

*Atlantic Sunrise Project – PA DEP Chapter 105 Joint Permit Application  
Transcontinental Gas Pipe Line Company, LLC  
Wyoming County*

**APPENDIX L -5  
METERING PLANS**

*Revised April 2017*



**TETRA TECH**

Revision 1 – 6/23/2016

# **METERING PLAN FOR SUSQUEHANNA RIVER**

## **ATLANTIC SUNRISE PROJECT**

**Eaton Township, Wyoming 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 and Consumptive Use Metering Plan**

### **A. Intake Design**

The surface water withdrawal location on the Susquehanna River is located along the proposed gas pipeline route where the water will be required for HDD boring and hydrostatic testing. Water will be transferred from the Susquehanna River to Baker tanks for the HDD drilling and 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. Water from this source will only be used consumptively while supplying water for the HDD bore. Transcontinental Gas Pipe Line, LLC (Transco) proposes to use two (2), 3-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 the Susquehanna River. The 3-foot long screens are connected by a tee fitting and include a foot valve. The intake structure will be connected to a 10-inch diameter flexible hose or HDPE pipe that will be used to convey water to the pump. The intake structure will be submerged in the approximate location of the river's thalweg (lowest point of river 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, including the Elktoe mussel identified in the Pennsylvania Natural Diversity Inventory Report (PNDI) as a special concern species. 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 the Susquehanna River when the river flow at the assigned reference gage is at or falls below prescribed passby flows.

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 river 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 river 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 Horizontal Directional Drilling (HDD) location and 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 up to 1,800 gpm flow rate (see Attachment A-6 for basis). Any returning mud/water used for the HDD will be collected and stored in tanks, and subsequently disposed of off-site at an approved disposal facility. 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 HDD drilling and hydrostatic testing of the pipeline segment is currently scheduled to be completed in January 2017. The main pipeline hydrostatic testing is scheduled for May 2017.

A wetland study was completed for the area on July 17, 2014. No wetlands were identified in the vicinity of the proposed intake. The intake pup will be located within the Federal Emergency Management Agency (FEMA) floodplain, but out of the FEMA floodway. The slope of the river 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, flows at the proposed withdrawal point will be estimated by proportioning based on the drainage area ratio method from a selected USGS gaging station near or on the Susquehanna River. At the proposed location, the Susquehanna River has a drainage area of 9,450 square miles (mi<sup>2</sup>). Based on that drainage area, the Aquatic Resource Class (ARC) of the Susquehanna River is classified as ARC 6, which represents a large river. Rivers classified as ARC 6 are likely to be less sensitive to potential impacts from withdrawals due to their large 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 the Susquehanna River. Flow rate data for a SRBC-selected stream or river located near the Susquehanna River that has an active USGS gaging station will be used to determine the flow rates of the Susquehanna River 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 1,800 gpm is well 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 the Susquehanna River and at the end of each day to ensure that the proposed 2.592 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.

To meter the volume of water withdrawn from storage to be used consumptively to complete the HDD bore, a 4-inch Seametrics AG2000 Irrigation Magmeter will be used at the discharge from the Baker storage tank(s) (see manufacturer information in A-1 and site plan in A-8). This spool-type electromagnetic flow meter and totalizer has no moving parts and minimal straight pipe requirements both above (i.e., 12 inches) and below (i.e., 6 inches) 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 12 gpm; the maximum rate is 1,000 gpm. The proposed withdrawal rate of 69.44 gpm is within this range. The meter is accurate to within +/-1% for flows between 100 gpm and 1,000 gpm and +/- 2% for flows under 100 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 the Baker storage tanks and at the end of each day to maintain an exact record of water used consumptively. Transco 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:	SUSQUEHANNA RIVER SCREENED INTAKE EVALUATION				
BASED ON:	Sure-Flo® Suction Line Fittings Catalog			DRAWING NUMBER:	
BY:	ARC	CHECKED BY:	LMH	APPROVED BY:	CAR
DATE:	9/29/2015	DATE:	10/19/15	DATE:	10/19/15

**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 Sure-Flo® J-Series Double Decked intake screens necessary to allow a flow rate of 1,800 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	=	1,800	=	Maximum flow (withdrawal) rate, gallons per minute
r	=	6.75	=	Radius of perforated intake pipe, inches
b	=	3	=	length of perforated intake pipe, feet
n	=	unknown	=	number of screens
A <sub>s</sub>	=	1,527	=	Area of screen (A <sub>s</sub> = 2πrb), square inches
A <sub>o</sub>	=	628	=	Open area of screen, square inches (see attached)
P	=	41.1%	=	Open area of perforated intake pipe (P = A <sub>o</sub> /A <sub>s</sub> )

- (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 1,800 gallons per minute.

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

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

$$n = \frac{1,800}{235 \times 6.75 \times 3 \times 0.411 \times 0.5}$$

$$n = 1.84$$

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

The minimum number of Sure-Flo® J-Series Double Decked intake screens necessary to allow for a total flow of 1,800 gpm to be withdrawn is 2.

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

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

$$V = \frac{1,800 / 2}{235 \times 6.75 \times 3 \times 0.411}$$

$$V = 0.460 \quad \text{feet per second}$$

CLIENT:	TRANSCO		JOB NUMBER:	212C-PB-00282	
SUBJECT:	SUSQUEHANNA RIVER SCREENED INTAKE EVALUATION				
BASED ON:	Sure-Flo® Suction Line Fittings Catalog			DRAWING NUMBER:	
BY:	ARC	CHECKED BY:	LMH	APPROVED BY:	CAR
DATE:	9/29/2015	DATE:	10/19/15	DATE:	10/19/15

**CONCLUSION:**

Two Sure-Flo® J-Series Double Decked intake screens provide an intake flow capacity of 1,800 gallons per minute with a maximum screen entrance velocity of 0.460 feet per second, which is conservatively 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 a minimum of 12-inches off of the creek bed.

## **A-2 Intake Manufacturer Information**

# **SURE-FLO®**

## **Suction Line Fittings**



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

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# 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

## 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.

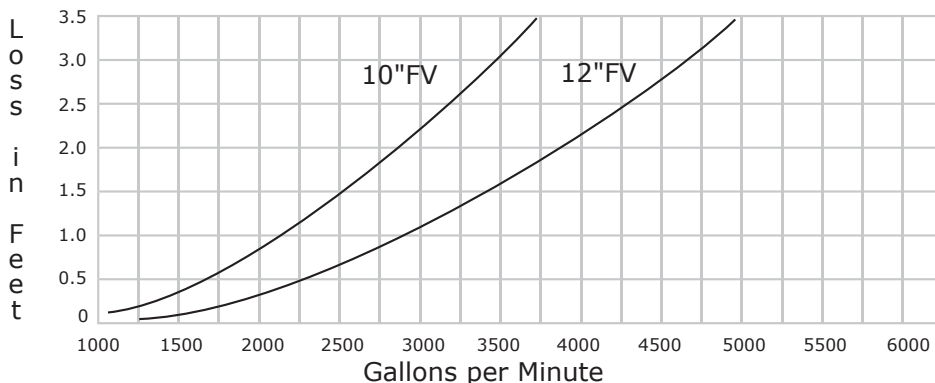
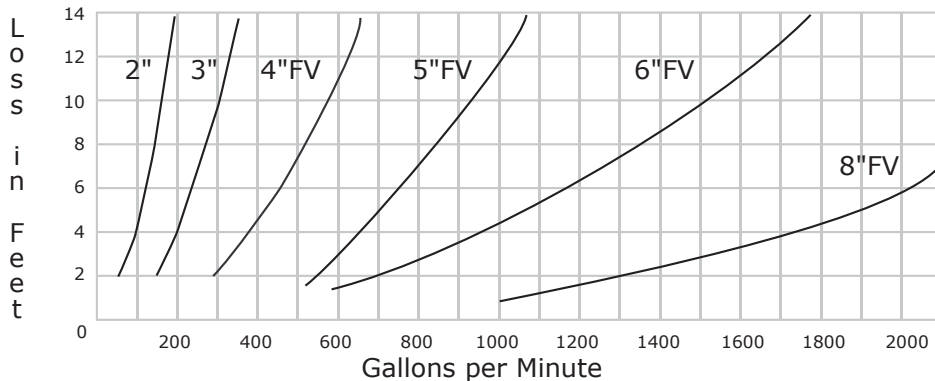


## Klamplox flange-



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

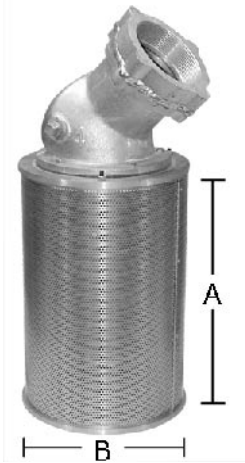
## X-Series

### 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



**45°**



**45°**



**45°**



**Vertical**



**Vertical**



**Vertical**

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

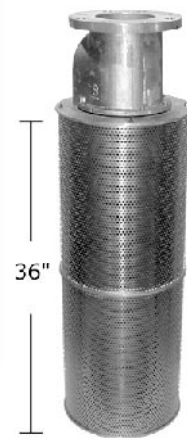
# Foot Valves

## 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
------------	-----------	---------------	------------------	-----------	---------------	------------------

### 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

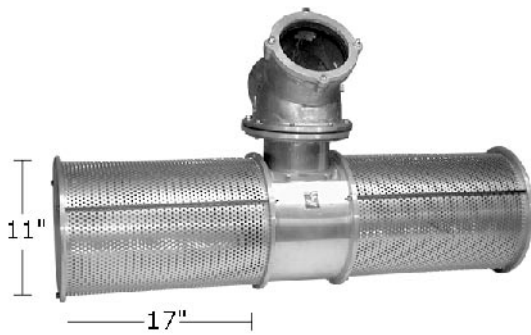
### Double Decked

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

## Horizontal-Series

### Horizontal-Basic



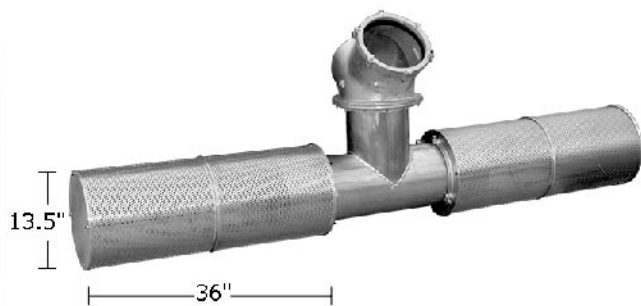
**SFHV6**

#### 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.



**SFHV10**

### Horizontal-JD

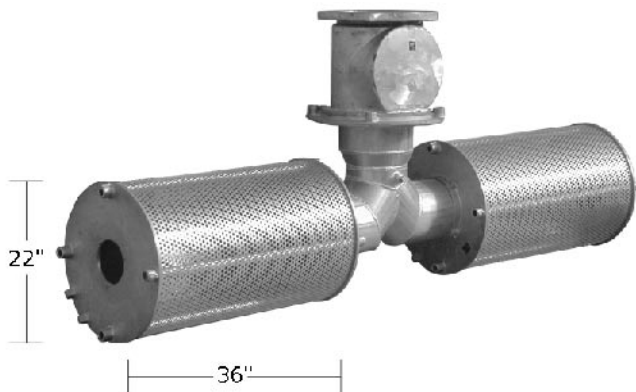
#### 10" foot valves:

Any body type.

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

**Total open area:** 1256 sq. in.

### Horizontal-XL



**SFHV12**

#### 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:

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

# 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

# Strainers



Can be used with any Sure-Flo foot valve

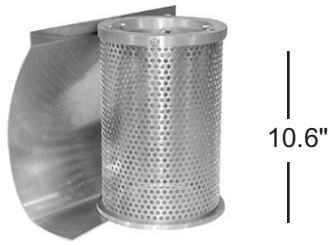


SCS2 and SCS2A 50 GPM  
Requires 35 psi

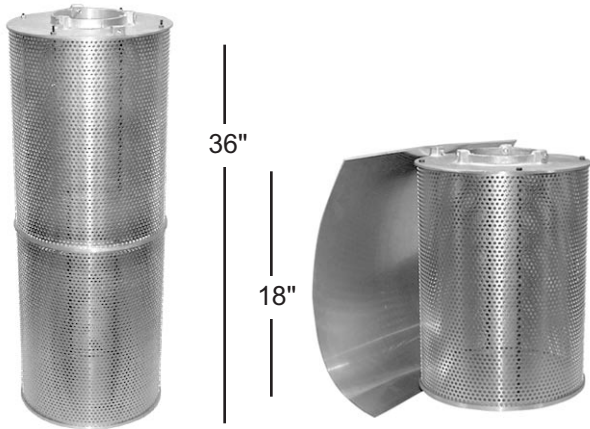


**\* See the Sure-Flo self-cleaning catalog for more information. \***

# 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
<b>Single Screen</b>			
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.
<b>Double Decked</b>			
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
<b>Single Screen</b>			
SPVCJ6	6"	19.5	314 sq. in.
SPVCJ8	8"	19.0	314 sq. in.
<b>Double Decked</b>			
SPVCJ6-D	6"	27.0	628 sq. in.
SPVCJ8-D	8"	27.0	628 sq. in.

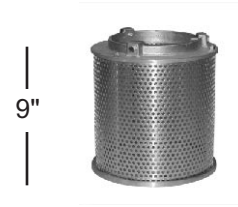
## XL

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.

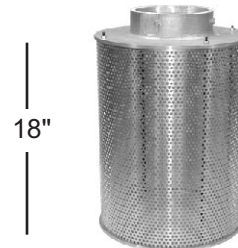
### Opening Size:

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

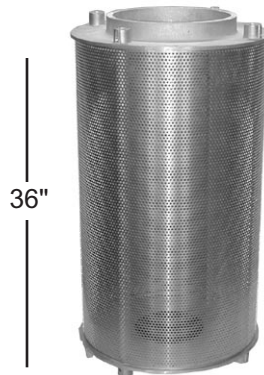
# Strainers



**SPVC6**



**SPVCJ8**

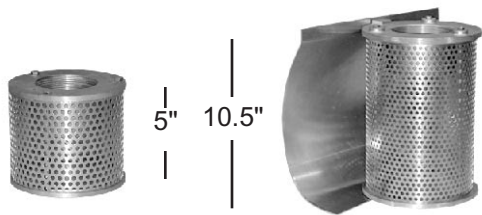


**SPVC12**

## 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
<b>Single Screen</b>			
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.
<b>Double Decked</b>			
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
<b>Single Screen</b>			
SFSFJ4	4"	16.5	314 sq. in.
SFSFJ6	6"	15.5	314 sq. in.
<b>Double Decked</b>			
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



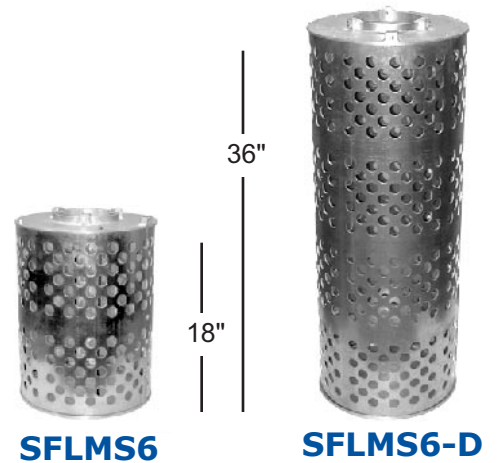
# Specialty

# Strainers

## Liquid Manure

Part No.	OD Tubing Size	Weight lbs.	Screen Open Area
<b>Single Screen</b>			
SFLMS4	4"	17	236 sq. in.
SFLMS5	5"	17	236 sq. in.
SFLMS6	6"	17	236 sq. in.
SFLMS8	8"	17	236 sq. in.
<b>Double Decked</b>			
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.

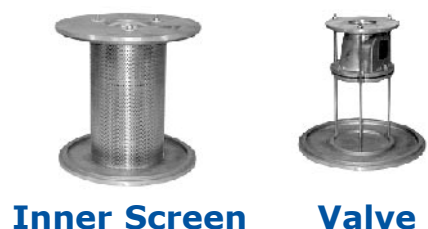
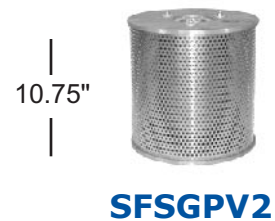
This rugged aluminum strainer quickly bolts on the end of an aluminum suction line. It will hold the weight of a man standing on the screen, yet it weighs only 20 pounds. Positioning the 284 1" holes in the 1/8" thick screen, is the secret to its ability to resist collapse. Available in a double-decked 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**

<b>Part No.</b>	<b>Companion Flange Size</b>	<b>OD</b>	<b>Weight lbs</b>
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**



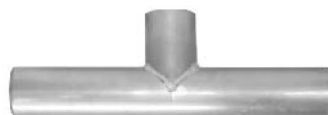
**6x4x4**



**8" 90°**



**10x10x10**

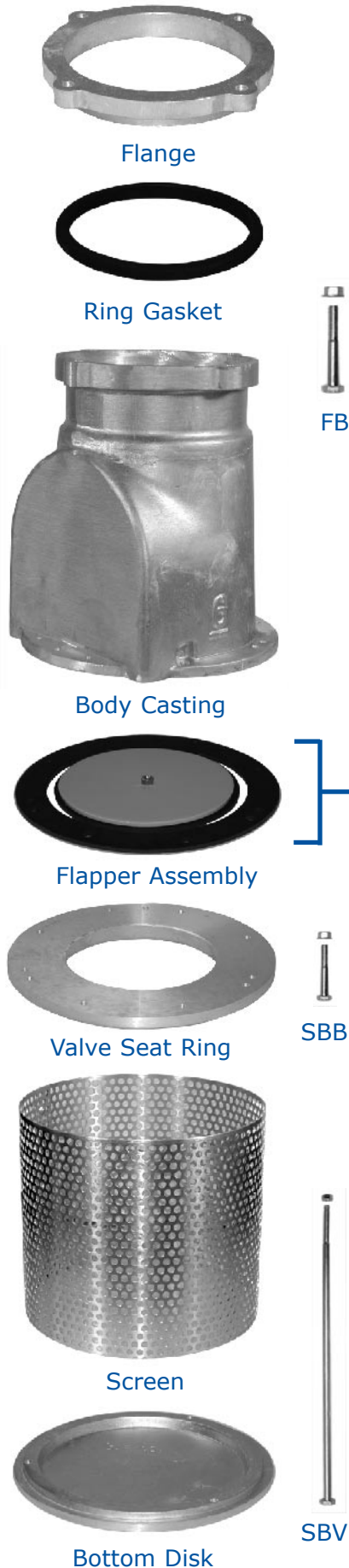


**4x4x4**

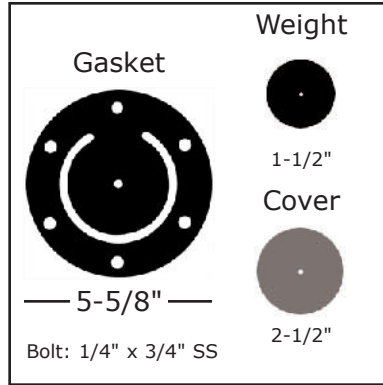


**6" 90°**

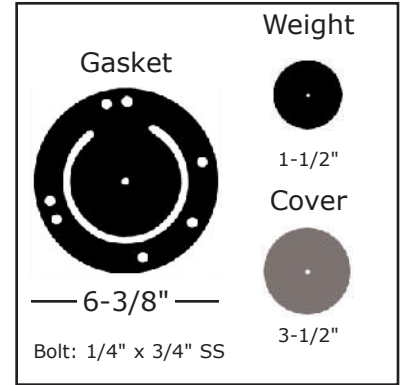
# Foot Valve Parts and Flapper Dimensions



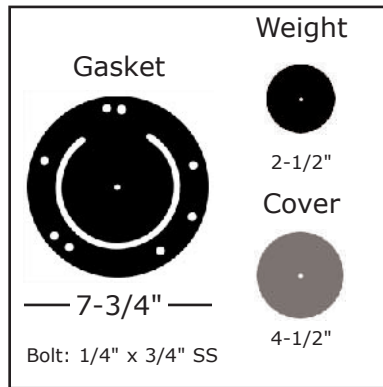
## 2" Flapper Assembly



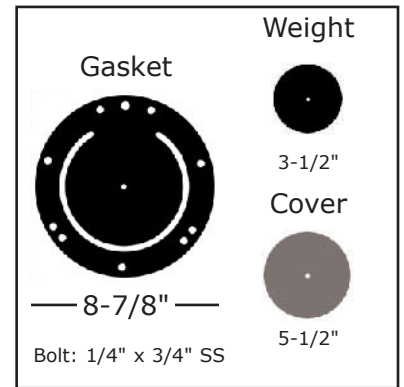
## 3" Flapper Assembly



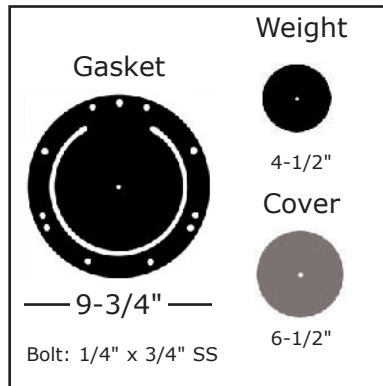
## 4" Flapper Assembly



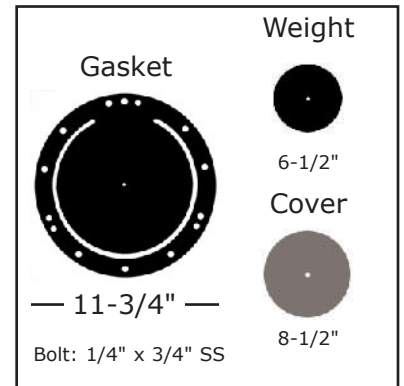
## 5" Flapper Assembly



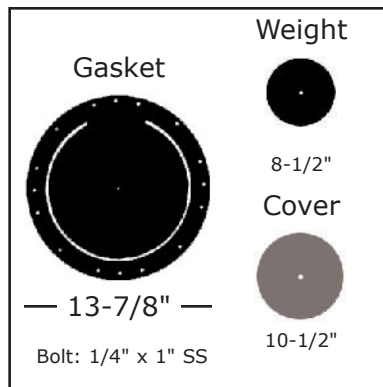
## 6" Flapper Assembly



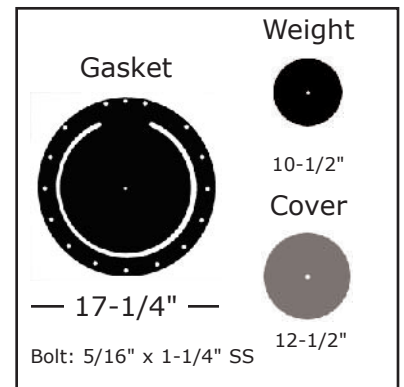
## 8" Flapper Assembly



## 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 <sup>3</sup> /h 180 l/s
Head, Max	320 feet 100 meters
Flow at BEP	2,625 USgpm 600 m <sup>3</sup> /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

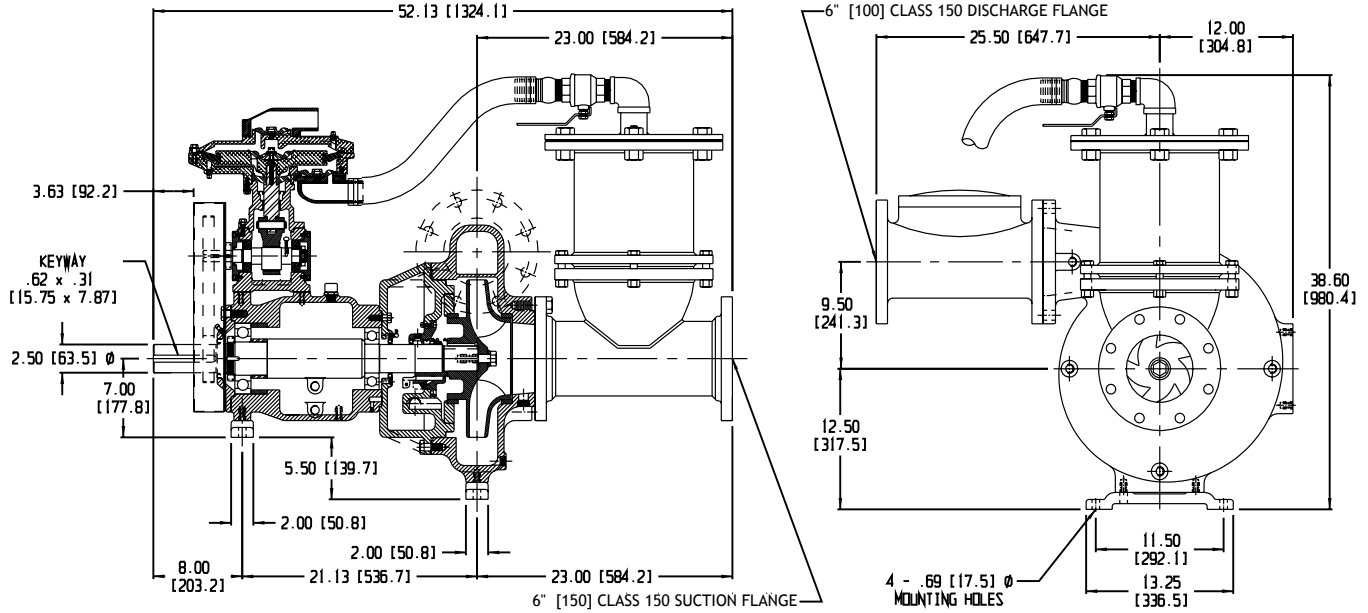
### Construction Materials

	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

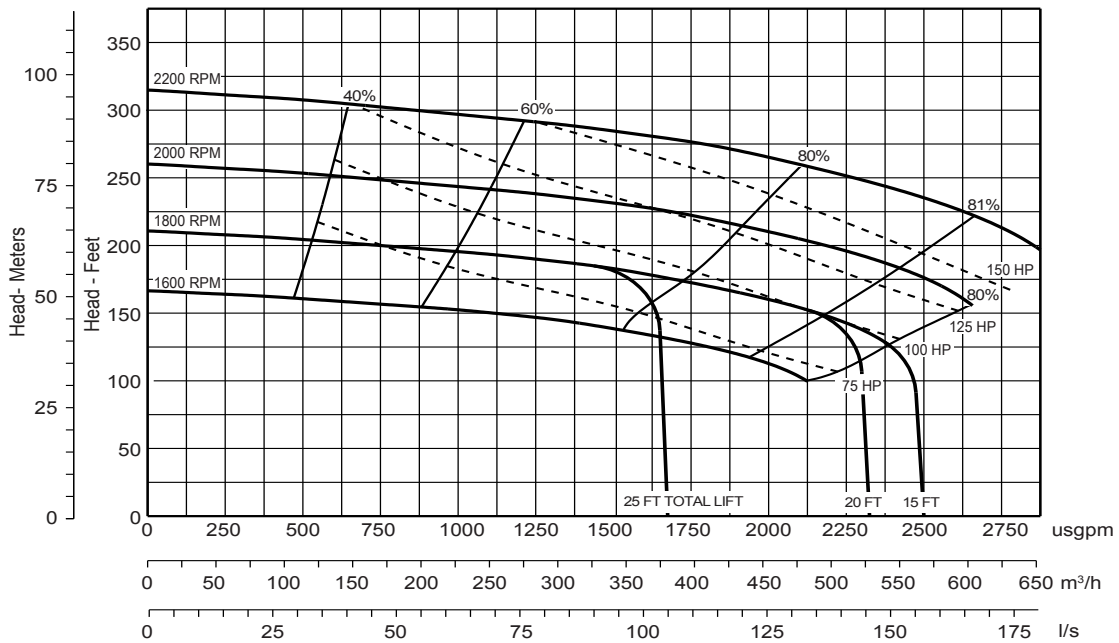


## PP66C14



# Performance Curve

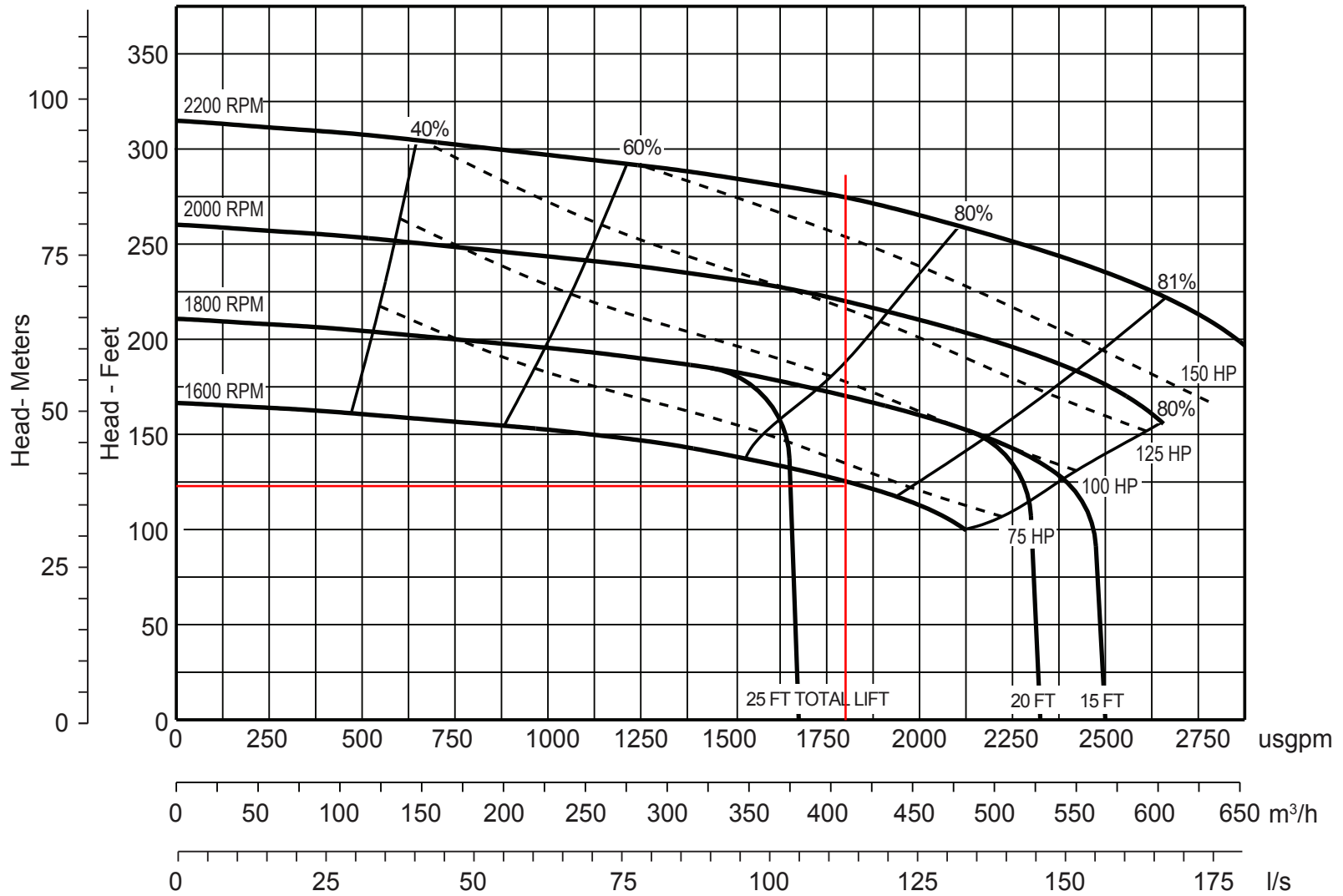
Model: PP66C14	Impeller Dia: 14"	Speed: Variable	Solids Size: 1.0"	Curve #A2578HQ
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Note: Losses from priming system not shown

## **A-4 Pump Head Curves and Pump Selection Justification**

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

## **A-5 Flow Control Valve Specification**

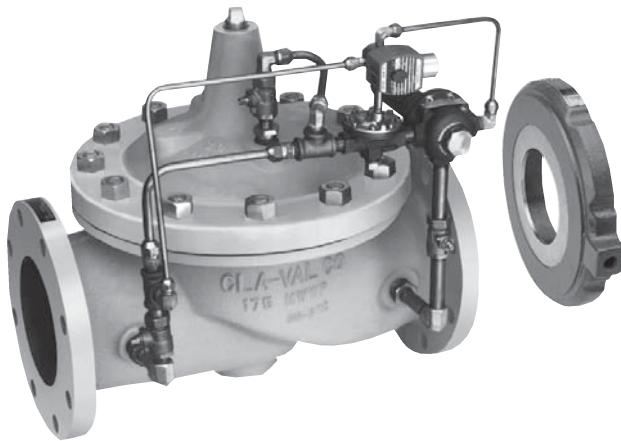


**43-01**  
(Full Internal Port)

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.

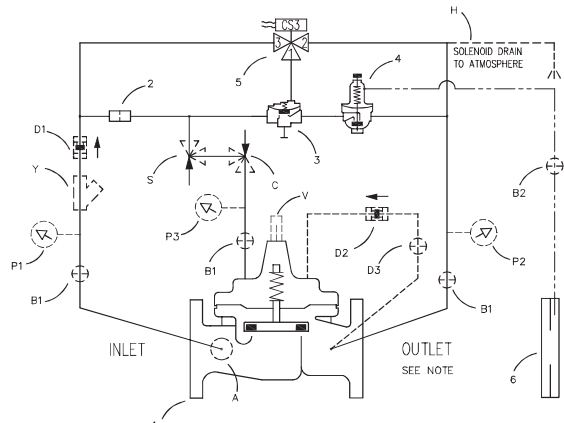
The Model 43-01/643-01 includes a orifice plate with a holder that should be installed one to five pipe diameters downstream of the main valve. If the check feature option is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes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

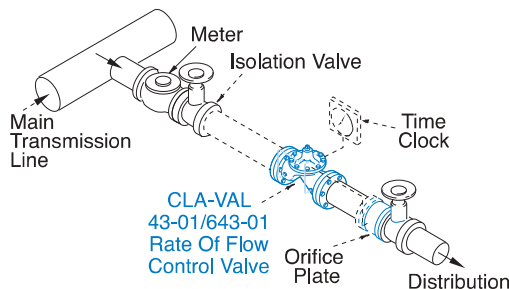
## Optional Features

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

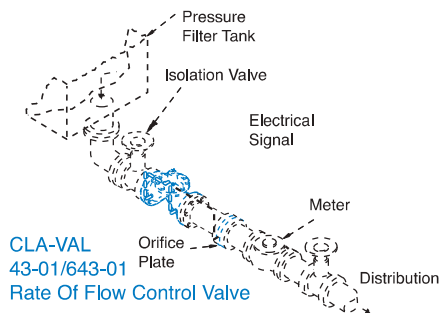


The "D" feature on a vertically installed 6" and larger valves must be horizontally installed.

## 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

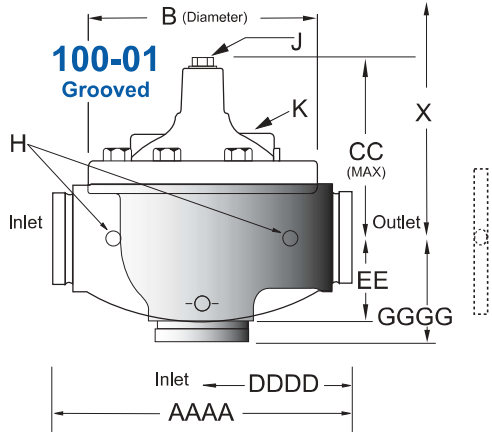
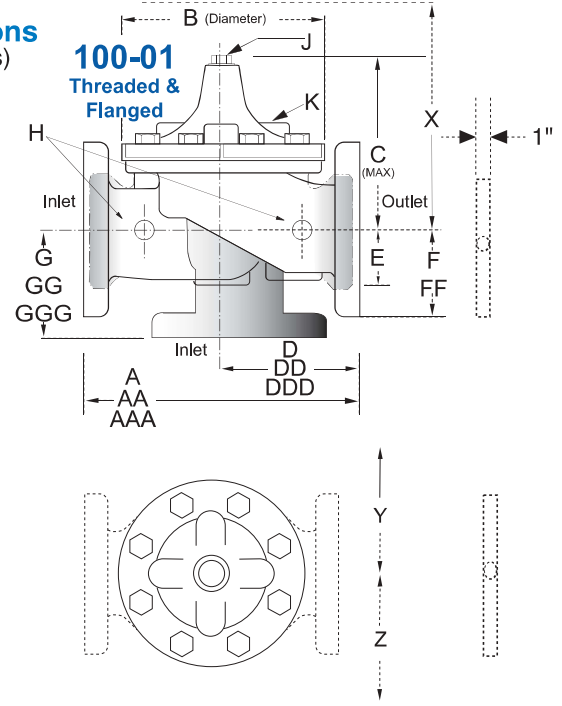
Note: \* ANSI standards are for flange dimensions only.  
 Flanged valves are available faced but not drilled.  
 ‡ End Details machined to ANSI B2.1 specifications.  
**Valves for higher pressure are available; consult factory for details**

**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.

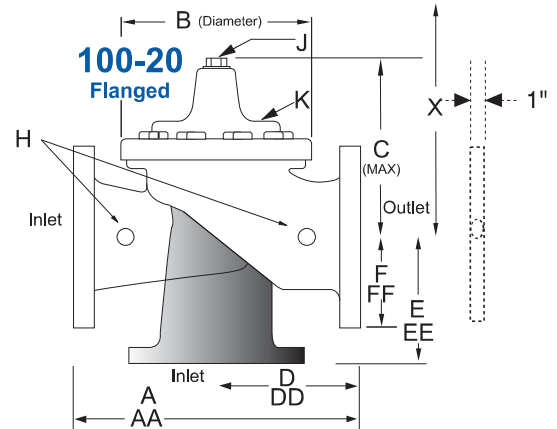
**Model 643-01** (Uses Basic Valve Model 100-20)

**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

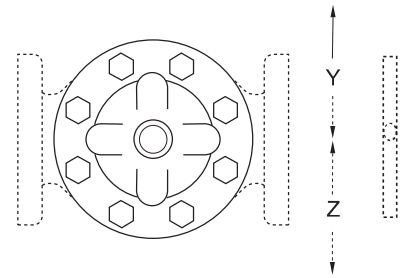
Note: \* ANSI standards are for flange dimensions only.  
Flanged valves are available faced but not drilled.  
**Valves for higher pressure are available; consult factory for details**



**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

1. Catalog No. 43-01 or No. 643-01
2. Valve Size
3. Pattern - Globe or Angle
4. Pressure Class
5. Threaded or Flanged
6. Trim Material
7. Adjustment Range/Orifice Bore
8. Energized or De-Energized to Open
9. Desired Options
10. 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: Susquehanna River (Wyoming) Pipe Size Calculation

Project Name: Atlantic Sunrise  
 Client: TRANSCO

Prepare By: DTK  
 Checked By: LMH

Date: 10/27/2015  
 Date: 11/9/2015

Design Flow Rate **1,800** gpm  
 Length<sup>1</sup> **374** ft  
 Elevation at Start<sup>1</sup> **566** ft MSL  
 Elevation at Pump **572** ft MSL  
 Elevation at End<sup>1</sup> **592** 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 **150** ft

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

Estimate Pipe Size based on velocity

Maintain Velocity at **15.0** ft/sec or less (temporary piping)  
 needed area 0.27 sf or a dia. = **7.0** 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)	1,800	1,800	1,800	
Pipe Size	(inch)	<b>8</b>	<b>10</b>	<b>12</b>	
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)	374	374	150	
Friction Head Loss (dH)	(feet)	28.3	9.7	2.7	
Total Head loss	(feet)	<b>123.28</b>	<b>104.69</b>	<b>21.6</b>	NPSHa > NPSHr = <b>13.0</b> ft
	(psi)	54	46		

\* - includes 6% safety factor on wall thickness

Horsepower Required

Determine Theoretical Hp req'd: HP	56	48
Pump Efficiency (est)	80%	80%
Motor Efficiency (est)	85%	85%
Motor Horsepower (est) HP	<b>82</b>	<b>70</b>

Design Considerations for Hydrotest

CPL Max Elevation: **1542** ft MSL  
 Max Static Head: **950** 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

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ex: 94043

Get Directions History

▼ Places

My Places

- ASR- Hydrotest Wit...
- ASR- Hydrotest ...
- CPLN
  - Fishing Cree...
  - Fishing Cree...
  - Susquehann...
  - Susquehann...
  - Tunkhannoc...
  - Tunkhannoc...
- CPLS
- Unity
- Chapman
- Susquehanna River
- Susquehanna River...
- Sunoco GIS Layers
- Seg#3 HDD's - 10.1...
- OPP-PPP KMZ Libr...
- ASR- Hydrotest Wit...
- Sightseeing Tour
  - Make sure 3D
  - Buildings
- Stay Dry and Flood Sn

▼ Layers Earth Gallery >>

- Primary Database
- Earth Pro (US)
- Voyager
  - Go on Safari
- Edition 2
  - Download
- Borders and Labels
- Places
- Photos
- Roads
- 3D Buildings
- Ocean
- Weather
- Gallery
- Global Awareness
- More
- Terrain



Imagery Date: 5/10/2014 1992 41°28'48.01" N 75°54'24.71" W elev 584 ft Eye alt 1756 ft

Graph: Min. Avg. Max. Elevation: 566, 574, 592 ft  
 Range Totals: Distance: 374 ft Elev Gain/Loss: 6.82 ft, -33.8 ft Max Slope: 93.6%, -80.7% Avg Slope: 0.3%, -80.7%



## **A-7 Flow Meter Specification**

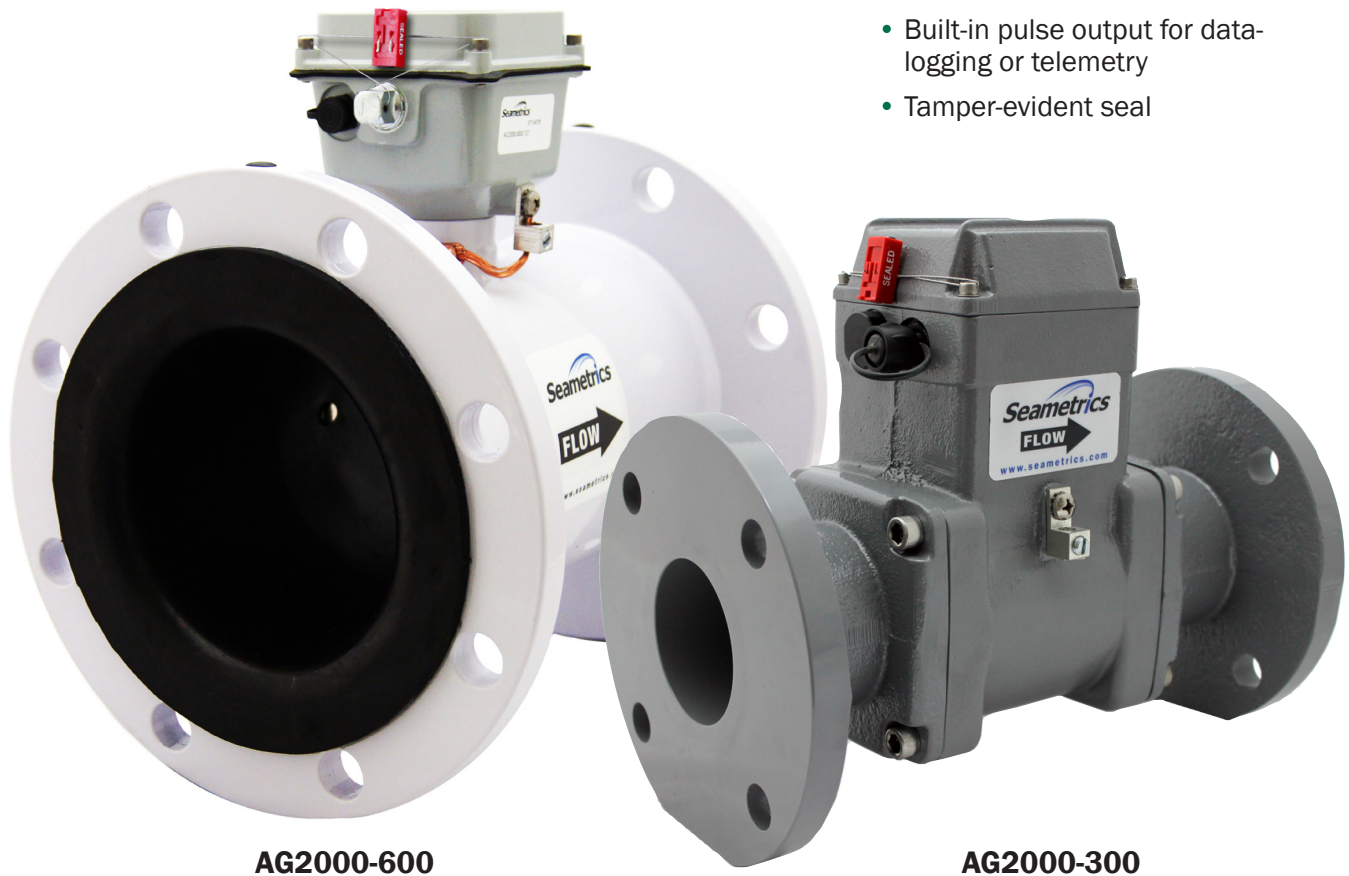


### APPLICATIONS

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

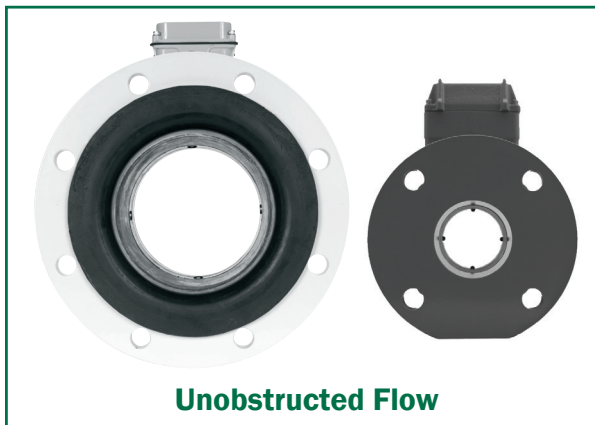
### FEATURES

- 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.

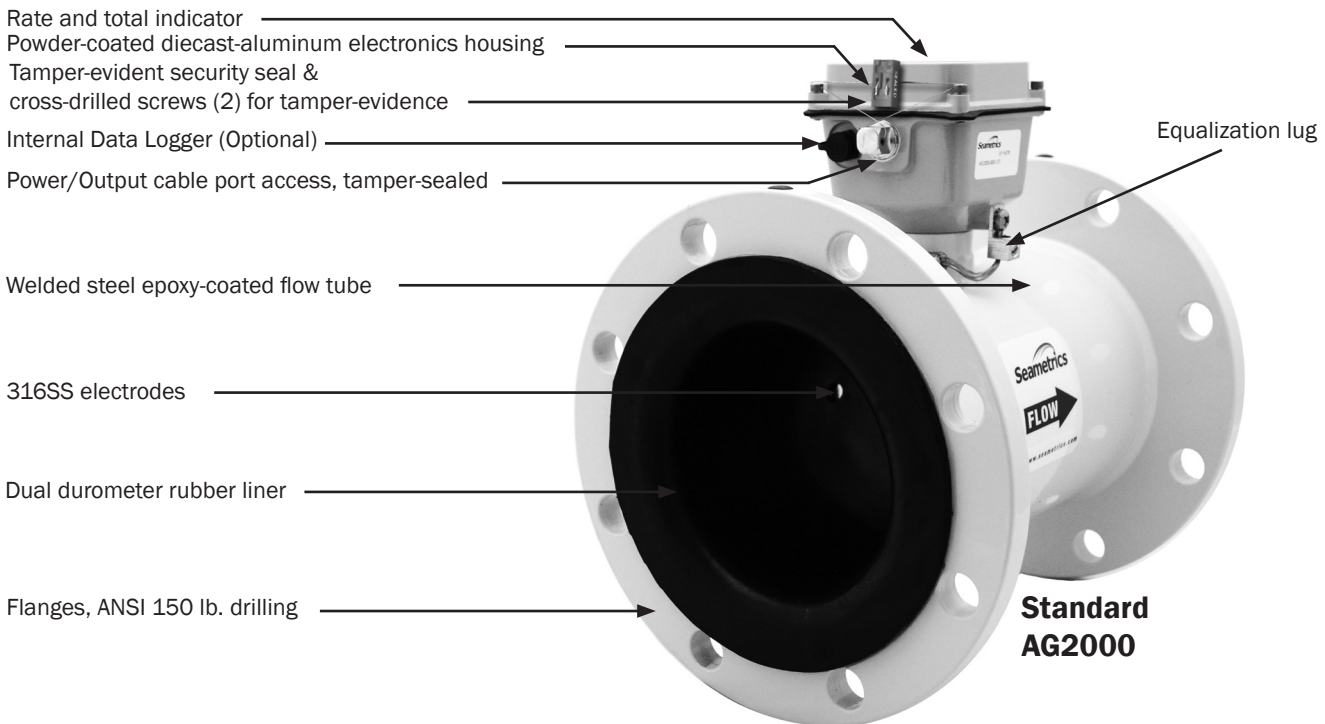
An IP68 version (-168 option) is available for burial or applications where the meter may be under water up to a depth of 3 meters for prolonged periods of time.

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.)

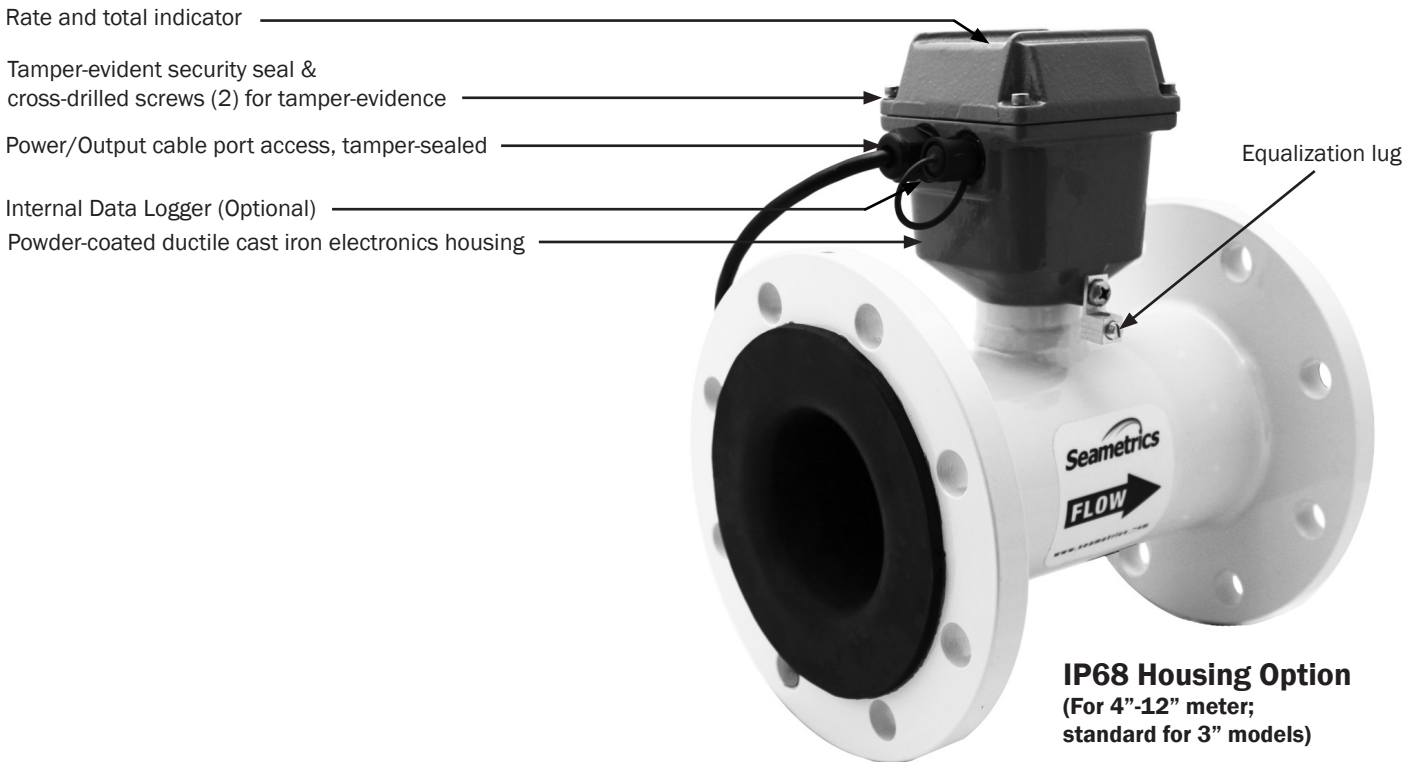
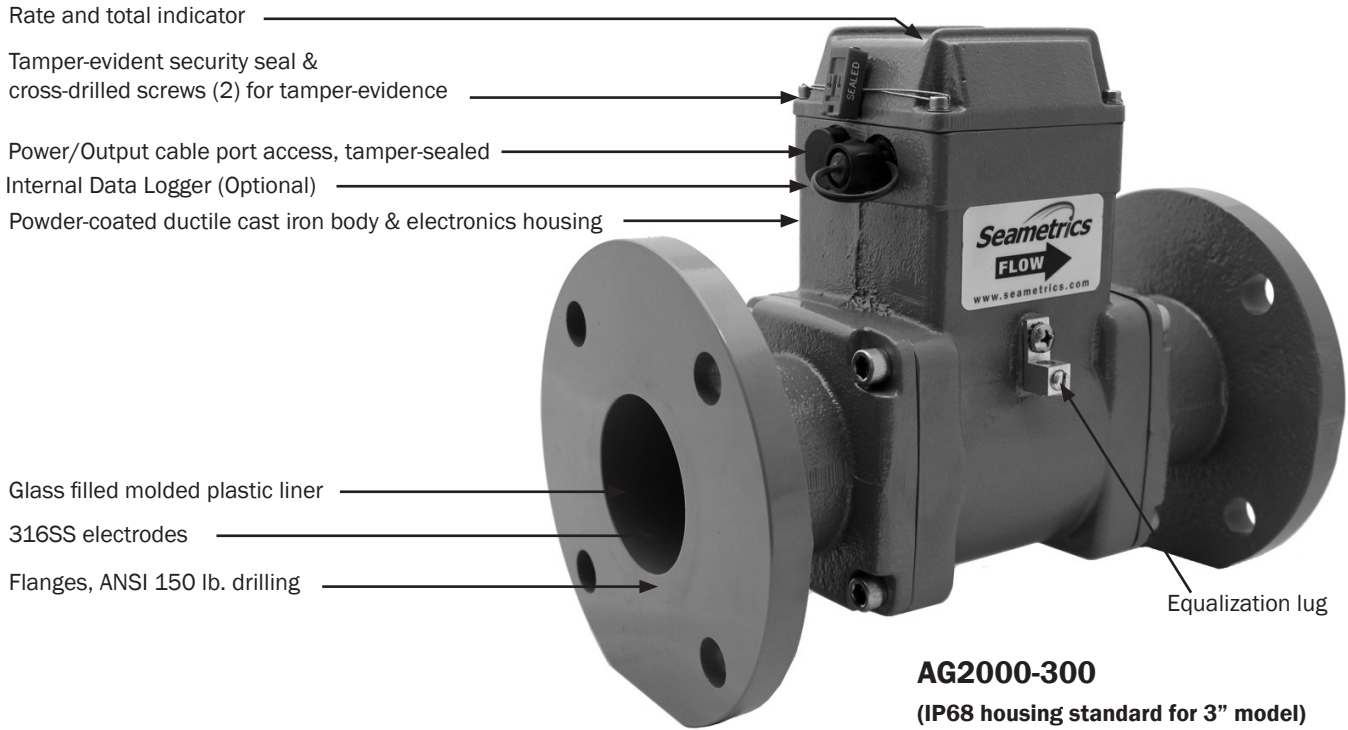
The AG2000 is secured with a seal wire to protect against unauthorized access. The seal can be broken by an authorized agent, to change units of measure, replace the battery pack, or to field-install an optional power/output cable. The cable can be factory or field-installed where external power is available 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](http://www.seametrics.com)).

## FEATURES



## FEATURES Continued





# AG2000 Irrigation Magmeter

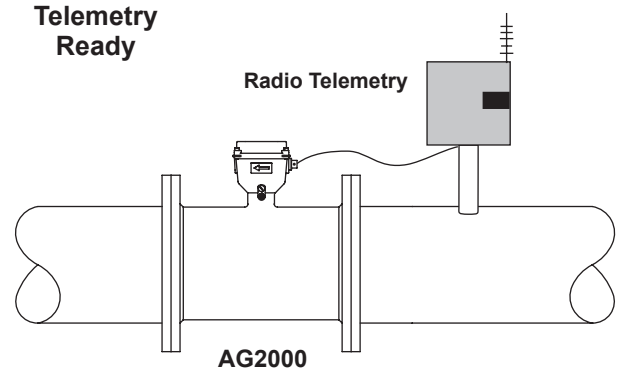
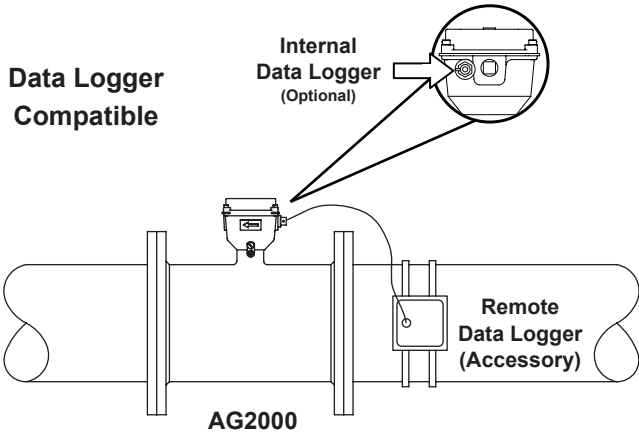
## SPECIFICATIONS\*

<b>Pipe Sizes</b>	3", 4", 6", 8", 10", 12"						
<b>Fittings</b>	ANSI 150 lb. drilling						
<b>Pressure</b>	150 psi (10.3 bar) working pressure						
<b>Temperature</b>	<b>Operating</b>	10° to 130° F (-12° to 54° C)					
	<b>Non-Operating</b>	-40° to 158° F (-40° to 70° C)					
<b>Accuracy</b>	+/- 1% of reading for flow between 10% to 100% of max flow						
	+/- 2% of reading for flow from cutoff to 10% of max flow						
<b>Materials</b>	<b>Body (3" Only)</b>	Ductile cast iron, powder coated w/NSF61 listed epoxy powder					
	<b>Body (4"-12")</b>	Welded steel, epoxy-coated					
	<b>Liner (3" Only)</b>	Noryl®					
	<b>Liner (4"-12")</b>	Santoprene/Polypropylene					
	<b>Electronics Housing</b>	Diecast aluminum, powder-coated (non-IP68)			Ductile Cast Iron (IP68)		
	<b>Electrodes</b>	316 stainless steel					
	<b>O-ring (3" Only)</b>	EPDM					
<b>Display</b>	<b>Rate</b>					<b>Total</b>	
	<b>Digits</b>	5				8	
	<b>Units</b>	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	
<b>Power</b>	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)						
<b>Pulse Output (with optional cable)</b>	<b>Signal</b>	Current sinking pulse, opto-isolated, 30 Vdc at 10 mA max					
	<b>Pulse Rates</b>	High Frequency; 10 units/pulse; 100 units/pulse; 1000 units/pulse					
	<b>High Frequency (pulse/gal)</b>	<b>3"</b>	<b>4"</b>	<b>6"</b>	<b>8"</b>	<b>10"</b>	<b>12"</b>
		25.228	16.362	6.307	3.344	2.15	1.530
<b>Conductivity</b>	>20 microSiemens/cm						
<b>Empty Pipe Detection</b>	Hardware/software, conductivity-based						
<b>Environmental</b>	NEMA 4X Standard (IP68 Option)						

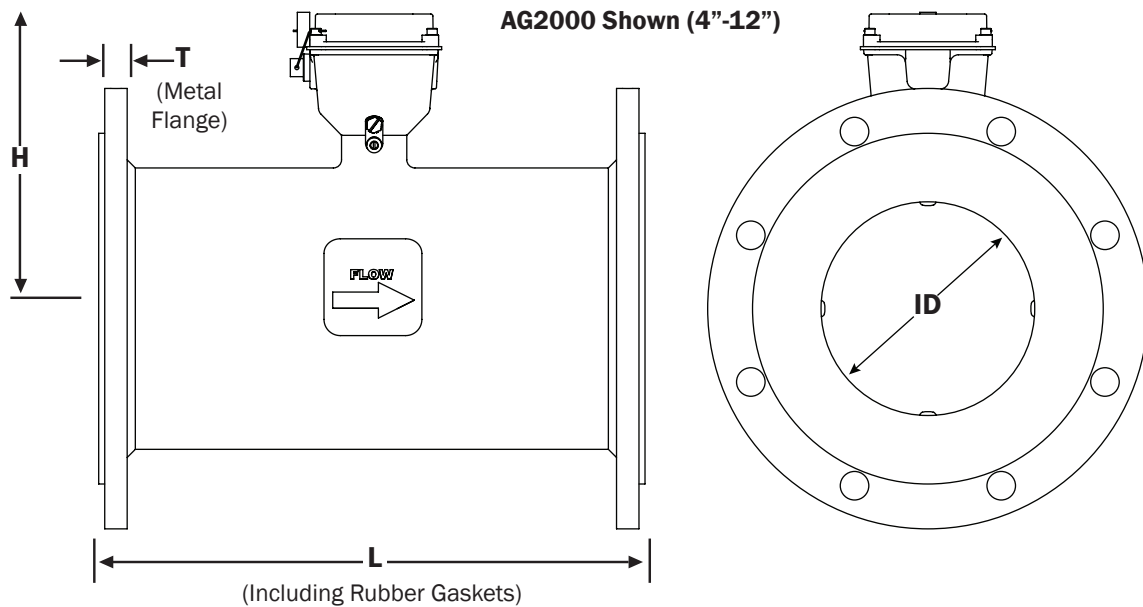
\*Specifications subject to change. Please consult our website for the most current data ([www.seametrics.com](http://www.seametrics.com)).

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

## OUTPUT CAPABILITIES



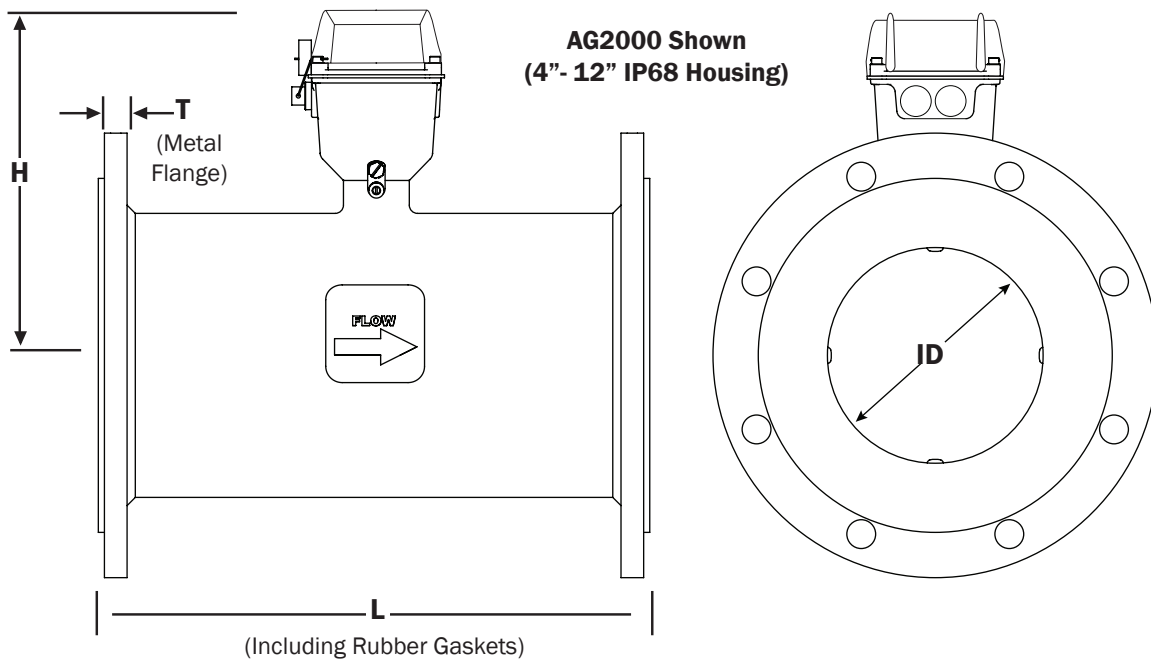
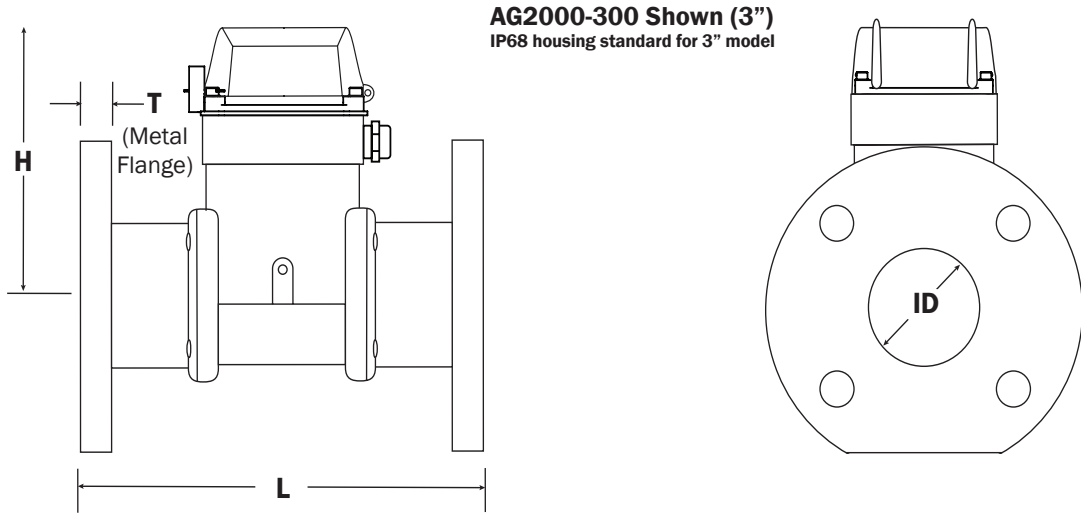
## DIMENSIONS



### 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
<b>Flanges</b>	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

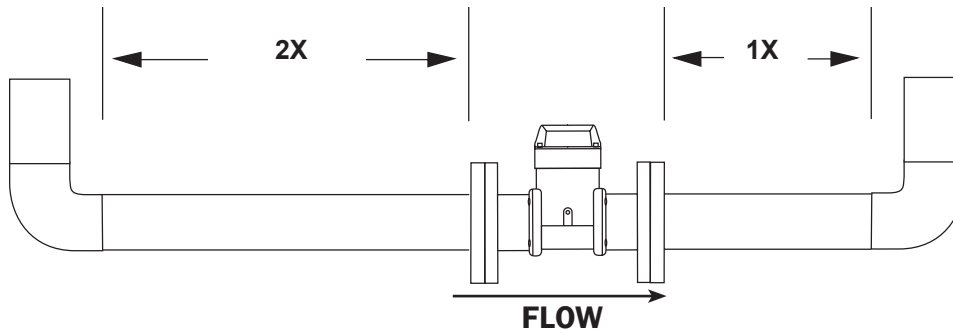
**Flanges** Standard ANSI 150 lb. drilling

Cable (AG2000) 1 lb.

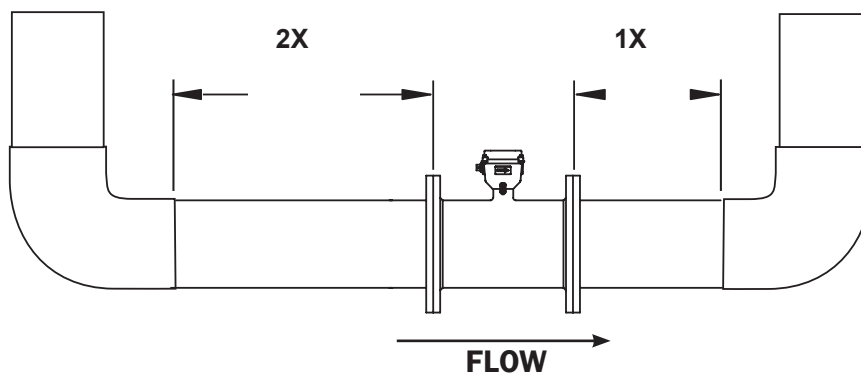
## STRAIGHT PIPE RECOMMENDATIONS

(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
<b>Minimum</b>	7.5	.47	12	.75	32	2	60	3.8	95	6	130	8.2
<b>Maximum</b>	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" = <b>-300*</b> 4" = <b>-400</b> 6" = <b>-600</b> 8" = <b>-800</b>  10" = <b>-1000</b> 12" = <b>-1200</b>	Factory Installed Power/ Output Cable: 6m (20 ft) = <b>-11/6</b> 15m (50 ft) = <b>-11/15</b> 30m (100 ft) = <b>-11/30</b>  Factory Installed IP68 Power/Output Cable: 6m (20 ft) = <b>-11/6S</b> 15m (50 ft) = <b>-11/15S</b> 30m (100 ft) = <b>-11/30S</b>  Internal Data Logger = <b>-127</b> Serial Output = <b>-131</b> IP68 Submersible = <b>-168</b> Extend. Battery Life <sup>1</sup> = <b>-178</b>	10 Units*/Pulse = <b>-PxX</b> 100 Units*/Pulse = <b>-PxH</b> 1000 Units*/Pulse = <b>-PxK</b> High Frequency** = <b>-HF</b>	<table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">Gal/Min = <b>GPM</b></td> <td style="width: 33%;">Gal = <b>G</b></td> <td style="width: 33%;">Gal x 1000 = <b>GT</b></td> </tr> <tr> <td>Liter/Min = <b>LPM</b></td> <td>Liter = <b>L</b></td> <td>Liter x 1000 = <b>LT</b></td> </tr> <tr> <td>Cu Ft/Min = <b>CFM</b></td> <td>Cu Meter/Hr = <b>CMH</b></td> <td>Mega Liters = <b>ML</b></td> </tr> <tr> <td>Gal/Sec = <b>GPS</b></td> <td>Gal/Sec = <b>GPS</b></td> <td>Cubic Meters = <b>CM</b></td> </tr> <tr> <td>Liters/Sec = <b>LPS</b></td> <td>Cu Ft/Sec = <b>CFS</b></td> <td>Cu Met x 1000 = <b>CMT</b></td> </tr> <tr> <td>Miner's In** = <b>MI</b></td> <td>Cu Met/Min = <b>CMM</b></td> <td>Acre Feet = <b>AF</b></td> </tr> <tr> <td></td> <td></td> <td>Cubic Feet = <b>CF</b></td> </tr> <tr> <td></td> <td></td> <td>Cu Feet x 1000 = <b>CFT</b></td> </tr> <tr> <td></td> <td></td> <td>Million Gal = <b>MG</b></td> </tr> <tr> <td></td> <td></td> <td>Miner's Inch Day = <b>MID</b></td> </tr> <tr> <td></td> <td></td> <td>Acre Inch = <b>AI</b></td> </tr> </table>	Gal/Min = <b>GPM</b>	Gal = <b>G</b>	Gal x 1000 = <b>GT</b>	Liter/Min = <b>LPM</b>	Liter = <b>L</b>	Liter x 1000 = <b>LT</b>	Cu Ft/Min = <b>CFM</b>	Cu Meter/Hr = <b>CMH</b>	Mega Liters = <b>ML</b>	Gal/Sec = <b>GPS</b>	Gal/Sec = <b>GPS</b>	Cubic Meters = <b>CM</b>	Liters/Sec = <b>LPS</b>	Cu Ft/Sec = <b>CFS</b>	Cu Met x 1000 = <b>CMT</b>	Miner's In** = <b>MI</b>	Cu Met/Min = <b>CMM</b>	Acre Feet = <b>AF</b>			Cubic Feet = <b>CF</b>			Cu Feet x 1000 = <b>CFT</b>			Million Gal = <b>MG</b>			Miner's Inch Day = <b>MID</b>			Acre Inch = <b>AI</b>
Gal/Min = <b>GPM</b>	Gal = <b>G</b>	Gal x 1000 = <b>GT</b>																																			
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Miner's In** = <b>MI</b>	Cu Met/Min = <b>CMM</b>	Acre Feet = <b>AF</b>																																			
		Cubic Feet = <b>CF</b>																																			
		Cu Feet x 1000 = <b>CFT</b>																																			
		Million Gal = <b>MG</b>																																			
		Miner's Inch Day = <b>MID</b>																																			
		Acre Inch = <b>AI</b>																																			
	*-300 available in IP68 only	<sup>1</sup> 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**

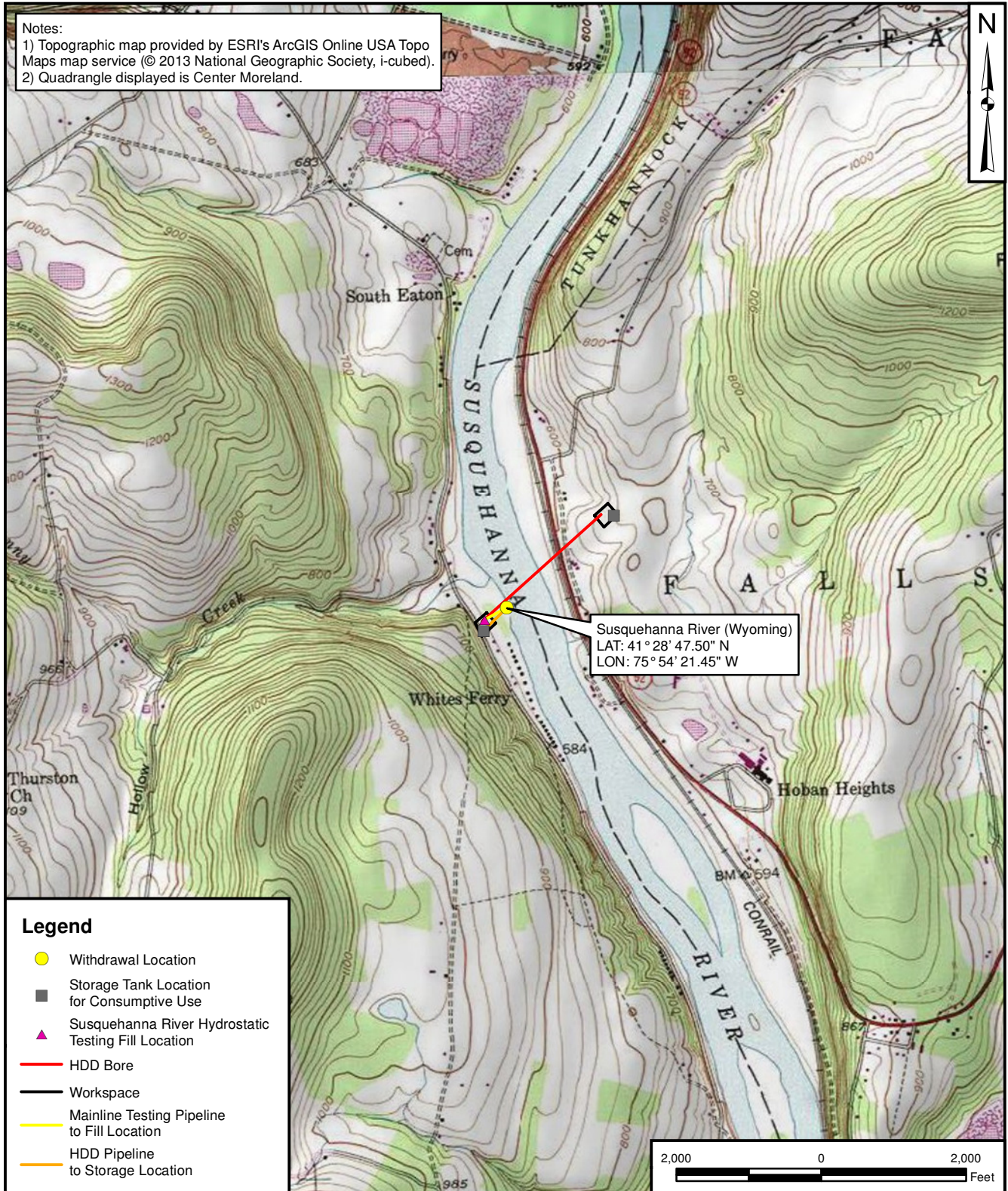
12" = **103288**

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

## CONTACT YOUR SUPPLIER

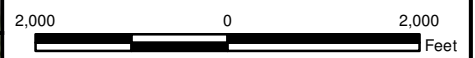
## **A-8 Plans, Details, and Maps**

Notes:  
 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, i-cubed).  
 2) Quadrangle displayed is Center Moreland.



**Legend**

- Withdrawal Location
- Storage Tank Location for Consumptive Use
- ▲ Susquehanna River Hydrostatic Testing Fill Location
- HDD Bore
- Workspace
- Mainline Testing Pipeline to Fill Location
- HDD Pipeline to Storage Location



USGS LOCATION MAP  
 TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC  
 SUSQUEHANNA RIVER  
 EATON TOWNSHIP  
 WYOMING COUNTY, PA

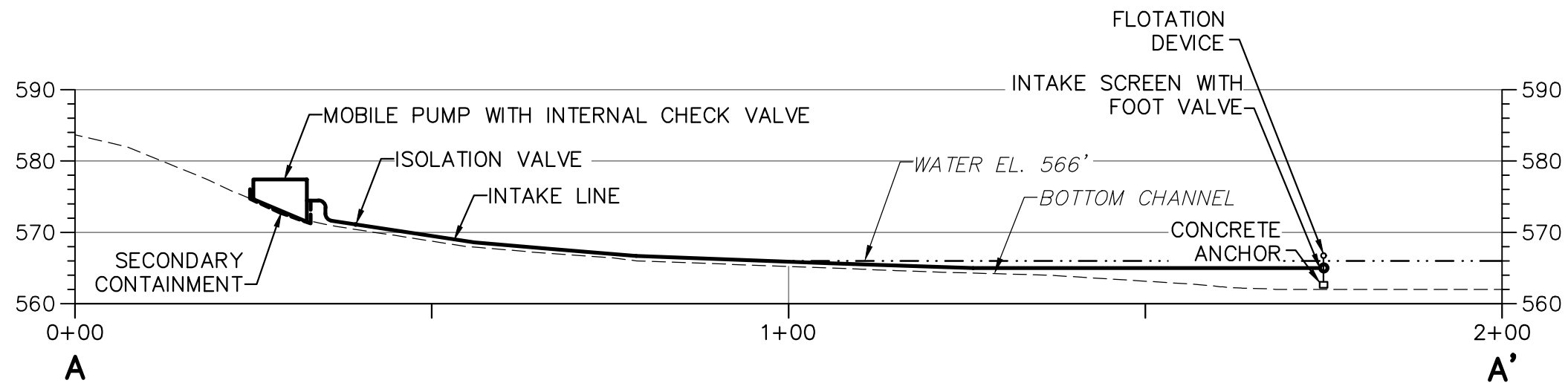
DRAWN BY: S. PAXTON 10/19/15  
 CHECKED BY: L. HERRING 10/19/15  
 APPROVED BY:

CONTRACT NUMBER: 212C-PB-00282

FIGURE NUMBER 8-1

REV 0





**CROSS-SECTION A-A'**



**NOTES:**

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

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

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC  
 SUSQUEHANNA RIVER, EATON TWP., WYOMING 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

COPYRIGHT TETRA TECH INC.  
**FIGURE 8-3**

## **A-9 Field Photographs**



**Susquehanna River Withdrawal Point**



**TETRA TECH**

**SURFACE WATER METERING PLAN FOR  
TUNKHANNOCK CREEK**

**ATLANTIC SUNRISE PROJECT**

**Nicholson Township, Wyoming County,  
Pennsylvania**

**Prepared For:**

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

**Prepared By:**

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

**September 2016**

## **SRBC Surface Water Withdrawal Application Metering Plan**

### **A. Intake Design**

The surface water withdrawal location on Tunkhannock Creek is located along the proposed gas pipeline route where the water will be required for hydrostatic testing. The anticipated volume of water to be withdrawn from Tunkhannock Creek for pipeline hydrotesting does not trigger any Susquehanna River Basin Commission (SRBC) permitting requirement (i.e., more than 100,000 gallons per day average over a 30-day period or 3,000,000 gallons in any consecutive 30-day period). No withdrawals from the creek in excess of these amounts are allowed at any time. All withdrawals must follow this document to protect the environment and ensure that the water volumes withdrawn from the creek are below the SRBC permit threshold volume. Water will be transferred from Tunkhannock 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 Company, LLC (Transco) proposes to use two (2), 5-foot long, 3-inch radius stainless steel screens with slot-size openings of 0.100-inch that are manufactured by Bilfinger Water Technologies™ to withdraw water from Tunkhannock Creek. The 5-foot long screens are connected by a tee fitting and include a foot valve to maintain a flooded suction and prevent backflow. The intake screen will be connected to a 10-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 3 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. The PNDI Report, which indicates no agency coordination required, is included in Attachment A-3.

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-4 and A-5, 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-6. 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 Tunkhannock Creek when the creek flow rate at the assigned reference gage is at or falls below the prescribed monthly passby flow rate.

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 maximum flow rate of up to 1,800 gpm (see Attachment A-7 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 2017.

A wetland study was completed for the area on July 8, 2015. One wetland was identified in the vicinity of the proposed withdrawal equipment; equipment will not be placed within the wetland, and crossing the wetlands by personnel or equipment will be minimized. The intake pump will be located within the Federal Emergency Management Agency (FEMA) floodplain, but out of the FEMA 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, flows at the proposed withdrawal point were calculated by proportioning based on the drainage area ratio method from a selected USGS gaging station on Tunkhannock Creek. At the proposed location, Tunkhannock Creek has a drainage area of 186 square miles (mi<sup>2</sup>). The selected USGS reference gage on Tunkhannock Creek for this project site is located in Tunkhannock, Pennsylvania and is identified as Gage No. 01534000. This gaging station is located downstream of the proposed intake location for this project and has a drainage area of approximately 383 mi<sup>2</sup>. Based on a drainage area at the withdrawal point of approximately 186 mi<sup>2</sup>, the Aquatic Resource Class (ARC) of Tunkhannock Creek is classified as 'ARC 3', which represents a small river. Creeks classified as ARC 3 are likely to be moderately sensitive to potential impacts from withdrawals due to their size, position in the landscape, and flow volumes. USGS records (scaled Gage Station data) indicate that at the proposed withdrawal location on Tunkhannock Creek the Q7-10 flow rate is 8.4 cubic feet per second (cfs) or 5.43 MGD. The requested daily withdrawal rates vary by month and range from 1.78 cfs (1.152 MGD) to 4.01 cfs (2.592 MGD). See withdrawal calculations in A-8.

Transco will stop or decrease withdrawals during low flow periods to avoid negatively impacting the quality of Tunkhannock Creek. The USGS gaging station located on Tunkhannock Creek at Tunkhannock, Pennsylvania (Gage No. 01534000) will be used to determine the flow rates of Tunkhannock 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-9). 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 range of 800 gpm to 1,800 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 Tunkhannock Creek and at the end of each day to ensure that the proposed month-specific maximum daily withdrawal rate [1.78 cfs (1.152 MGD) to 4.01 cfs (2.592 MGD)] 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-10. Site Photographs are included in Attachment A-11.

## **A-1 Intake Screen Calculations**

CLIENT:	TRANSCONTINENTAL PIPE LINE COMPANY, LLC		JOB NUMBER:	212C-PB-00282	
SUBJECT:	TUNKHANNOCK CREEK SCREENED INTAKE EVALUATION				
BASED ON:	Bilfinger Water Technologies			DRAWING NUMBER:	
BY:	DTK	CHECKED BY:	LMH	APPROVED BY:	CAR
DATE:	12/11/2015	DATE:	12/15/2015	DATE:	12/15/15

**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. Creek depth is less than 3 feet.

**APPROACH:**

Use typical industry equations to calculate the minimum number of Bilfinger Water Technologies 6-inch diameter well screens necessary to allow a flow rate of 1,800 gallons per minute. Assume multiple intake screens with 0.1-inch slots.

**CALCULATIONS:**

- (1) Data was obtained from Bilfinger Water Technologies® for the well screen.

d	=	0.100	=	Maximum perforation diameter, inches
V	=	0.5	=	Maximum intake velocity, feet per second
Q	=	1,800	=	Maximum flow (withdrawal) rate, gallons per minute
r	=	3.09	=	Radius of perforated intake pipe, inches
b	=	5.000	=	length of perforated intake pipe, feet
n	=	unknown	=	number of screens
A <sub>s</sub>	=	790	=	Area of screen, square inches
A <sub>o</sub>	=	494	=	Open area of screen, square inches (see attached)
P	=	62.5%	=	Open area of perforated intake pipe (P = A <sub>o</sub> /A <sub>s</sub> )

- (2) Use the following equation from the Handbook of Groundwater Development, Roscoe Moss Company, to calculate first the minimum number of Bilfinger Water Technologies intake screens necessary for a withdrawal of 1,800 gallons per minute.

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

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

$$n = \frac{1,800}{235 \times 3.09 \times 5 \times 0.625 \times 0.5}$$

$$n = 1.59$$

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

The minimum number of Bilfinger Water Technologies 6-inch diameter well screens necessary to allow for a total flow of 1,800 gpm to be withdrawn is 2.

- (3) Using the equation from Step 2, calculate the entrance velocity when 2 Bilfinger Water Technologies 6-inch diameter well screens are used.

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

$$V = \frac{1,800 / 2}{235 \times 3.09 \times 5 \times 0.625}$$

$$V = 0.40 \quad \text{feet per second}$$

CLIENT:	TRANSCONTINENTAL PIPE LINE COMPANY, LLC	JOB NUMBER:	212C-PB-00282		
SUBJECT:	TUNKHANNOCK CREEK SCREENED INTAKE EVALUATION				
BASED ON:	Bilfinger Water Technologies	DRAWING NUMBER:			
BY:	DTK	CHECKED BY:	LMH	APPROVED BY:	CAR
DATE:	12/11/2015	DATE:	12/15/2015	DATE:	12/15/15

**CONCLUSION:**

Two Bilfinger Water Technologies 6-inch diameter well screens provide an intake flow capacity of 1,800 gallons per minute with a maximum screen entrance velocity of 0.40 feet per second, which is conservatively 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 intake screens will be cradled to elevate them a minimum of 6-inches off of the creek bed.

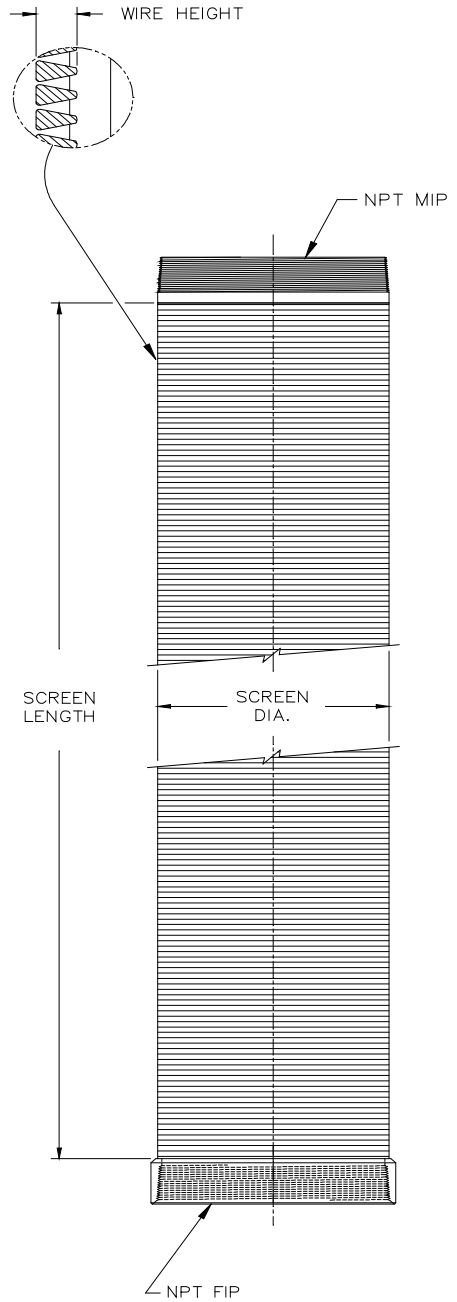
## **A-2 Intake Manufacturer Information**

SCREEN INFORMATION		
<b>CUSTOMER</b>	Tetra-tech	
<b>REFERENCE</b>		
<b>DIAMETER</b>	6 in	PS
<b>MATERIAL</b>	304 Stainless	
<b>COLLAPSE</b>	45	PSI
<b>SLOT SIZE</b>	0.100	IN
<b>OPEN AREA</b>	62.50%	
<b>ROD AREA</b>	0.864	SQ IN
<b>HANGING WT<sup>1</sup></b>	11,000	LB
<sup>1</sup> MAXIMUM RECOMMENDED HANGING WEIGHT FOR THE TOP SCREEN JOINT		
<b>LENGTH (ft)</b>	5	FULL
<b>NO. OF PIECES</b>	1	Joints
<b>TOP FITTING</b>	1.5 in	F/NPT
<b>BTM FITTING</b>	1.5 in	M/NPT

\* A broad range of site conditions can impact the physical strength requirements for a successful screen installation. Consult Johnson Screens with questions for successful screen installation. Consult Johnson Screens with questions regarding the parameters presented above as they relate to your specific requirements.

\*\* Vertical weight on screen that should not be exceeded without use of rigid centralizers!

Prepared by Waterwell Sales. Subject to Bilfinger Water Technologies, Inc Standard Terms and Conditions.



*THIS DRAWING AND DESIGN DATA IS CONFIDENTIAL IN NATURE AND IS THE PROPERTY OF BILFINGER WATER TECHNOLOGIES INC, ST. PAUL, MN, USA, AND SHALL NOT BE REPRODUCED IN ANY MANNER OR USED FOR ANY PURPOSE WHATSOEVER EXCEPT BY WRITTEN PERMISSION OF BILFINGER WATER TECHNOLOGIES INC.*



## WELL SCREEN SUBMITTAL DATA

CLIENT: Tetra-tech  
PROJECT:

Material	304 Stainless			
Nom Size	6	PS	150	mm
Top x Bottom Fitting Configuration	NPT x WR W/PB			
Estimated Total Well Depth	2	ft	1	meters
Estimated Feet of Screen	5	ft	2	meters
Design Slot Size	0.100	in	2.5	mm
Approx. Outside Diameter	6.72	in	171	mm
Screen Barrel Inside Diameter	6.18	in	157	mm
Approx. Clear ID at Fittings	6.02	in	153	mm
Approx. Weight Per Ft	6	lbs	3	kg
Wire Width	0.060	in	1.5	mm
Wire Height	0.100	in	2.5	mm
Calc. Collapse Strength *	45	PSI	3	kg/sq.cm
Open Area	62.5%			
Intake Area	158	sq.in./ft	3,349	sq.cm./meter
Transmitting Capacity-at 0.1 ft/sec	49	gpm/ft	10	lps/meter
Support Rod Diam	0.150	in	3.8	mm
No Rods	40			
Cross Sectional Rod Area	0.86	sq.in.	5.57	sq.cm.
Design Yield Strength	30,000	PSI	2,109	kg/sq.cm
Calc.Tensile Strength *	22,000	lbs	10,000	kg
Max.Recomended Hang Wt. *	11,000	lbs	5,000	kg
Column Load **	5,000	lbs	2,300	kg

\* A broad range of site conditions can impact the physical strength requirements for a successful screen installation. Consult Johnson Screens with questions regarding the parameters presented above as they relate to your specific requirements.

\*\* Vertical weight on screen that should not be exceeded without consulting manufacturer. Column load calculations should include some allowance for gravel pack contribution.

Prepared by Albert Smith  
Subject to Bilfinger Water Technologies, Inc.  
Standard Terms and Conditions.  
**www.johnsonscreens.com**

**A-3 PNDI**

## 1. PROJECT INFORMATION

Project Name: **Tunkhannock**

Date of review: **9/1/2015 7:57:28 AM**

Project Category: **Water extraction/transfer, Extraction of surface water (e.g., from stream, river, creek, lake, or pond)**

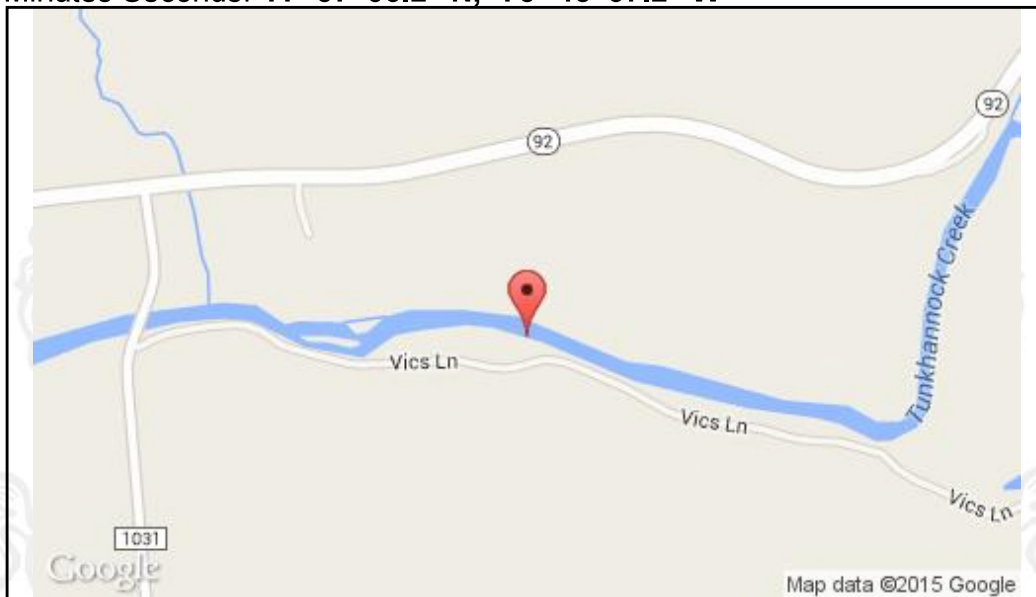
Project Area: **N/A**

County: **Wyoming** Township/Municipality: **Nicholson Twp**

Quadrangle Name: **HOP BOTTOM** ~ ZIP Code: **18446**

Decimal Degrees: **41.626716 N, -75.760338 W**

Degrees Minutes Seconds: **41° 37' 36.2" N, -75° 45' 37.2" W**



## 2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate no known impacts to threatened and endangered species and/or special concern species and resources within the project area. Therefore, based on the information you provided, no further coordination is required with the jurisdictional agencies. This response does not reflect potential agency concerns regarding impacts to other ecological resources, such as wetlands.

### 3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jurisdictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

#### PA Game Commission

**RESPONSE:** No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

#### PA Department of Conservation and Natural Resources

**RESPONSE:** No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

#### PA Fish and Boat Commission

**RESPONSE:** No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

#### U.S. Fish and Wildlife Service

**RESPONSE:** No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

### 4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at <http://www.naturalheritage.state.pa.us>.

### 5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page ([www.naturalheritage.state.pa.us](http://www.naturalheritage.state.pa.us)). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

### 6. AGENCY CONTACT INFORMATION

**PA Department of Conservation and Natural Resources**  
Bureau of Forestry, Ecological Services Section  
400 Market Street, PO Box 8552, Harrisburg, PA.  
17105-8552  
Fax:(717) 772-0271

**U.S. Fish and Wildlife Service**  
Pennsylvania Field Office  
110 Radnor Rd; Suite 101, State College, PA 16801  
NO Faxes Please.

**PA Fish and Boat Commission**  
Division of Environmental Services  
450 Robinson Lane, Bellefonte, PA. 16823-7437  
NO Faxes Please

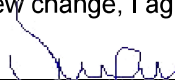
**PA Game Commission**  
Bureau of Wildlife Habitat Management  
Division of Environmental Planning and Habitat Protection  
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797  
Fax:(717) 787-6957

### 7. PROJECT CONTACT INFORMATION

Name: \_\_\_\_\_  
Company/Business Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City, State, Zip: \_\_\_\_\_  
Phone:(\_\_\_\_\_) \_\_\_\_\_ Fax:(\_\_\_\_\_) \_\_\_\_\_  
Email: \_\_\_\_\_

### 8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

  
\_\_\_\_\_  
applicant/project proponent signature

12-28-2015  
\_\_\_\_\_  
date

## **A-4 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 <sup>3</sup> /h 180 l/s
Head, Max	320 feet 100 meters
Flow at BEP	2,625 USgpm 600 m <sup>3</sup> /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	

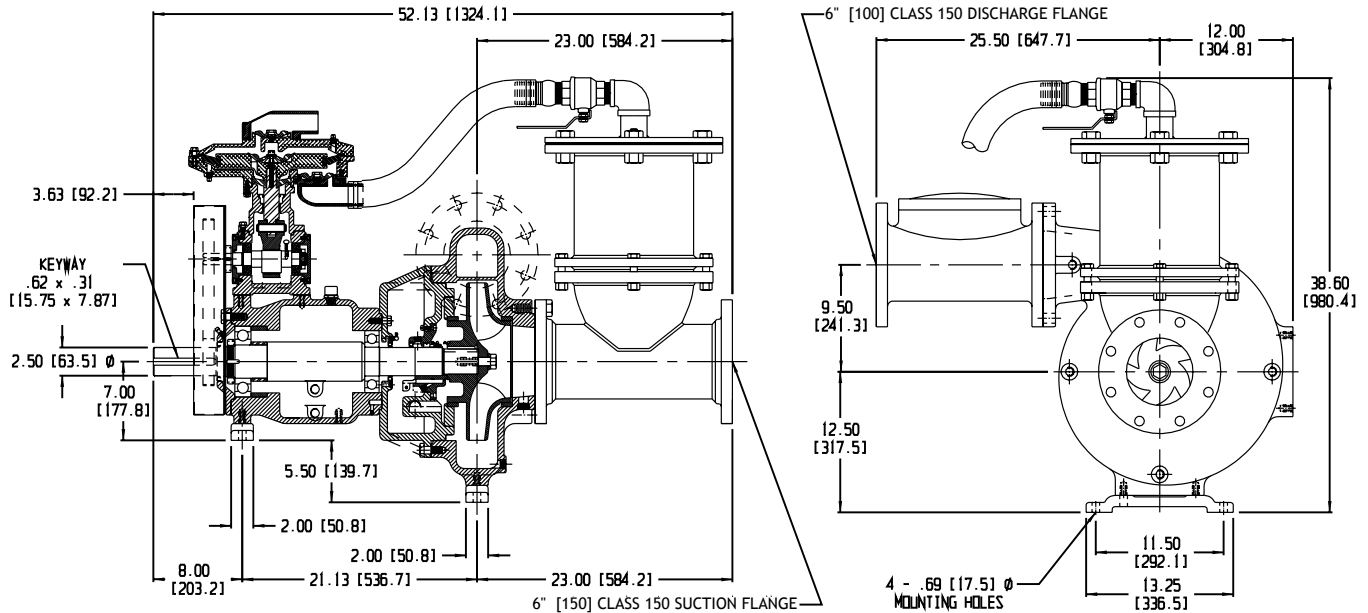
#### Construction Materials

	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

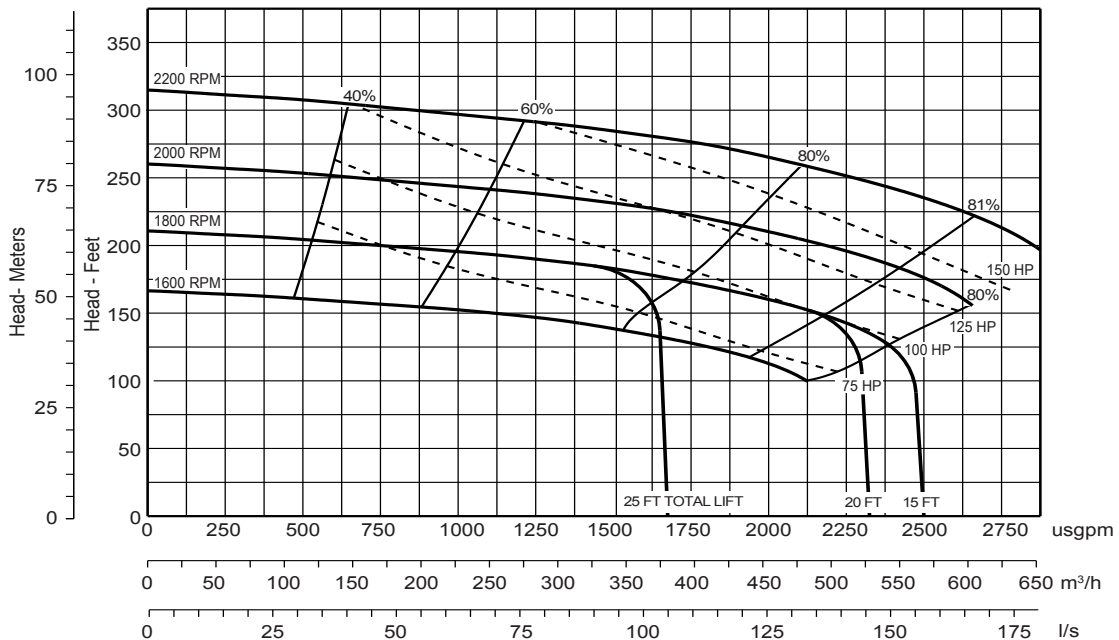


## PP66C14



# Performance Curve

Model: PP66C14	Impeller Dia: 14"	Speed: Variable	Solids Size: 1.0"	Curve #A2578HQ
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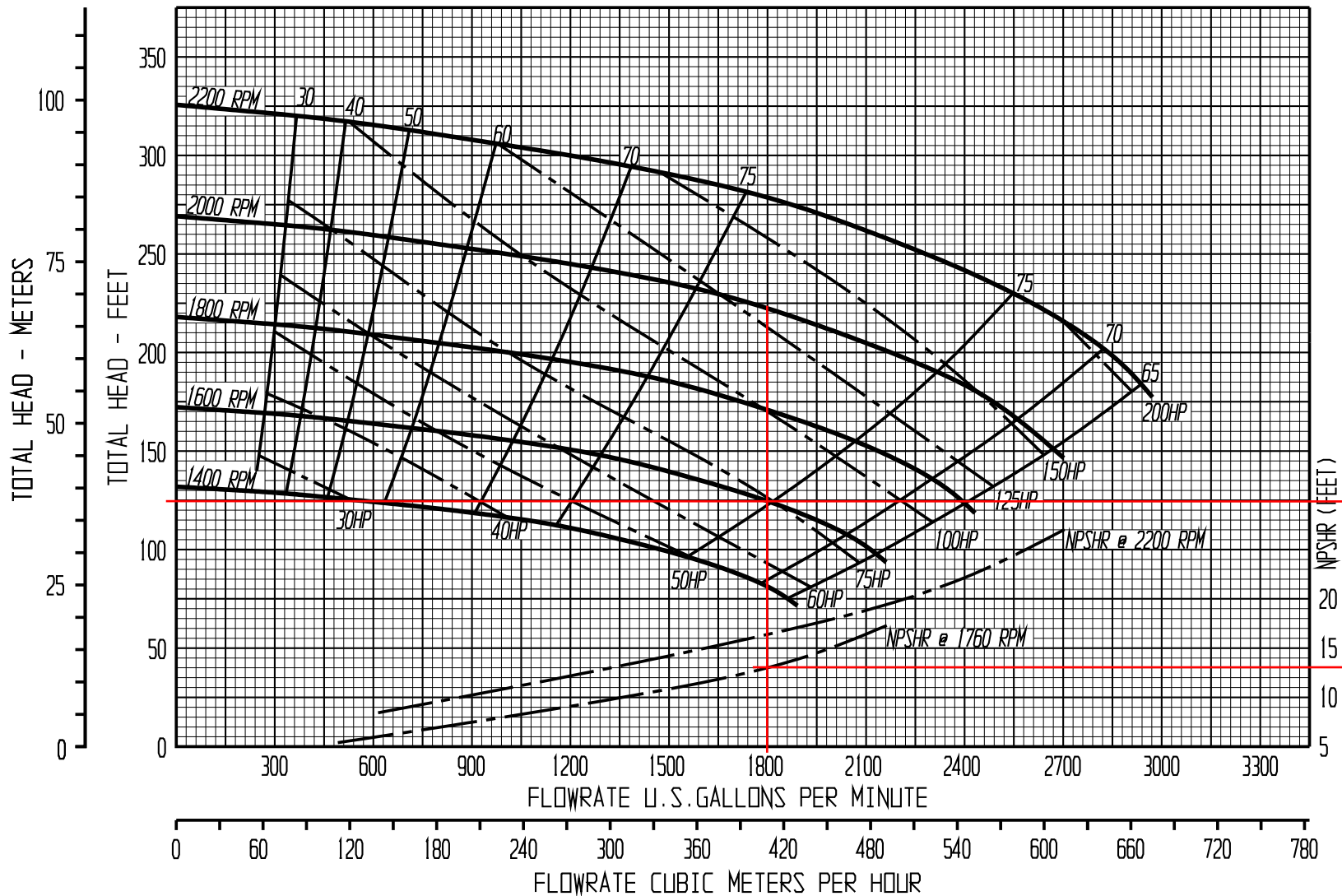


Note: Losses from priming system not shown

Corporate +1 (503) 266-4115 ■ EMEA +44 (0)1449 736777 ■ South Africa +27 (0) 118240085 ■ Australia +61 3 9988 1650

[www.pioneerpump.com](http://www.pioneerpump.com)

## **A-5 Pump Head Curves and Pump Selection Justification**



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

125 ft  
 TDH

13.0 ft  
 NPSHr



MODEL: PP66C14

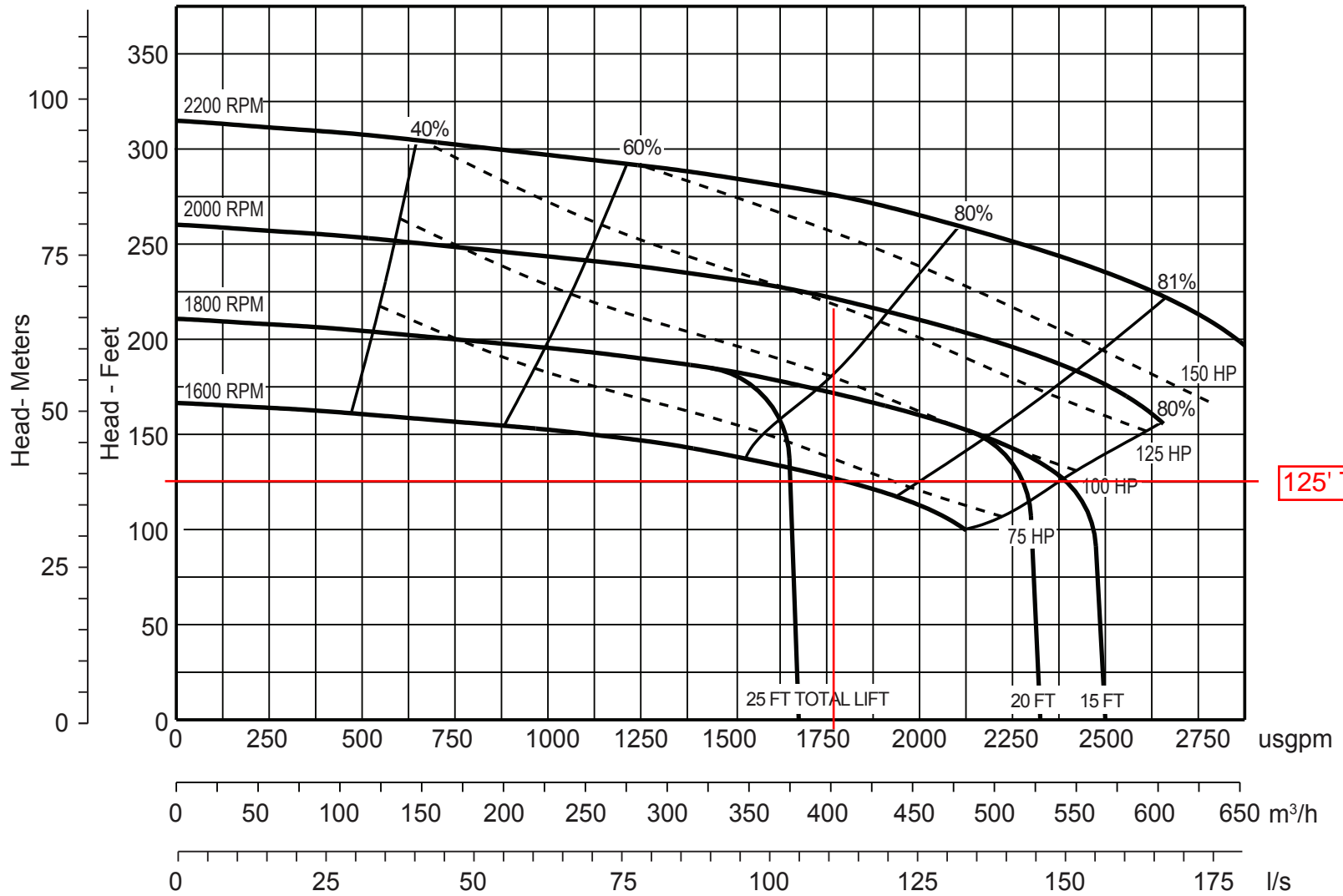
IMPELLER DIA. 14.0"

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

## **A-6 Flow Control Valve Specification**

**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

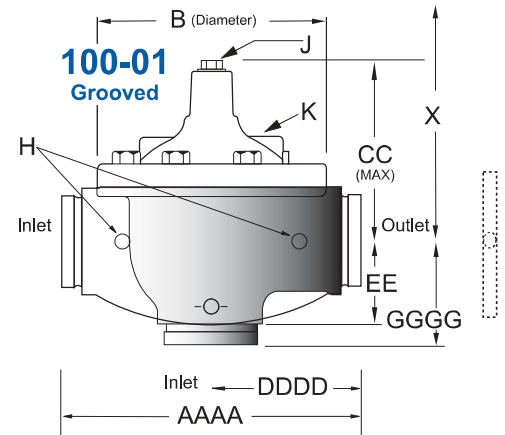
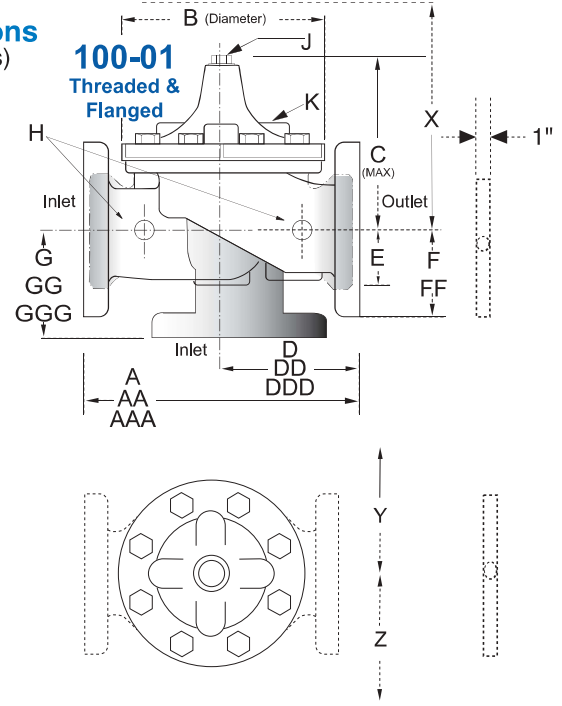
Note: \* ANSI standards are for flange dimensions only.  
 Flanged valves are available faced but not drilled.  
 ‡ End Details machined to ANSI B2.1 specifications.  
**Valves for higher pressure are available; consult factory for details**

**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.

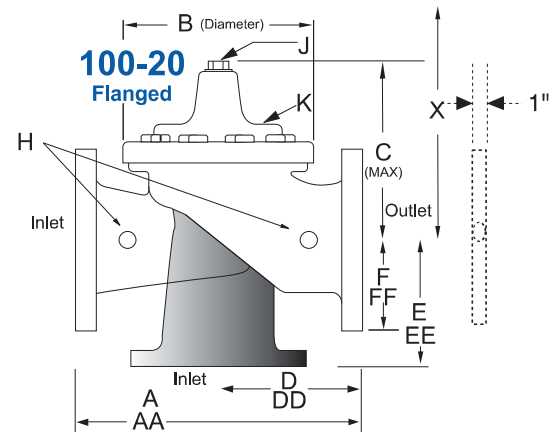
**Model 643-01** (Uses Basic Valve Model 100-20)

**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

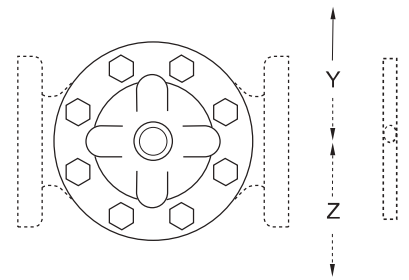
Note: \* ANSI standards are for flange dimensions only.  
Flanged valves are available faced but not drilled.  
**Valves for higher pressure are available; consult factory for details**



**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	
	End Detail	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

1. Catalog No. 43-01 or No. 643-01
2. Valve Size
3. Pattern - Globe or Angle
4. Pressure Class
5. Threaded or Flanged
6. Trim Material
7. Adjustment Range/Orifice Bore
8. Energized or De-Energized to Open
9. Desired Options
10. 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-7 Pipeline Sizing Justification**

Title: Tunkhannock Creek Pipe Size Calculation  
 Project Name: Atlantic Sunrise  
 Client: Transcontinental Gas Pipe Line Company LLC

Prepare By: DTK  
 Checked By: LMH

Date: 12/9/2015  
 Date: 12/15/2015

Design Flow Rate **1,800** gpm  
 Length<sup>1</sup> **246** ft  
 Elevation at Start<sup>1</sup> **727** ft MSL  
 Elevation at Pump **729** ft MSL  
 Elevation at End<sup>1</sup> **729** ft MSL  
 Backpressure at Discharge **46** psig (NOTE: to account for minor losses; throttle discharge valve as required)  
 Hazen-Williams Coefficient **140**  
 Suction Pipe Length **105** ft

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

Estimate Pipe Size based on velocity

Maintain Velocity at **15.0** ft/sec or less (temporary piping)  
 needed area 0.27 sf or a dia. = **7.0** 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)	1,800	1,800	1,800	
Pipe Size	(inch)	<b>8</b>	<b>10</b>	<b>10</b>	
Outer Diameter	(inch)	8.625	10.75	10.75	
DR rating	-	13.5	13.5	13.5	
Diameter (D)*	(inch)	7.27	9.06	9.06	
Length (L)	(feet)	246	246	105	
Friction Head Loss (dH)	(feet)	18.6	6.4	3.7	
Total Head loss	(feet)	<b>125.25</b>	<b>113.02</b>	<b>24.6</b>	NPSHa > NPSHr = <b>13.0</b> ft
	(psi)	54	49		

\* - includes 6% safety factor on wall thickness

Horsepower Required

Determine Theoretical Hp req'd: HP	57	51
Pump Efficiency (est)	80%	80%
Motor Efficiency (est)	85%	85%
Motor Horsepower (est) HP	<b>84</b>	<b>76</b>

Design Considerations for Hydrotest

CPL Max Elevation: **1366.49** ft MSL  
 Max Static Head: **637** 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)  
41 37 36.94 -75 45 37.24 Search  
ex: 37 25.818' N, 122 05.36' W  
Get Directions History

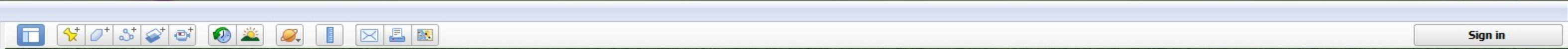
✓ 41 37 36.94 -75 45 37.24

Places

- Temporary Places
  - ASR- Hydrotest Withdraw and Fill Location.kmz
    - ASR- Hydrotest Withdraw and Fill Location
      - CPLN
        - Fishing Creek Withdraw Location
        - Fishing Creek Fill Location
        - Susquehanna River Withdraw Location
        - Susquehanna River Fill Location
        - Tunkhannock Creek Withdraw Location
        - Tunkhannock Creek Fill Location
      - CPLS
      - Unity
      - Chapman
      - Tunkhannock

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
- Weather



Imagery Date: 5/10/2014 1992 41°37'39.61" N 75°45'28.87" W elev 732 ft Eye alt 1901 ft



## **A-8 Withdrawal Calculation**

## Withdrawal Location: Tunkhannock Creek

Watershed Information	
Watershed:	Upper Susquehanna-Tunkhannock
Designation:	TSF
Trout Sensitive Stream?	No
USGS Station:	01534000
Station Drainage Area <sup>(1)</sup> (mi <sup>2</sup> ):	383.0
Station Average Daily Flow <sup>(1)</sup> (cfs):	544.4
Station Q <sub>7-10</sub> Flow Rate <sup>(1)</sup> (cfs):	17.3
Operator Withdrawal Rate <sup>(2)</sup> (cfs)	4.01
Operator 30-day Average Withdrawal Rate <sup>(7)</sup> (cfs)	0.079

### Method:

Follow Susquehanna River Basin Commission (SRBC) Policy No. 2012-01.

### Footnotes:

<sup>(1)</sup> From USGS StreamStats Data-Collection Station Rprt for Station Tunkhannock Crk @ Tunkhannock, PA

<sup>(2)</sup> Typical maximum withdrawal rate by operator is 42.9 bpm = 1,800 gpm = 2.6 MGD = 4.01 cfs.

<sup>(3)</sup> From USGS StreamStats Ungaged Report

<sup>(4)</sup> Area-weighted flow rate.

<sup>(5)</sup> From SRBC Policy No. 2012-01 Attachment E

<sup>(6)</sup> Total required flow rate is the sum of the weighted P<sub>x</sub> flow rate and the required operator withdrawal rate. The minimum passby flow must be equal to or greater than the monthly P95 flow rate.

<sup>(7)</sup> Total Withdrawal Rate averaged over 30 days = 1,530,400 gallons/30 days = 0.051 MGD = 0.079 cfs

### Step #1: Determine ARC Classification

Withdrawal Location	Latitude / Longitude	Drainage Area <sup>(3)</sup> (mi <sup>2</sup> )	ARC Classification
Tunkhannock Creek	41.626897 -75.760386	186	3

### Step #2: Determine Q<sub>7-10</sub> Flow Rate and Total Flow Requirement and Monthly Percent Exceedance

Withdrawal Location	Drainage Area <sup>(3)</sup> (mi <sup>2</sup> )	Q <sub>7-10</sub> flow <sup>(4)</sup> (cfs)	Monthly Percent Exceedance (P <sub>x</sub> )	30-day Average Withdrawal Rate as a Percentage of Q <sub>7-10</sub>	Maximum Withdrawal Rate as a percentage of Q <sub>7-10</sub>
Tunkhannock Creek	186	8.40	80	0.94%	47.7%

### Step #3: Determine the Months of the Year When the Total Required Flow Will Be Available

Month	Station Mean Flow Rate <sup>(1)</sup> (cfs)	Weighted Mean Flow Rate <sup>(4)</sup> (cfs)	Station P <sub>x</sub> Flow Rate <sup>(5)</sup> (cfs)	Weighted P <sub>x</sub> Flow Rate <sup>(4)</sup> (cfs)	Total Required Flow Rate <sup>(6)</sup> (cfs)	Is There Sufficient Flow To Allow For Withdrawal?
January	594	288.5	150	72.8	76.9	Yes
February	646	313.7	177	86.0	90.0	Yes
March	1170	568.2	384	186.5	190.5	Yes
April	1100	534.2	416.5	202.3	206.3	Yes
May	632	306.9	219	106.4	110.4	Yes
June	364	176.8	93	45.2	49.2	Yes
July	218	105.9	53	25.7	29.7	Yes
August	183	88.9	38	18.5	22.5	Yes
September	242	117.5	37	18.0	22.0	Yes
October	348	169.0	52	25.3	29.3	Yes
November	545	264.7	104	50.5	54.5	Yes
December	656	318.6	180	87.4	91.4	Yes

### CONCLUSION

There is sufficient flow in Tunkhannock Creek to allow a varying withdrawal rate of 1.78 cfs to 4.01 cfs and maintain a monthly passby flow based on a percent exceedance of 80. A rule-of-thumb (Weighted Mean Flow Rate > 2 × Total Required Flow Rate) was used to determine the months when flow rates may be too low for withdrawal. SRBC methodology was used to determine allowable withdrawal rates (See attached Withdrawal Worksheet).

Month	Station P80 Flow Rate (cfs)	Weighted P80 Flow Rate (cfs)	10% P80 (cfs)	10% P80 (gpm)	Weighted P80 Flow Rate Divided by 9 (cfs)	Weighted P80 Flow Rate Divided by 9 (gpm)	Transco Proposed Withdrawal Rate (gpm)	Required Flow Rate at USGS Gage (cfs)
January	150	72.8	7.3	3269.3	8.1	3632.6	1800	158
February	177	86.0	8.6	3857.8	9.6	4286.5	1800	185
March	384	186.5	18.6	8369.5	20.7	9299.4	1800	392
April	416.5	202.3	20.2	9077.8	22.5	10086.5	1800	425
May	219	106.4	10.6	4773.2	11.8	5303.6	1800	227
June	93	45.2	4.5	2027.0	5.0	2252.2	1800	101
July	53	25.7	2.6	1155.2	2.9	1283.5	1200	59
August	38	18.5	1.8	828.2	2.1	920.3	800	42
September	37	18.0	1.8	806.4	2.0	896.0	800	41
October	52	25.3	2.5	1133.4	2.8	1259.3	1200	58
November	104	50.5	5.1	2266.7	5.6	2518.6	1800	112
December	180	87.4	8.7	3923.2	9.7	4359.1	1800	188

Month	Station P95 Flow Rate (cfs)	Weighted P95 Flow Rate (cfs)	De Minimus Flow Rate at 5% of Weighted P95 Flow Rate (cfs)	De Minimus Flow Rate at 5% of Weighted P95 Flow Rate (gpm)
January	90	43.7	2.19	980.8
February	98	47.6	2.38	1068.0
March	200	97.1	4.86	2179.6
April	252	122.4	6.12	2746.2
May	131	63.6	3.18	1427.6
June	55	26.7	1.34	599.4
July	30	14.6	0.73	326.9
August	22	10.7	0.53	239.8
September	21	10.2	0.51	228.9
October	27	13.1	0.66	294.2
November	45.5	22.1	1.10	495.8
December	76	36.9	1.85	828.2

## **A-9 Flow Meter Specification**

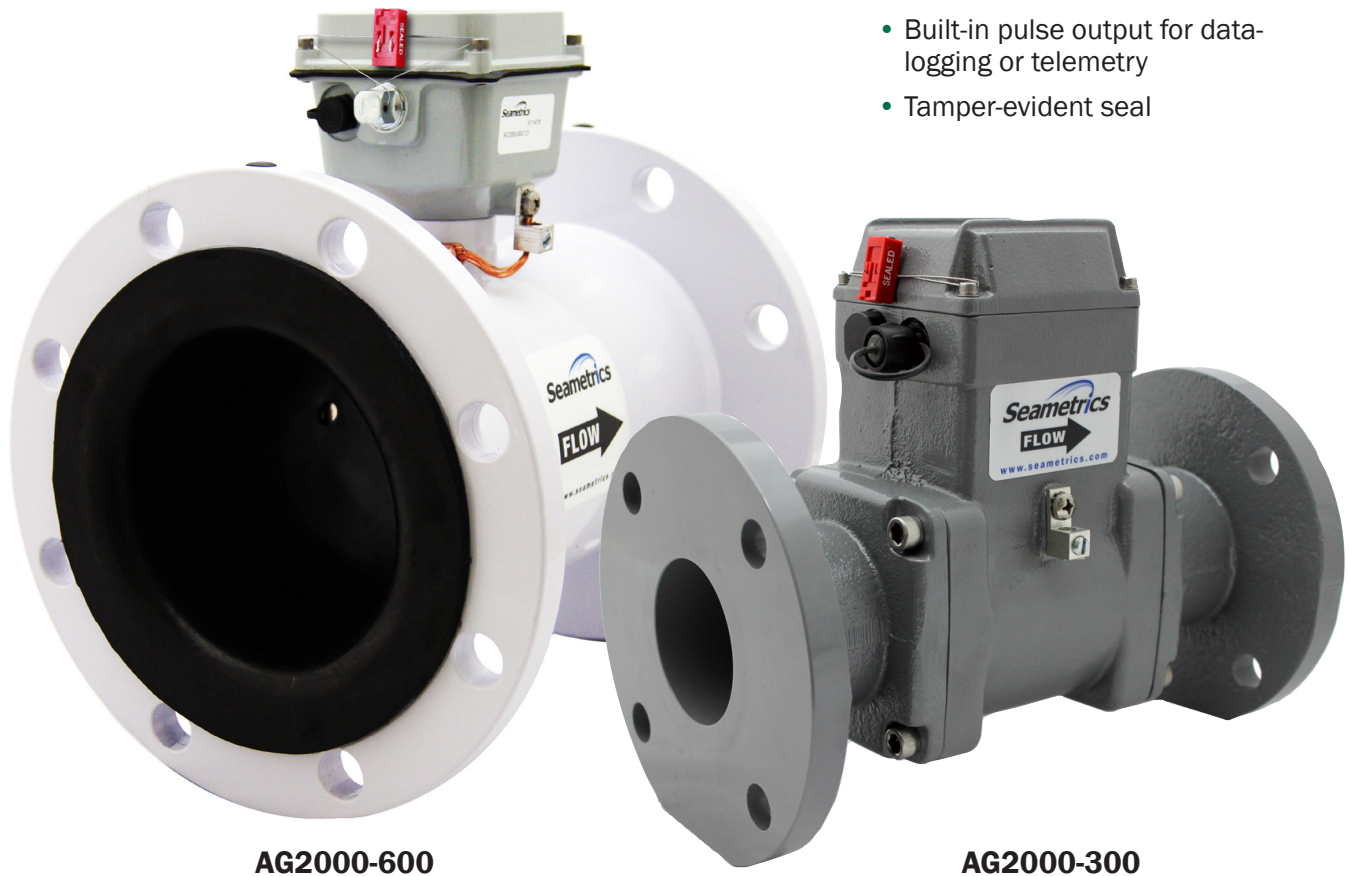


### APPLICATIONS

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

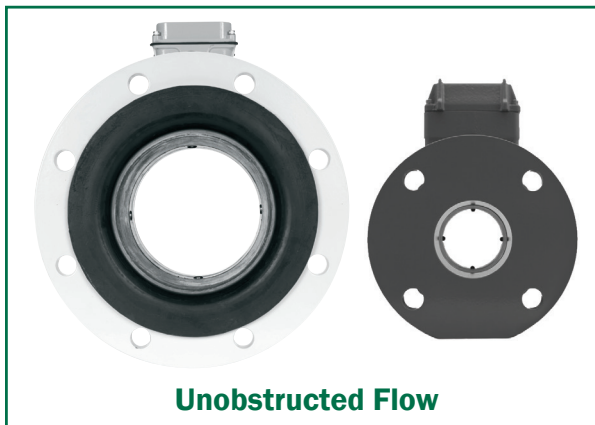
### FEATURES

- 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.

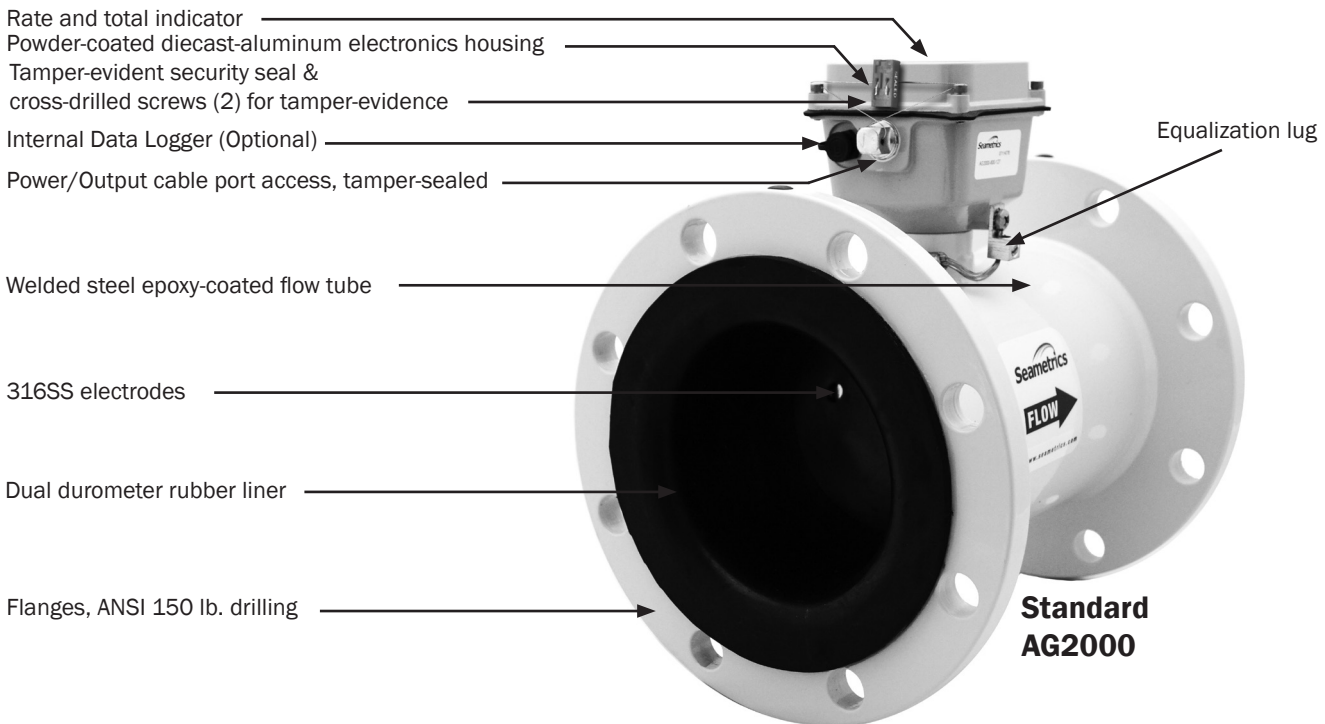
An IP68 version (-168 option) is available for burial or applications where the meter may be under water up to a depth of 3 meters for prolonged periods of time.

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.)

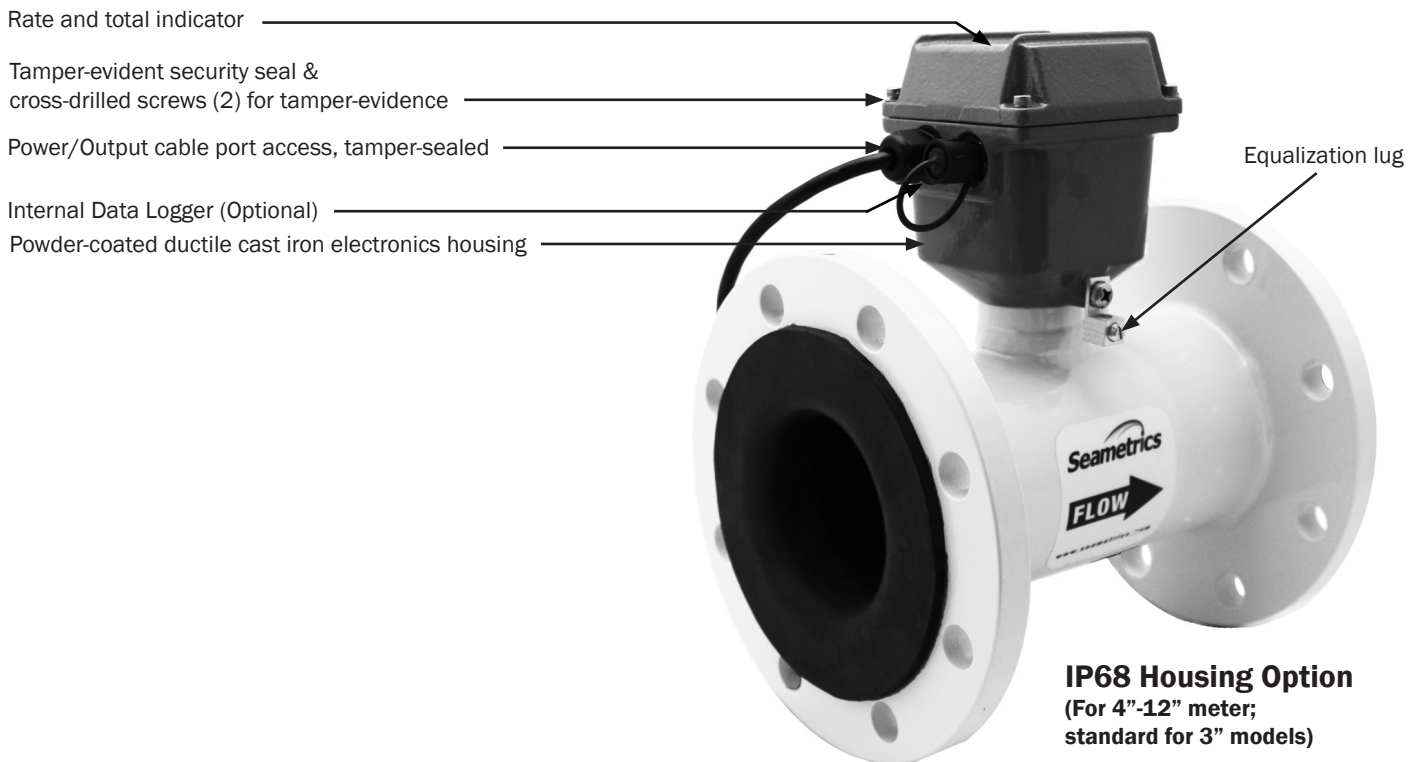
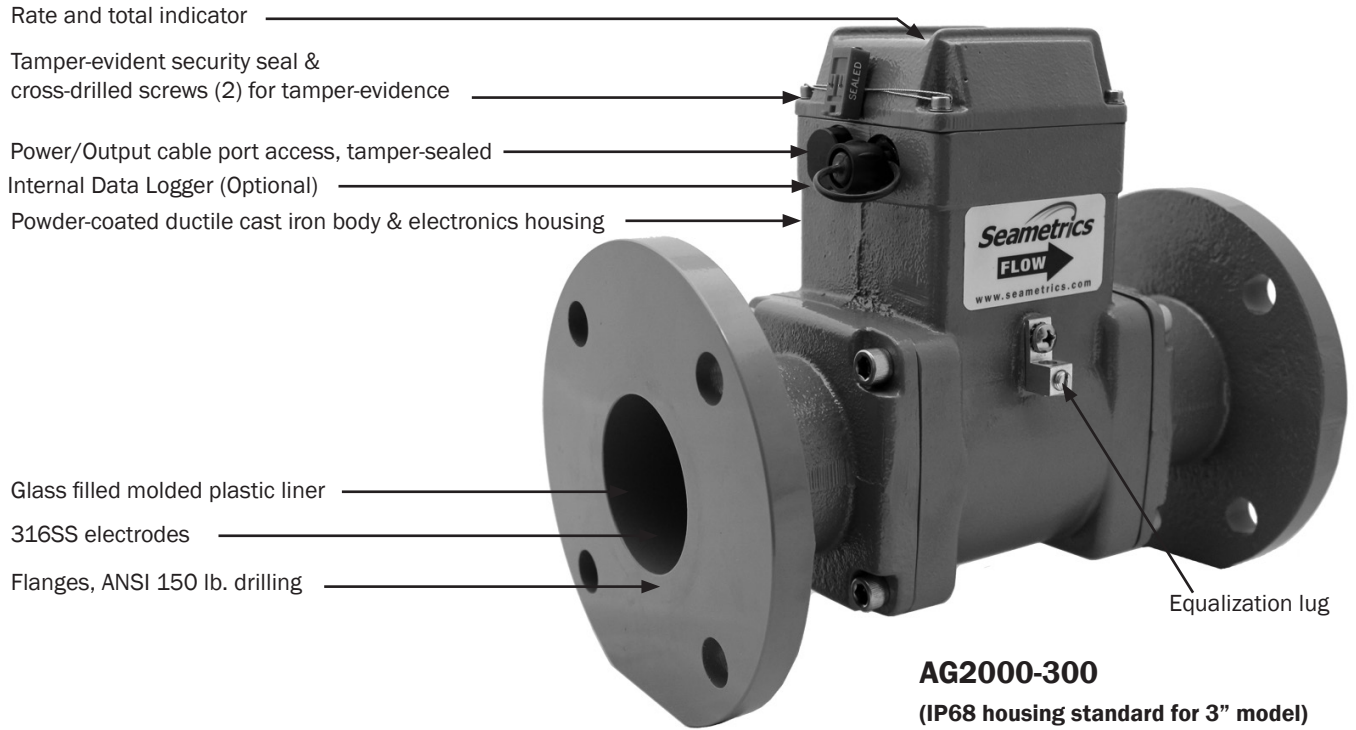
The AG2000 is secured with a seal wire to protect against unauthorized access. The seal can be broken by an authorized agent, to change units of measure, replace the battery pack, or to field-install an optional power/output cable. The cable can be factory or field-installed where external power is available 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](http://www.seametrics.com)).

## FEATURES



### FEATURES Continued





# AG2000 Irrigation Magmeter

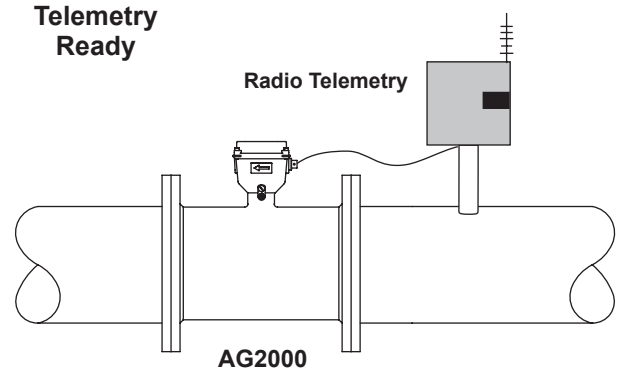
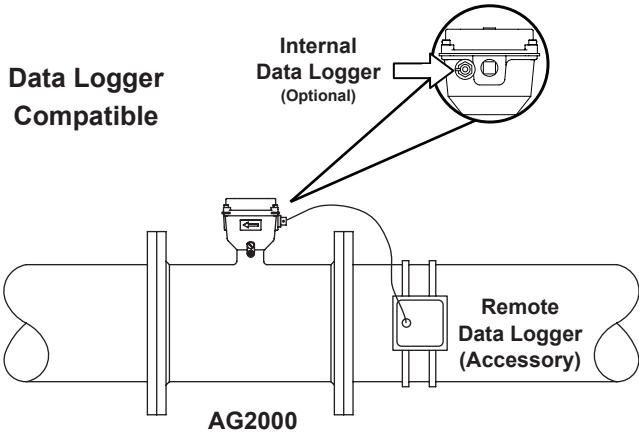
## SPECIFICATIONS\*

<b>Pipe Sizes</b>	3", 4" 6" 8", 10", 12"						
<b>Fittings</b>	ANSI 150 lb. drilling						
<b>Pressure</b>	150 psi (10.3 bar) working pressure						
<b>Temperature</b>	<b>Operating</b>	10° to 130° F (-12° to 54° C)					
	<b>Non-Operating</b>	-40° to 158° F (-40° to 70° C)					
<b>Accuracy</b>	+/- 1% of reading for flow between 10% to 100% of max flow						
	+/- 2% of reading for flow from cutoff to 10% of max flow						
<b>Materials</b>	<b>Body (3" Only)</b>	Ductile cast iron, powder coated w/NSF61 listed epoxy powder					
	<b>Body (4"-12")</b>	Welded steel, epoxy-coated					
	<b>Liner (3" Only)</b>	Noryl®					
	<b>Liner (4"-12")</b>	Santoprene/Polypropylene					
	<b>Electronics Housing</b>	Diecast aluminum, powder-coated (non-IP68)			Ductile Cast Iron (IP68)		
	<b>Electrodes</b>	316 stainless steel					
	<b>O-ring (3" Only)</b>	EPDM					
<b>Display</b>	<b>Rate</b>					<b>Total</b>	
	<b>Digits</b>	5				8	
	<b>Units</b>	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	
<b>Power</b>	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)						
<b>Pulse Output (with optional cable)</b>	<b>Signal</b>	Current sinking pulse, opto-isolated, 30 Vdc at 10 mA max					
	<b>Pulse Rates</b>	High Frequency; 10 units/pulse; 100 units/pulse; 1000 units/pulse					
	<b>High Frequency (pulse/gal)</b>	<b>3"</b>	<b>4"</b>	<b>6"</b>	<b>8"</b>	<b>10"</b>	<b>12"</b>
		25.228	16.362	6.307	3.344	2.15	1.530
<b>Conductivity</b>	>20 microSiemens/cm						
<b>Empty Pipe Detection</b>	Hardware/software, conductivity-based						
<b>Environmental</b>	NEMA 4X Standard (IP68 Option)						

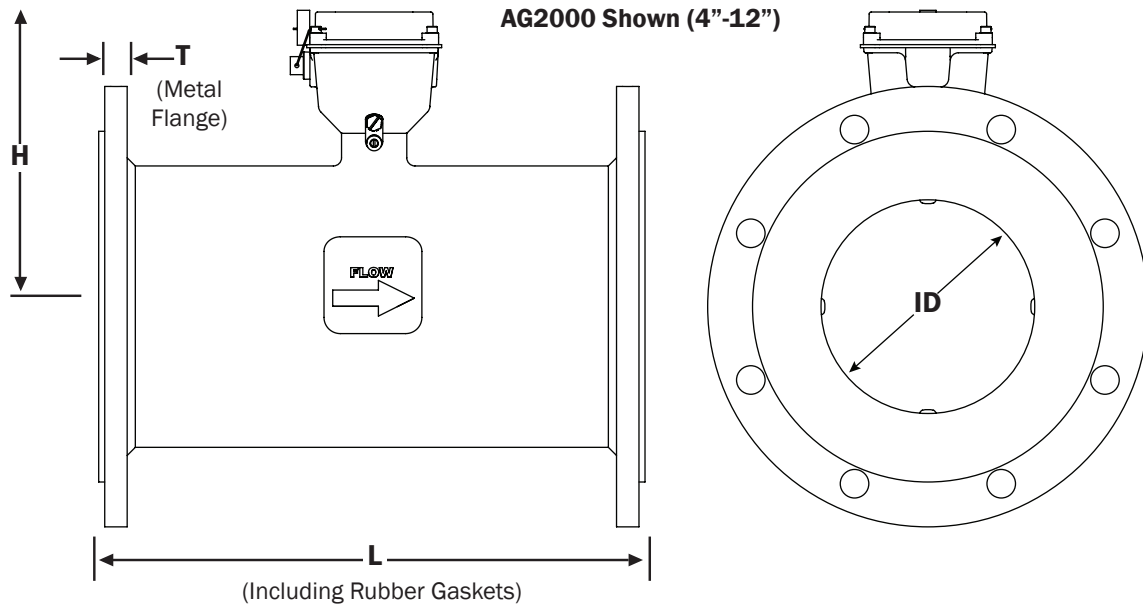
\*Specifications subject to change. Please consult our website for the most current data ([www.seametrics.com](http://www.seametrics.com)).

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

## OUTPUT CAPABILITIES



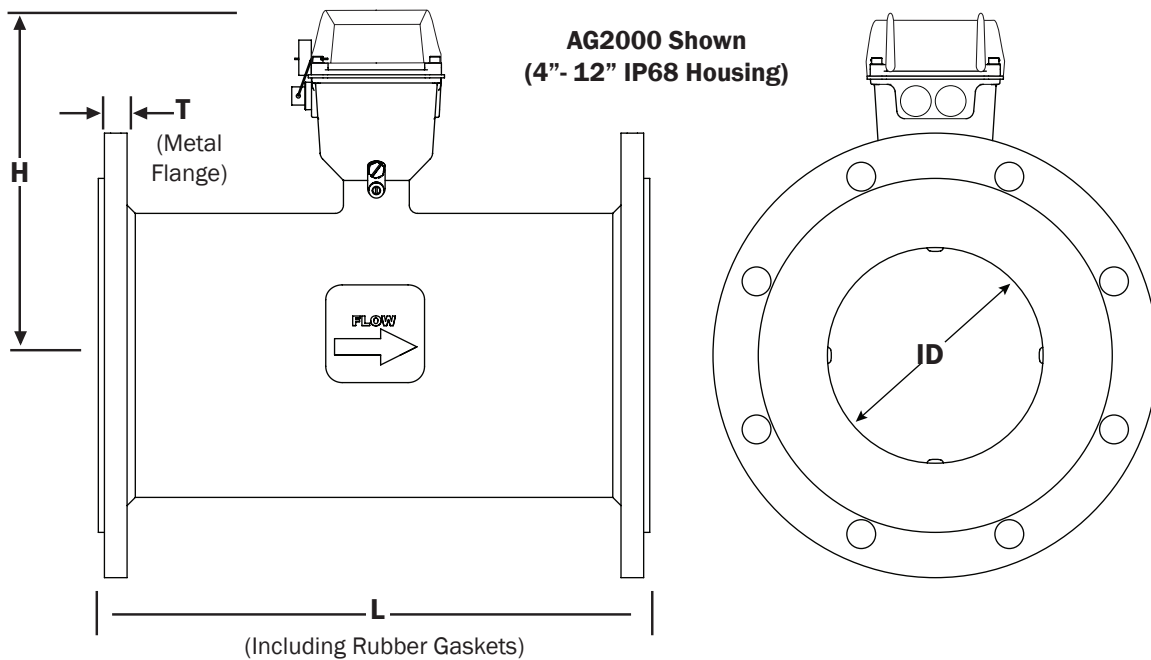
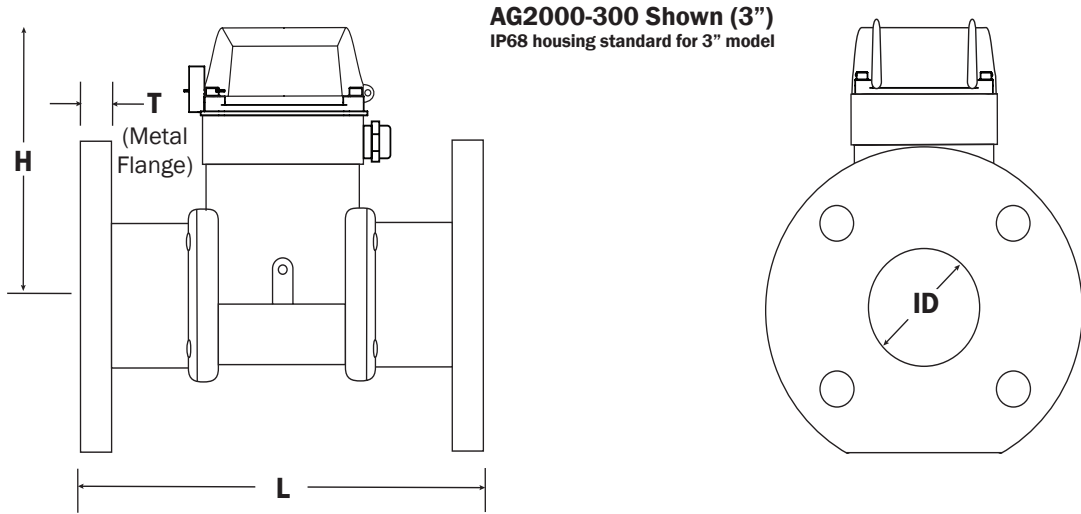
## DIMENSIONS



### 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
<b>Flanges</b>	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

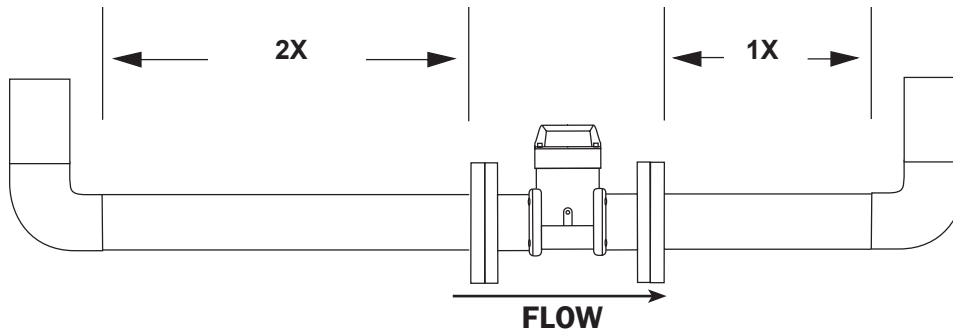
**Flanges** Standard ANSI 150 lb. drilling

Cable (AG2000) 1 lb.

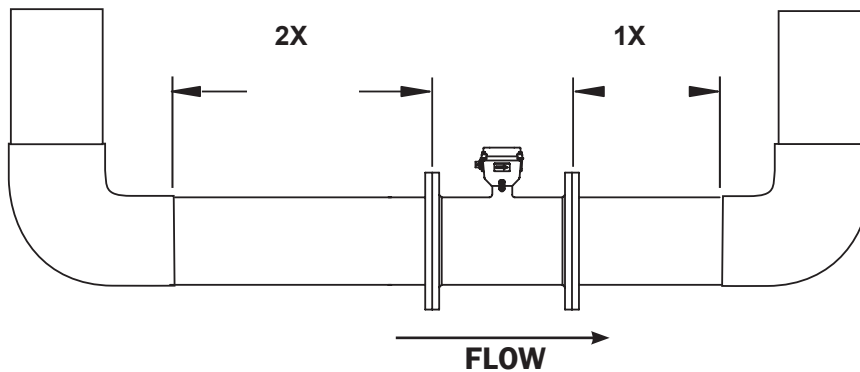
## STRAIGHT PIPE RECOMMENDATIONS

(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" = <b>-300*</b> 4" = <b>-400</b> 6" = <b>-600</b> 8" = <b>-800</b>  10" = <b>-1000</b> 12" = <b>-1200</b>	Factory Installed Power/ Output Cable: 6m (20 ft) = <b>-11/6</b> 15m (50 ft) = <b>-11/15</b> 30m (100 ft) = <b>-11/30</b>  Factory Installed IP68 Power/Output Cable: 6m (20 ft) = <b>-11/6S</b> 15m (50 ft) = <b>-11/15S</b> 30m (100 ft) = <b>-11/30S</b>  Internal Data Logger = <b>-127</b> Serial Output = <b>-131</b> IP68 Submersible = <b>-168</b> Extend. Battery Life <sup>1</sup> = <b>-178</b>	10 Units*/Pulse = <b>-PxX</b> 100 Units*/Pulse = <b>-PxH</b> 1000 Units*/Pulse = <b>-PxK</b> High Frequency** = <b>-HF</b>	<table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Gal/Min = <b>GPM</b></td> <td style="width: 30%;">Gal = <b>G</b></td> <td style="width: 40%;">Gal x 1000 = <b>GT</b></td> </tr> <tr> <td>Liter/Min = <b>LPM</b></td> <td>Liter = <b>L</b></td> <td>Liter x 1000 = <b>LT</b></td> </tr> <tr> <td>Cu Ft/Min = <b>CFM</b></td> <td>Cu Meter/Hr = <b>CMH</b></td> <td>Mega Liters = <b>ML</b></td> </tr> <tr> <td>Gal/Sec = <b>GPS</b></td> <td>Gal/Sec = <b>GPS</b></td> <td>Cubic Meters = <b>CM</b></td> </tr> <tr> <td>Liters/Sec = <b>LPS</b></td> <td>Cu Ft/Sec = <b>CFS</b></td> <td>Cu Met x 1000 = <b>CMT</b></td> </tr> <tr> <td>Miner's In** = <b>MI</b></td> <td>Cu Met/Min = <b>CMM</b></td> <td>Acre Feet = <b>AF</b></td> </tr> <tr> <td></td> <td></td> <td>Cubic Feet = <b>CF</b></td> </tr> <tr> <td></td> <td></td> <td>Cu Feet x 1000 = <b>CFT</b></td> </tr> <tr> <td></td> <td></td> <td>Million Gal = <b>MG</b></td> </tr> <tr> <td></td> <td></td> <td>Miner's Inch Day = <b>MID</b></td> </tr> <tr> <td></td> <td></td> <td>Acre Inch = <b>AI</b></td> </tr> </table>	Gal/Min = <b>GPM</b>	Gal = <b>G</b>	Gal x 1000 = <b>GT</b>	Liter/Min = <b>LPM</b>	Liter = <b>L</b>	Liter x 1000 = <b>LT</b>	Cu Ft/Min = <b>CFM</b>	Cu Meter/Hr = <b>CMH</b>	Mega Liters = <b>ML</b>	Gal/Sec = <b>GPS</b>	Gal/Sec = <b>GPS</b>	Cubic Meters = <b>CM</b>	Liters/Sec = <b>LPS</b>	Cu Ft/Sec = <b>CFS</b>	Cu Met x 1000 = <b>CMT</b>	Miner's In** = <b>MI</b>	Cu Met/Min = <b>CMM</b>	Acre Feet = <b>AF</b>			Cubic Feet = <b>CF</b>			Cu Feet x 1000 = <b>CFT</b>			Million Gal = <b>MG</b>			Miner's Inch Day = <b>MID</b>			Acre Inch = <b>AI</b>
Gal/Min = <b>GPM</b>	Gal = <b>G</b>	Gal x 1000 = <b>GT</b>																																			
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		Million Gal = <b>MG</b>																																			
		Miner's Inch Day = <b>MID</b>																																			
		Acre Inch = <b>AI</b>																																			
	*-300 available in IP68 only	<sup>1</sup> 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**

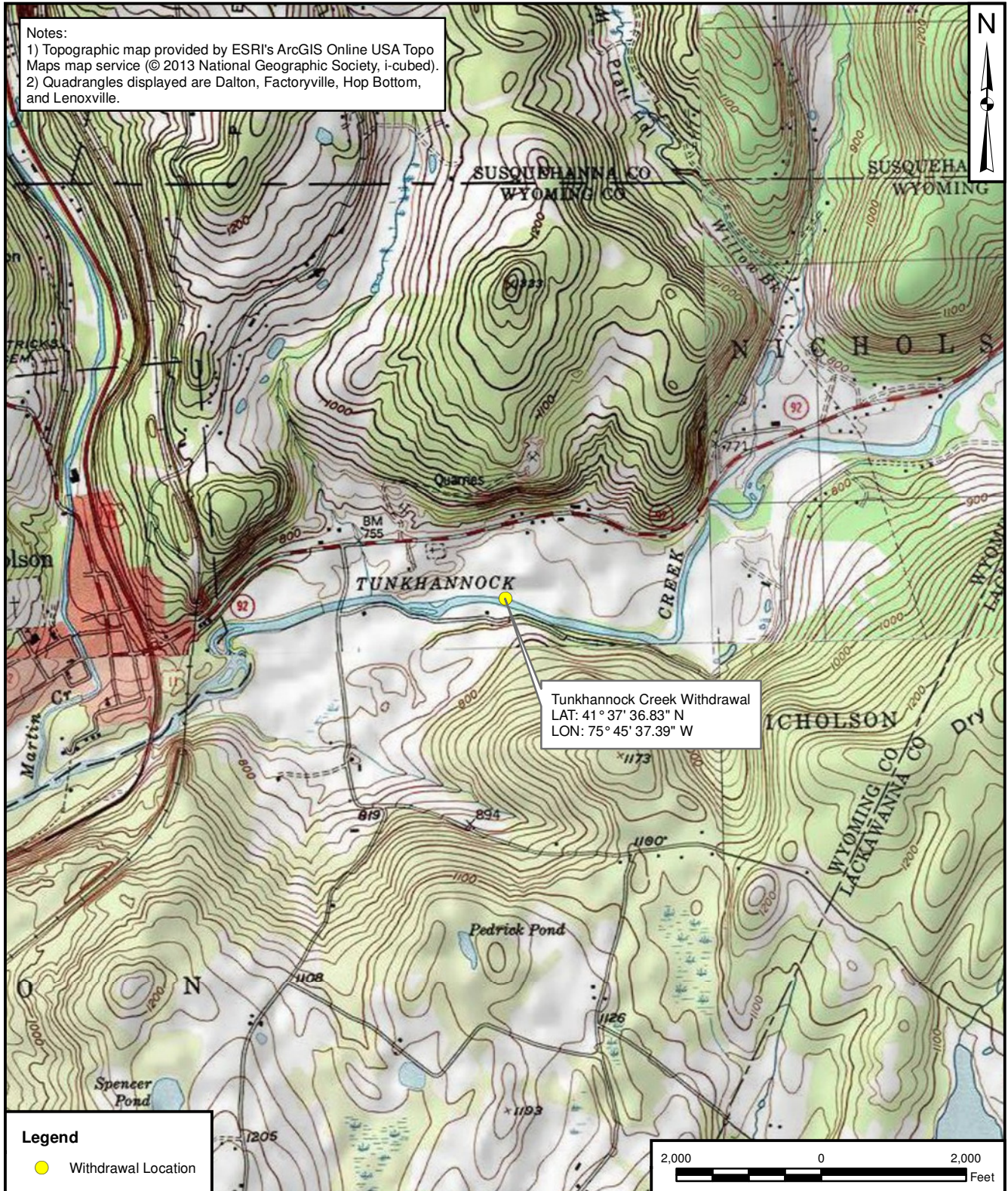
\*Consult customer service to determine the appropriate indicator based on the distance it will be installed from the meter.

## CONTACT YOUR SUPPLIER

## **A-10 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 Dalton, Factoryville, Hop Bottom, and Lenoxville.



Legend

- Withdrawal Location



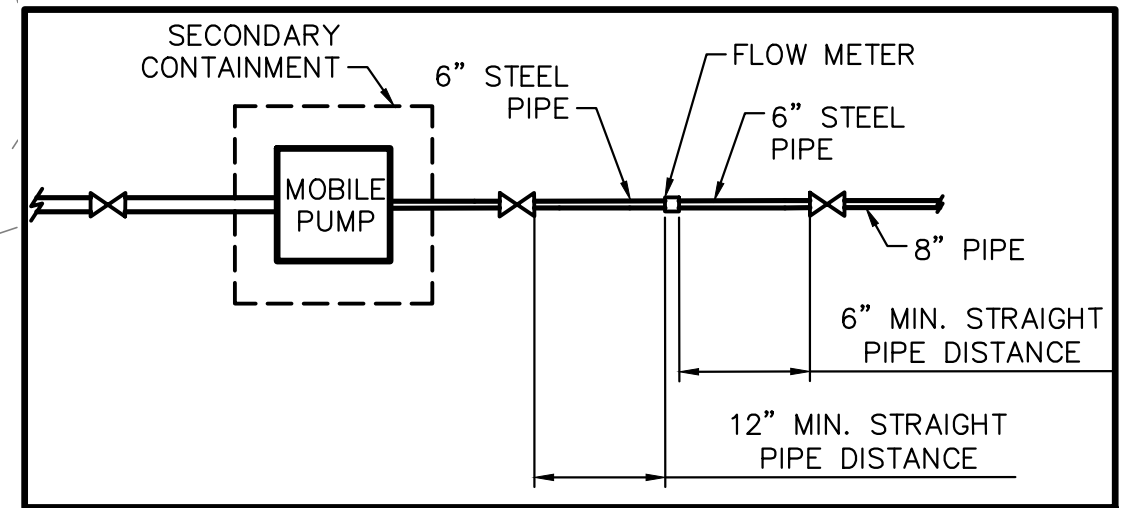
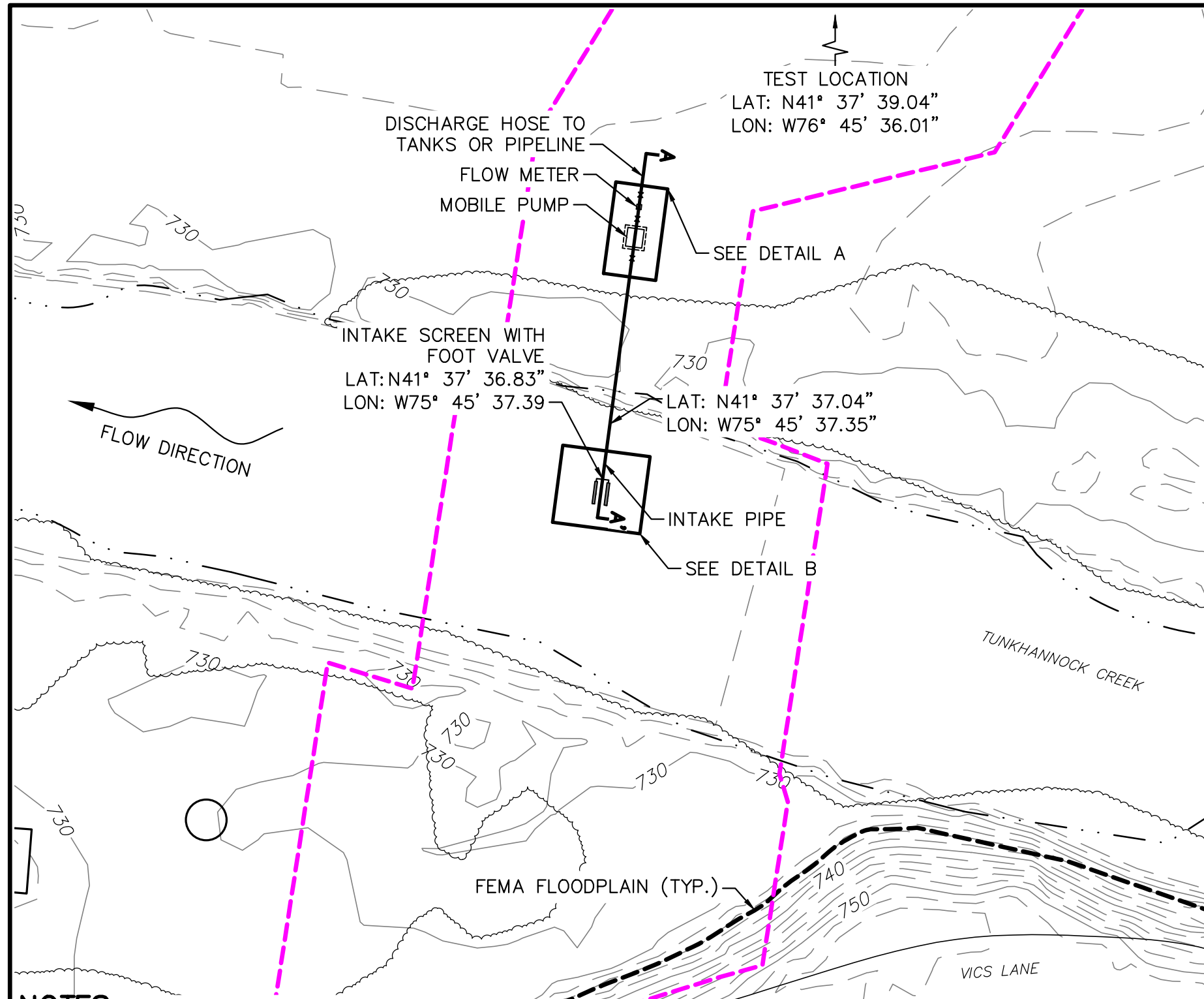
USGS LOCATION MAP  
 TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC  
 TUNKHANNOCK CREEK WITHDRAWAL  
 NICHOLSON TOWNSHIP  
 WYOMING COUNTY, PA

DRAWN BY: J. HERNING 12/11/15  
 CHECKED BY: L. HERRING 12/16/15  
 APPROVED BY:

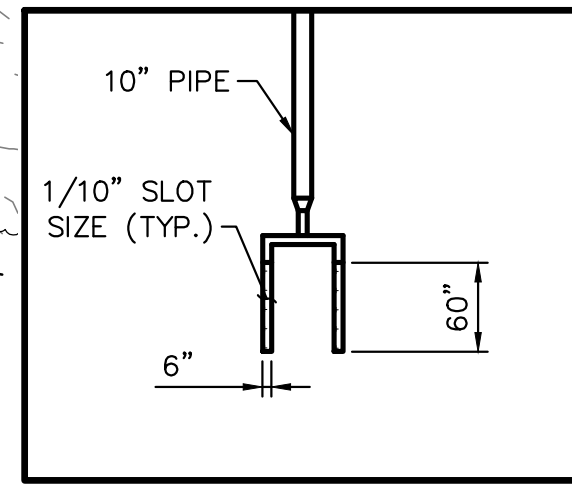
CONTRACT NUMBER: 212C-PB-00282

FIGURE NUMBER	1
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REV	0
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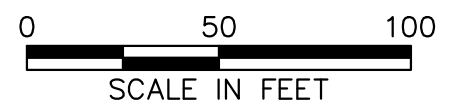
**PUMP & FLOW METER  
DETAIL A**  
NOT TO SCALE



**SHALLOW WATER INTAKE  
DETAIL B**  
NOT TO SCALE

**LEGEND**

- LIMIT OF DISTURBANCE
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING ROAD
- EXISTING TREE LINE
- EXISTING BUILDING
- STREAM TOP OF BANK
- VALVE
- FEMA FLOODPLAIN



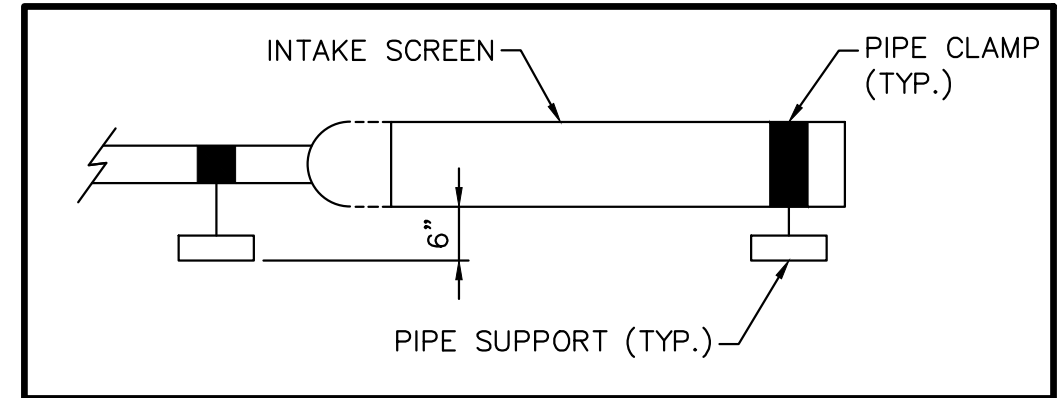
- NOTES:**
- SURVEY DATUM:  
HORIZONTAL: PA STATE PLANE NAD83  
VERTICAL: NAVD88
  - PLACEMENT OF HYDROSTATIC WATER WITHDRAWAL EQUIPMENT WILL HAVE NO EARTH DISTURBANCE AND IS TEMPORARY IN NATURE.

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

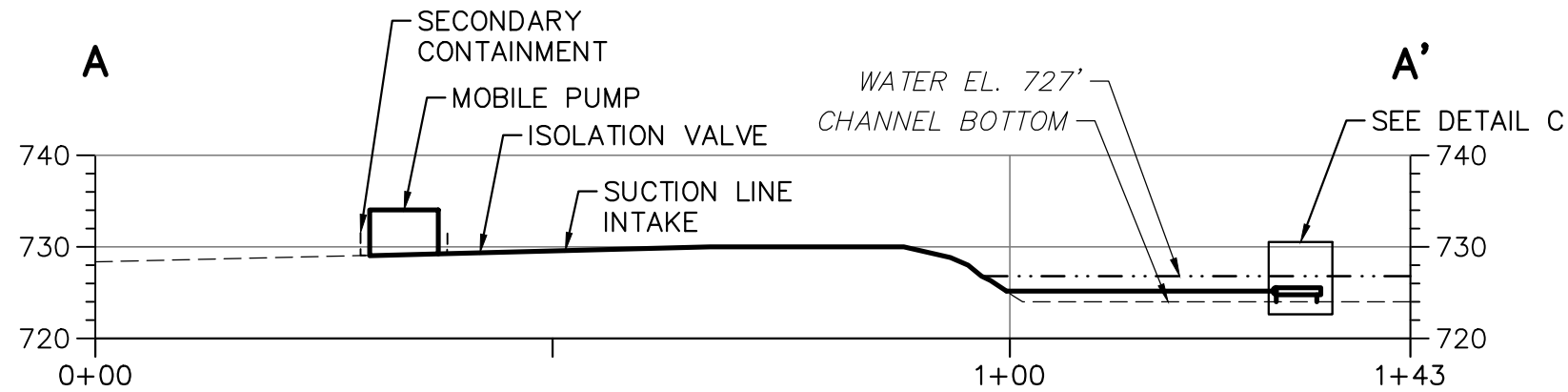
TRANSCONTINENTAL GAS PIPE LINE COMPANY LLC  
TUNKHANNOCK CREEK, NICHOLSON TWP, WYOMING CO.

**SITE PLAN**

DATE:	08/12/16
PROJECT NO.:	212C-PB-00282
DESIGNED BY:	RD
DRAWN BY:	NN
CHECKED BY:	CR
SHEET:	1 OF 2
COPYRIGHT TETRA TECH INC.	
<b>FIGURE 1</b>	



**INTAKE PROFILE**  
**DETAIL C**  
 NOT TO SCALE



**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 PIPE LINE COMPANY LLC  
 TUNKHANNOCK CREEK, NICHOLSON TWP, WYOMING CO.

**CROSS-SECTION OF INTAKE SYSTEM**

DATE:	12/1/15
PROJECT NO.:	212C-PB-00282
DESIGNED BY:	RD
DRAWN BY:	NN
CHECKED BY:	CR
SHEET:	2 OF 2

COPYRIGHT TETRA TECH INC.

**FIGURE 2**

## **A-11 Field Photographs**



09:06 09-12-2014

Lat: 41° 37' 36.6" N Lon: 75° 45' 37.55" W

Tunkhannock Creek



09:08 09-12-2014

Lat: 41° 37' 36.13" N Lon: 75° 45' 37.44" W

Tunkhannock Creek