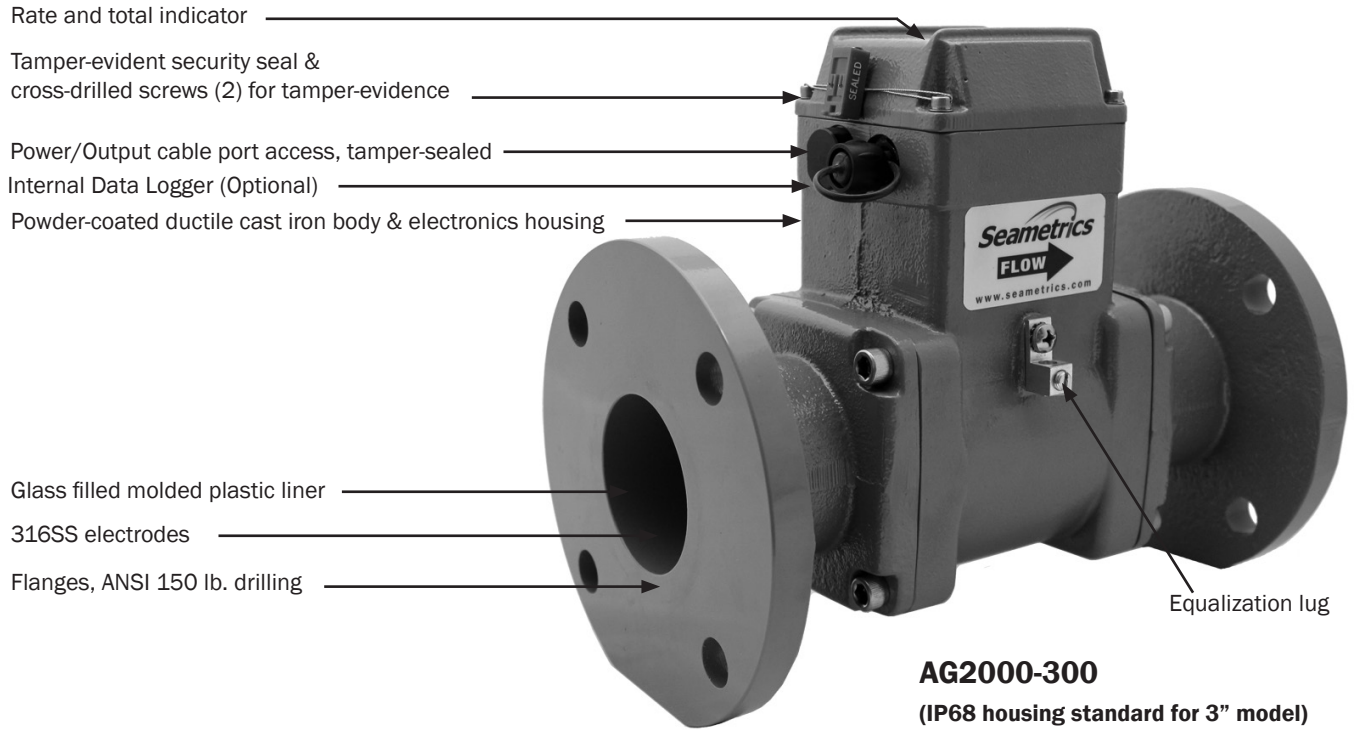
The AG2000 is secured with a seal wire to protect against unauthorized access. The seal can be broken by an authorized agent, to change units of measure, replace the battery pack, or to field-install an optional power/output cable. The cable can be factory or field-installed where external power is available and/or pulse output is needed. An accessory weather guard is available for additional protection in outdoor applications.

For chemigation applications, the chemical injection point must be placed downstream of the meter **OR** far enough upstream for **complete mixing** to occur before the flow reaches the meter. (See tech bulletin on Seametrics' website, www.seametrics.com).

FEATURES



FEATURES Continued





AG2000 Irrigation Magmeter

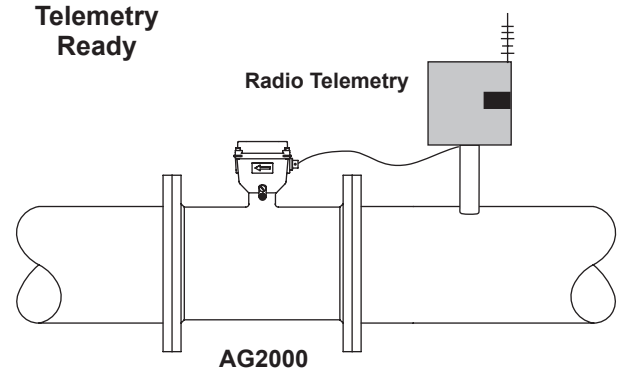
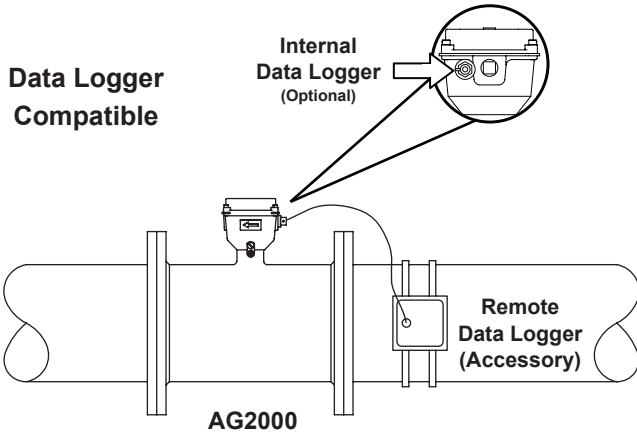
SPECIFICATIONS*

Pipe Sizes	3", 4" 6" 8", 10", 12"						
Fittings	ANSI 150 lb. drilling						
Pressure	150 psi (10.3 bar) working pressure						
Temperature	Operating	10° to 130° F (-12° to 54° C)					
	Non-Operating	-40° to 158° F (-40° to 70° C)					
Accuracy	+/- 1% of reading for flow between 10% to 100% of max flow						
	+/- 2% of reading for flow from cutoff to 10% of max flow						
Materials	Body (3" Only)	Ductile cast iron, powder coated w/NSF61 listed epoxy powder					
	Body (4"-12")	Welded steel, epoxy-coated					
	Liner (3" Only)	Noryl®					
	Liner (4"-12")	Santoprene/Polypropylene					
	Electronics Housing	Diecast aluminum, powder-coated (non-IP68)			Ductile Cast Iron (IP68)		
	Electrodes	316 stainless steel					
	O-ring (3" Only)	EPDM					
Display	Rate					Total	
	Digits	5				8	
	Units	Gallon/Minute, Liter/Minute, Cubic Feet/Minute, Cubic Meter/Hour, Gallons/Sec, Liter/Second, Cubic Feet/ Sec, Miner's Inch, Cubic Meter/Min				Gallon, Gallon x 1000, Liter, Liter x 1000, Mega Liter, Cubic Meters, Cubic Meter x 1000, Acre Feet, Cubic Feet, Cubic Feet x 1000, Million Gallon, Miner's Inch Day, Acre Inch	
Power	1 battery pack that contains 2 Lithium 3.6V "D" batteries, replaceable. Standard battery life 2.5 years 5 years with extended battery life (EBL) option With external power option (uses 8-32 Vdc, 30 mA), Lithium batteries serve as backup in power failure (10 year life)						
Pulse Output (with optional cable)	Signal	Current sinking pulse, opto-isolated, 30 Vdc at 10 mA max					
	Pulse Rates	High Frequency; 10 units/pulse; 100 units/pulse; 1000 units/pulse					
	High Frequency (pulse/gal)	3"	4"	6"	8"	10"	12"
		25.228	16.362	6.307	3.344	2.15	1.530
Conductivity	>20 microSiemens/cm						
Empty Pipe Detection	Hardware/software, conductivity-based						
Environmental	NEMA 4X Standard (IP68 Option)						

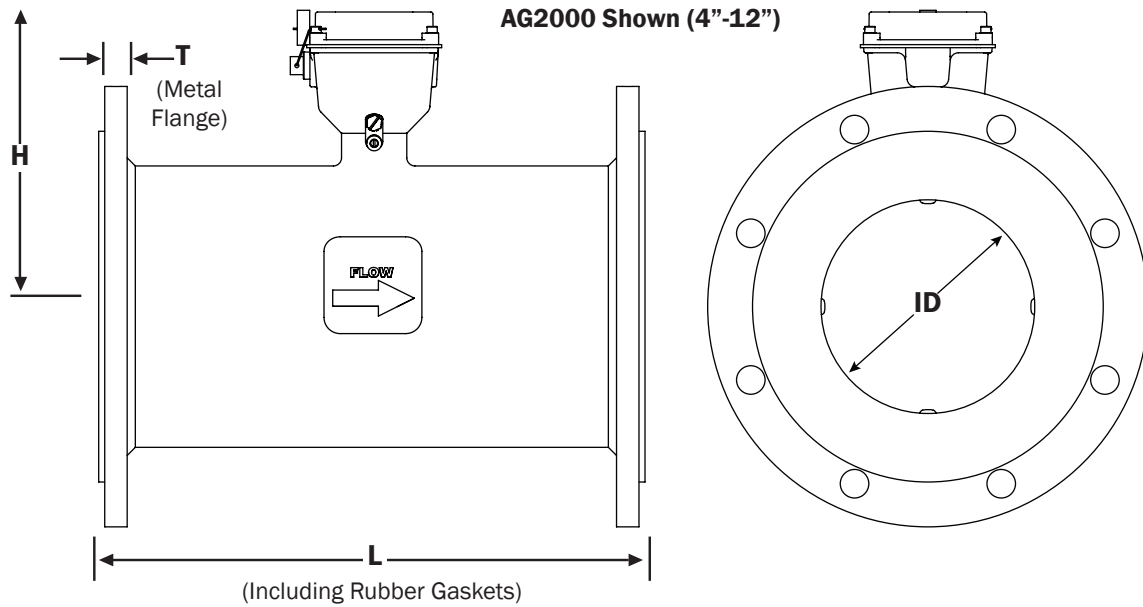
*Specifications subject to change. Please consult our website for the most current data (www.seametrics.com).

**Extended battery life option is standard on all IP68 meters.

OUTPUT CAPABILITIES



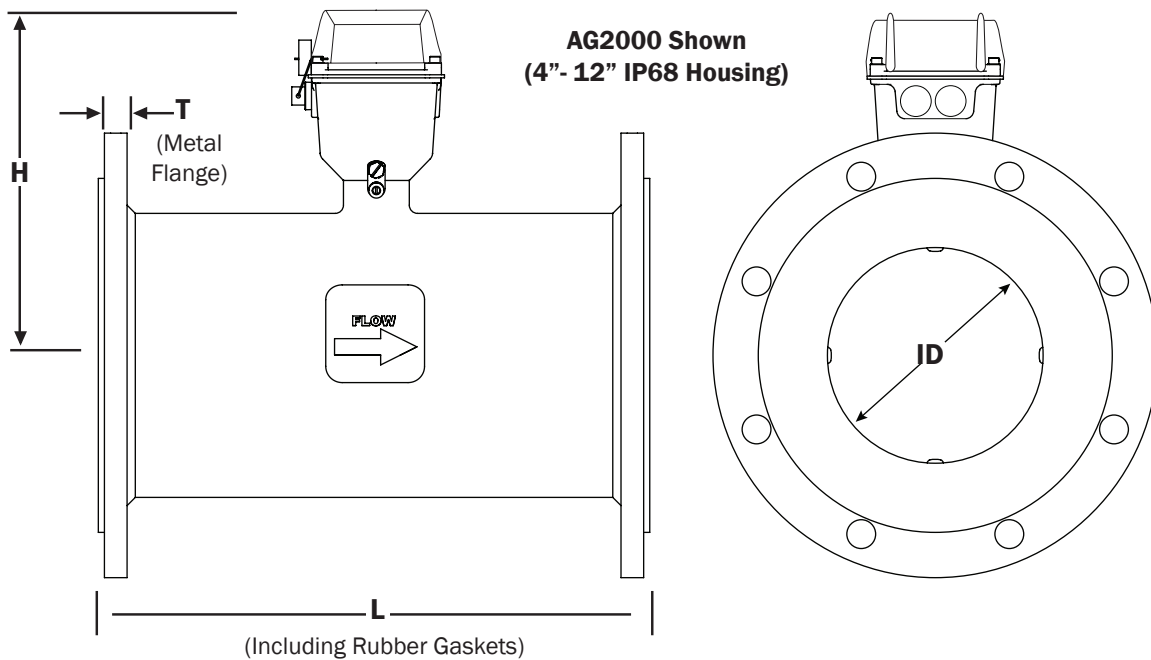
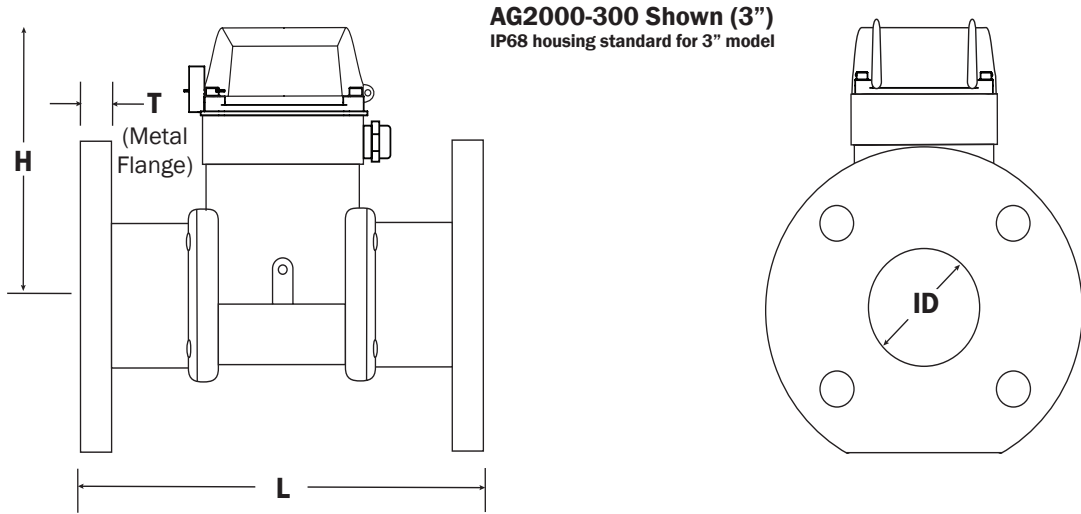
DIMENSIONS



AG2000 (Standard Housing)

Standard AG2000 Meter Size	L		H		T		ID		Shipping Weight Standard		
	inch	mm	inch	mm	inch	mm	inch	mm	pounds	Kg	
4"	10.24	260	7.0	178	.62	20.9	3.12	79.25	32	15	
6"	12.27	312	8.1	206	.69	23.3	5.05	128.27	47	21	
8"	14.24	362	9.1	231	.69	23.3	6.44	163.58	69	31	
10"	18.18	462	10.1	257	.69	23.3	8.61	218.69	125	57	
12"	19.68	500	11.1	282	.81	20.6	10.55	267.97	145	66	
Flanges									Standard ANSI 150 lb. drilling		Cable (AG2000) 1 lb.

DIMENSIONS



AG2000 with IP68 Housing (-168 option)

IP68 AG2000 Meter Size	L		H		T		ID		Shipping Weight IP68 Version	
	inch	mm	inch	mm	inch	mm	inch	mm	pounds	Kg
3"	12.0	305	6.80	173	.68	17.3	2.60	66.04	41	19
4"	10.24	260	8.12	206	.62	20.9	3.12	79.25	35	16
6"	12.27	312	9.22	234	.69	23.3	5.05	128.27	50	23
8"	14.24	362	10.22	260	.69	23.3	6.44	163.58	72	33
10"	18.18	462	11.22	285	.69	23.3	8.61	218.69	128	58
12"	19.68	500	12.28	312	.81	20.6	10.55	267.97	148	67

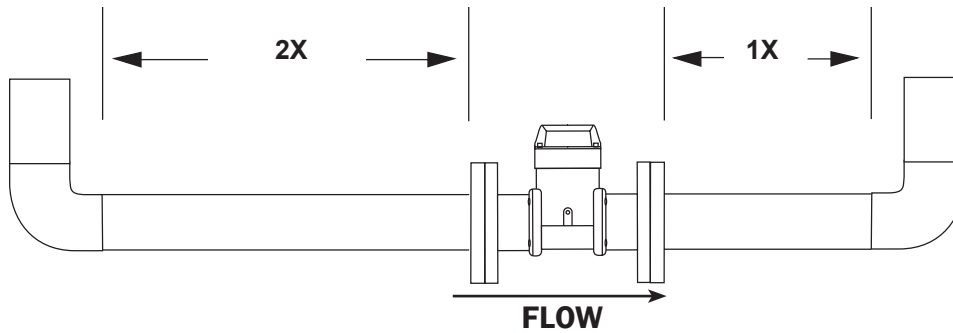
Flanges Standard ANSI 150 lb. drilling

Cable (AG2000) 1 lb.

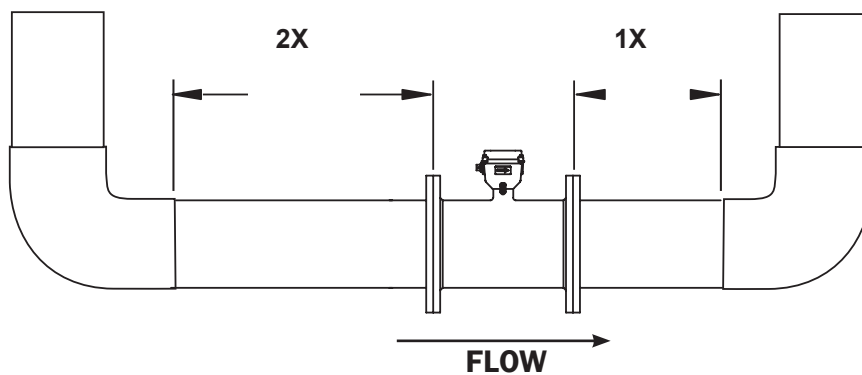
STRAIGHT PIPE RECOMMENDATIONS

(X = pipe diameter)

*Minimal straight pipe
required between elbows.
For other piping configurations,
consult factory.*



(X = pipe diameter)



FLOW RANGE (3" - 12")

Meter Size	3"		4"		6"		8"		10"		12"	
	Gal/Min	Liter/Sec	Gal/Min	Liter/Sec	Gal/Min	Liter/Sec	Gal/Min	Liter/Sec	Gal/Min	Liter/Sec	Gal/Min	Liter/Sec
Minimum	7.5	.47	12	.75	32	2	60	3.8	95	6	130	8.2
Maximum	700	44.2	1,000	63	2,400	151.4	4,400	277.6	7,000	441.6	10,000	630.9

HOW TO ORDER

MODEL	SIZE	OPTIONS	PULSE RATE (With Option -11)	UNITS																																	
AG2000	3" = -300* 4" = -400 6" = -600 8" = -800 10" = -1000 12" = -1200	Factory Installed Power/ Output Cable: 6m (20 ft) = -11/6 15m (50 ft) = -11/15 30m (100 ft) = -11/30 Factory Installed IP68 Power/Output Cable: 6m (20 ft) = -11/6S 15m (50 ft) = -11/15S 30m (100 ft) = -11/30S Internal Data Logger = -127 Serial Output = -131 IP68 Submersible = -168 Extend. Battery Life ¹ = -178	10 Units*/Pulse = -PxX 100 Units*/Pulse = -PxH 1000 Units*/Pulse = -PxK High Frequency** = -HF	<table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">Gal/Min = GPM</td> <td style="width: 33%;">Gal = G</td> <td style="width: 33%;">Gal x 1000 = GT</td> </tr> <tr> <td>Liter/Min = LPM</td> <td>Liter = L</td> <td>Liter x 1000 = LT</td> </tr> <tr> <td>Cu Ft/Min = CFM</td> <td>Cu Meter/Hr = CMH</td> <td>Mega Liters = ML</td> </tr> <tr> <td>Gal/Sec = GPS</td> <td>Gal/Sec = GPS</td> <td>Cubic Meters = CM</td> </tr> <tr> <td>Liters/Sec = LPS</td> <td>Cu Ft/Sec = CFS</td> <td>Cu Met x 1000 = CMT</td> </tr> <tr> <td>Miner's In** = MI</td> <td>Cu Met/Min = CMM</td> <td>Acre Feet = AF</td> </tr> <tr> <td></td> <td></td> <td>Cubic Feet = CF</td> </tr> <tr> <td></td> <td></td> <td>Cu Feet x 1000 = CFT</td> </tr> <tr> <td></td> <td></td> <td>Million Gal = MG</td> </tr> <tr> <td></td> <td></td> <td>Miner's Inch Day = MID</td> </tr> <tr> <td></td> <td></td> <td>Acre Inch = AI</td> </tr> </table>	Gal/Min = GPM	Gal = G	Gal x 1000 = GT	Liter/Min = LPM	Liter = L	Liter x 1000 = LT	Cu Ft/Min = CFM	Cu Meter/Hr = CMH	Mega Liters = ML	Gal/Sec = GPS	Gal/Sec = GPS	Cubic Meters = CM	Liters/Sec = LPS	Cu Ft/Sec = CFS	Cu Met x 1000 = CMT	Miner's In** = MI	Cu Met/Min = CMM	Acre Feet = AF			Cubic Feet = CF			Cu Feet x 1000 = CFT			Million Gal = MG			Miner's Inch Day = MID			Acre Inch = AI
Gal/Min = GPM	Gal = G	Gal x 1000 = GT																																			
Liter/Min = LPM	Liter = L	Liter x 1000 = LT																																			
Cu Ft/Min = CFM	Cu Meter/Hr = CMH	Mega Liters = ML																																			
Gal/Sec = GPS	Gal/Sec = GPS	Cubic Meters = CM																																			
Liters/Sec = LPS	Cu Ft/Sec = CFS	Cu Met x 1000 = CMT																																			
Miner's In** = MI	Cu Met/Min = CMM	Acre Feet = AF																																			
		Cubic Feet = CF																																			
		Cu Feet x 1000 = CFT																																			
		Million Gal = MG																																			
		Miner's Inch Day = MID																																			
		Acre Inch = AI																																			
	*-300 available in IP68 only	¹ Extended battery life is standard on all IP68 meters	*Units = Gal or Liter depending on Rate/Total unit selection **High Frequency pulse rate will shorten battery life	Consult factory for additional units Any rate selection can be combined with any total selection ** 1 Miner's Inch = 1.2 CFM																																	

ACCESSORIES

Remote 4-20 mA (analog) signal = **AO55W**

Remote Rate and Total Indicator (Battery) = **FT415W***

Remote Rate and Total Indicator (Powered) = **FT420W***

Remote Data Logger = **DL76W**

Dual Power Supply, 115 Vac, 12/24 Vdc = **PC42**

(Use with High Frequency pulse rate)

Replacement Battery Pack = 100889

Weather Guard = **100961**

Post-Factory 20-ft. Power/Output Cable
(Standard Housing Only) = **DC30**

Post-Factory 50-ft. Power/Output Cable
(Standard Housing Only) = **DC35**

Post-Factory 20-ft. Power/Output Cable
(IP68 Housing Only) = **DC30S**

Post-Factory 50-ft. Power/Output Cable
(IP68 Housing Only) = **DC35S**

Grounding Rings
(not needed for most applications):

3" = **102157**

4" = **100876**

6" = **100877**

8" = **100878**

10" = **100879**

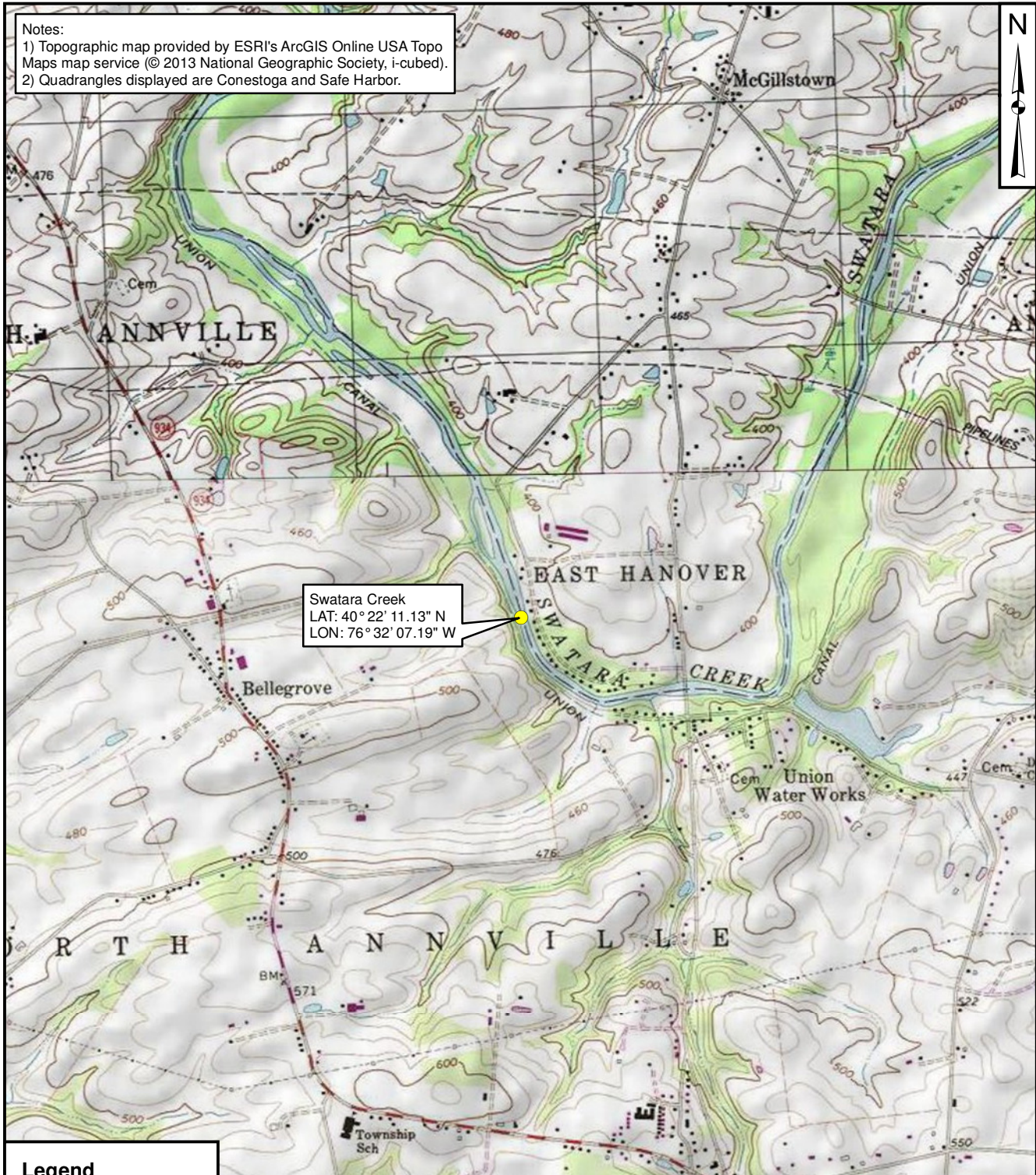
12" = **103288**

*Consult customer service to determine the appropriate indicator based on the distance it will be installed from the meter.

CONTACT YOUR SUPPLIER

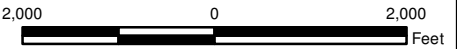
A-8 Plans, Details, and Maps

Notes:
 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).
 2) Quadrangles displayed are Conestoga and Safe Harbor.



Legend

Withdrawal Location



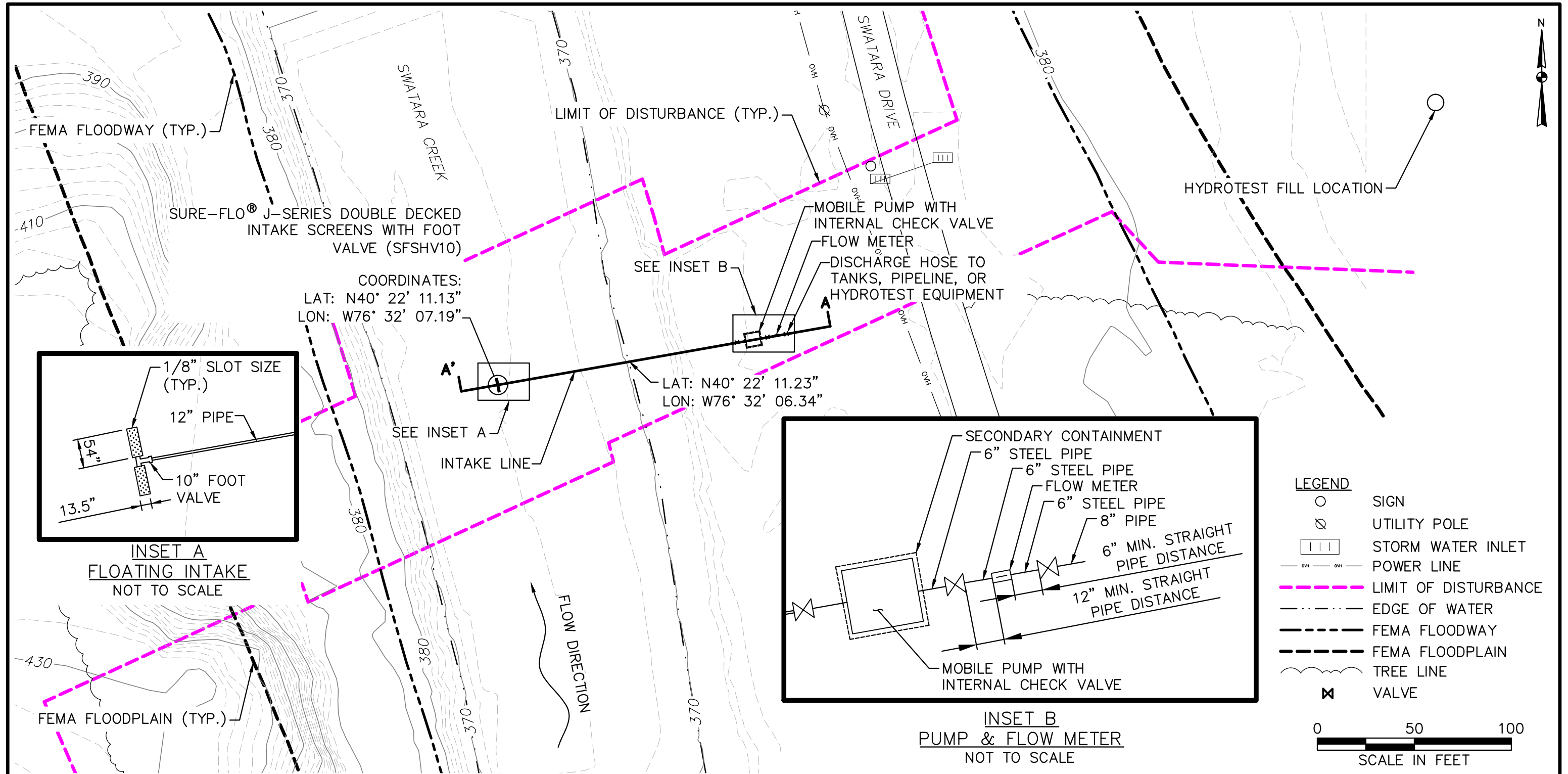
USGS LOCATION MAP
 TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
 SWATARA CREEK
 NORTH ANNVILLE TOWNSHIP
 LEBANON COUNTY, PA

DRAWN BY: S. PAXTON 10/16/15
 CHECKED BY: L. HERRING 10/16/15
 APPROVED BY:

CONTRACT NUMBER: 212C-PB-00282

FIGURE NUMBER 8-1

REV 0



COORDINATES:
 LAT: N40° 22' 11.13"
 LON: W76° 32' 07.19"

LAT: N40° 22' 11.23"
 LON: W76° 32' 06.34"

NOTES:
 SURVEY DATUM:
 HORIZONTAL: PA STATE PLANE NAD83
 VERTICAL: NAVD88



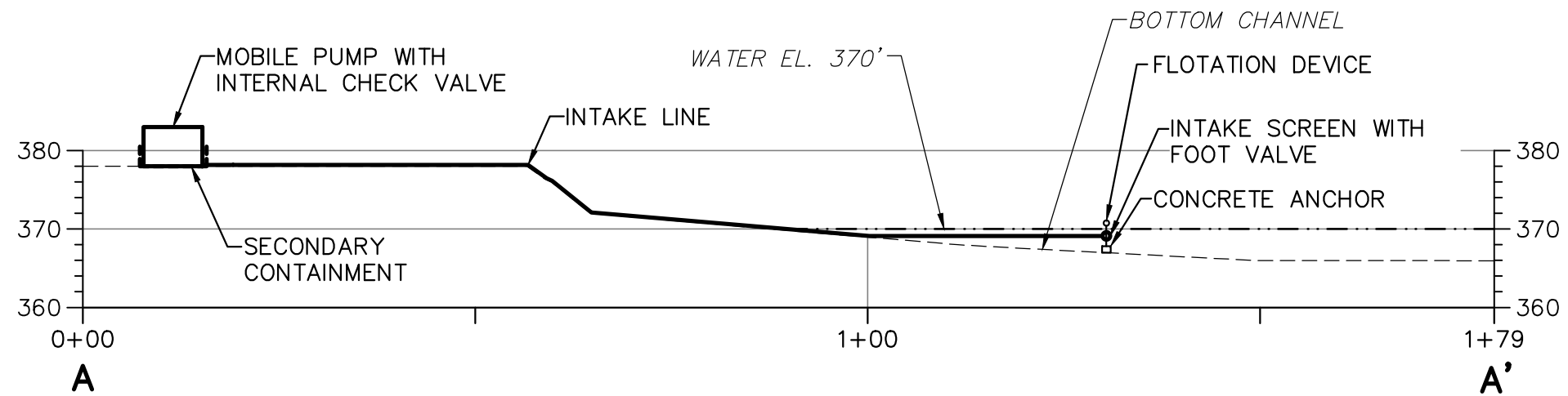
WWW.TETRATECH.COM
 661 ANDERSEN DRIVE - FOSTER PLAZA 7
 PITTSBURGH, PA 15220
 T: (412) 921-7090 | F: (412) 921-4040

TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
 SWATARA CREEK, NORTH ANNVILLE TWP, LEBANON CO.

SITE PLAN

DATE:	10/28/15
PROJECT NO.:	212C-PB-00282
DESIGNED BY:	RD
DRAWN BY:	CK
CHECKED BY:	CR
SHEET:	1 OF 2

COPYRIGHT TETRA TECH INC.
FIGURE 8-2



CROSS-SECTION A-A'



NOTES:

SURVEY DATUM:
HORIZONTAL: PA STATE PLANE NAD83
VERTICAL: NAVD88



WWW.TETRATECH.COM

661 ANDERSEN DRIVE - FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
SWATARA CREEK, NORTH ANNVILLE TWP., LEBANON CO.

CROSS-SECTION OF INTAKE SYSTEM

DATE:	10/28/15
PROJECT NO.:	212C-PB-00282
DESIGNED BY:	RD
DRAWN BY:	CK
CHECKED BY:	CR
SHEET:	2 OF 2

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FIGURE 8-3



Swatara Creek



Swatara Creek