REV 1 – 7/22/2016

TETRA TECH

SURFACE WATER METERING PLAN FOR FISHING CREEK

ATLANTIC SUNRISE PROJECT

Sugar Loaf Township, Columbia County, Pennsylvania

Prepared For:

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC
HOUSTON, TEXAS

Prepared By:

TETRA TECH, INC.
PITTSBURGH, PENNSYLVANIA

May 2016

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SRBC Surface Water Withdrawal Application Metering Plan

A. Intake Design

The surface water withdrawal location on Fishing Creek is located along the proposed gas pipeline route where the water will be required for hydrostatic testing. Water will be transferred from Fishing 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 Pipeline, 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 Fishing Creek. Each 5-foot long screen will be manifolded together into a single intake structure. The intake structure will include a foot valve which will maintain a flooded suction line and prevent backflow. The intake screen will be connected to a 10-inch diameter flexible hose or HDPE suction pipe. The intake screen will be anchored 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 between 1 to 2 feet. The slot openings were sized to avoid potential aquatic impacts associated with impingement and entrainment. Calculations for the intake's through-screen approach velocity (provided in Attachment A-1) show the screen entrance velocity to be less than 0.5 feet per second (ft/s). Manufacturer information for the intake screens is included in Attachment A-2.

Transco proposes to use one 6'' by 6'' Pioneer Prime Series PP66C14 vacuum assisted, end suction centrifugal pump. This pump is mechanically driven and operates at a maximum of 2,200 revolutions per minute. Pump specification sheets and head curves are included in Attachments A-3 and A-4, respectively. Transco will limit the instantaneous pumping rate by using a Cla Val Combination Rate of Flow Controller & Solenoid Shut-off Valve (Model 43-01) on the discharge end of the pump. Specifications are included in Attachment A-5. This valve will be locked to prevent unintentional changes to the flow rate. Transco's staff will be prepared to comply with monthly passby rates and withdrawal rates. To protect aquatic resources and downstream users, Transco will cease withdrawals from Fishing Creek when the creek 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 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 up to 1,800 gpm flow rate (see Attachment A-6 for basis). Water used for the pipeline hydrostatic testing will be discharged at a Pennsylvania Department of Environmental

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

A wetland study was completed for the area on May 22, 2014. No wetlands were identified in the vicinity of the proposed intake. The intake pump will be located within the Federal Emergency Management Agency (FEMA) floodplain, 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, flow rates at the proposed withdrawal point will be estimated by proportioning based on the drainage area ration method from a selected USGS gaging station near Fishing Creek. At the proposed withdrawal location, Fishing Creek has a drainage area of 53.2 square miles (mi^2). Based on that drainage area, the Aquatic Resource Class (ARC) of Fishing 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.

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

B. Metering

To meter the volume of water withdrawn at the surface water withdrawal location, a 6-inch Seametrics AG2000 Irrigation Magmeter will be used (see manufacturer information in A-7). This spool-type electromagnetic flow meter and totalizer has no moving parts and minimal straight pipe requirements both above (i.e., 12 inches, minimum) and below (i.e., 6 inches, minimum) the meter. This allows unobstructed flow and makes it an ideal choice for use in surface water withdrawal applications where debris may cause damage to the equipment. This model is capable of displaying up to 5 digits for flow rate and 8 digits for the totalizer. The minimum flow rate for this model of flow meter is 32 gpm; the maximum rate is 2,400 gpm. The proposed withdrawal rate of 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 Fishing Creek and at the end of each day to ensure that the approved month-specific maximum daily withdrawal volumes (range from 0.432 MGD to 2.592 MGD) are not exceeded. Transco will maintain daily records of the project's withdrawal and consumptive water use and shall report the data to the SRBC on a quarterly and annual basis or as prescribed. Transco will also ensure that the meter readout will be accessible for SRBC staff at all times without locks, keys or other special access requirements.

C. Plans, Details, and Maps

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

A-1 Intake Screen Calculations

CLIENT: Transcontinental Gas Pipe Line Company, LLC				JOB NUMBER: 212C-PB-00282	
SUBJECT: FISHING CREEK SCREENED INTAKE EVALUATION - REV. 1					
BASED ON: Bilfinger Water Technologies, Inc.				DRAWING NUMBER:	
BY:	LMH	CHECKED BY:	CAR	REVISED BY:	LMH
DATE:	10/27/2015	DATE:	10/28/2015	DATE:	7/22/2016
APPROVED BY:	RWD				
DATE:	7/25/2016				

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 for a flow rate of 1,800 gallons per minute. Creek depth is less than 2 feet.

APPROACH:

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

CALCULATIONS:

(1) Data was obtained from Bilfinger Water Technologies, Inc. for the well screen (see attached).

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	=	3.36	=	Radius of perforated intake pipe, inches
b	=	5	=	Length of perforated intake pipe, feet
n	=	unknown	=	Number of screens
A_s	=	1,267	=	Area of screen, square inches
A_o	=	792	=	Open area of screen, square inches
P	=	62.5%	=	Open area of perforated intake pipe ($P = A_o/A_s$)

(2) Use the following equation from the Handbook of Groundwater Development, Roscoe Moss Company, to calculate first the minimum number of Bilfinger Water Technologies, Inc. intake screens necessary for a withdrawal of 2,000 gallons per minute.

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

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

$$n = \frac{1{,}800}{235 \times 3.36 \times 5 \times 0.625 \times 0.5}$$

$$n = 1.46$$

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

The minimum number of Bilfinger Water Technologies, Inc. 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, Inc. 6-inch diameter well screens are used.

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

$$V = \frac{1{,}800 / 2}{235 \times 3.36 \times 5 \times 0.625}$$

$$V = 0.365 \quad \text{feet per second}$$

CLIENT: Transcontinental Gas Pipe Line Company, LLC				JOB NUMBER: 212C-PB-00282	
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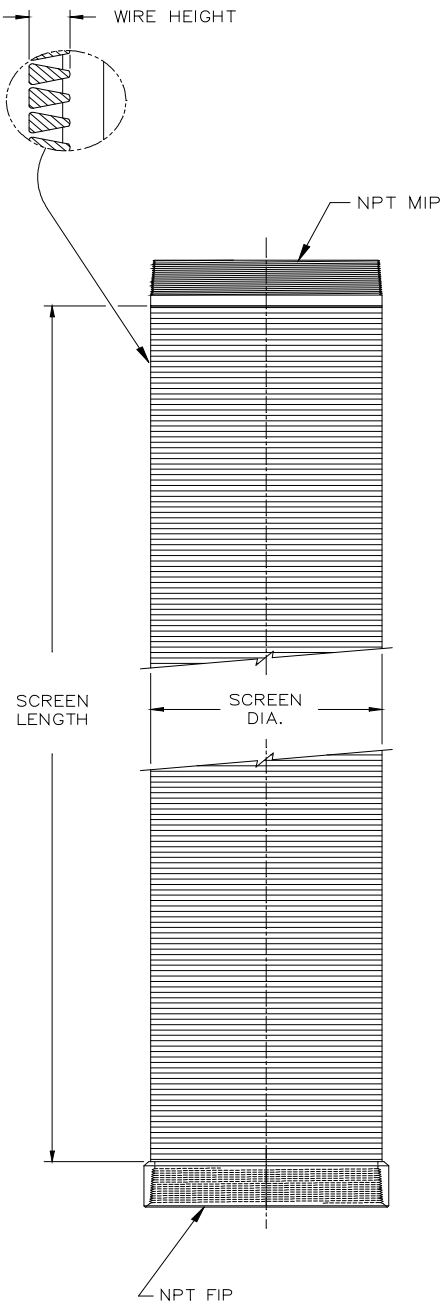
BASED ON: Bilfinger Water Technologies, Inc.				DRAWING NUMBER:	
BY:	LMH	CHECKED BY:	CAR	REVISED BY: LMH	APPROVED BY: RWD
DATE:	10/27/2015	DATE:	10/28/2015	DATE: 7/22/2016	DATE: 7/25/2016

CONCLUSION:

Two Bilfinger Water Technologies, Inc. 6-inch diameter well screens provide an intake flow capacity of 1,800 gallons per minute with a maximum screen entrance velocity of 0.365 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		
CUSTOMER	**Tetra-tech**	
REFERENCE		
DIAMETER	6 in	PS
MATERIAL	304 Stainless	
COLLAPSE	45	PSI
SLOT SIZE	0.100	IN
OPEN AREA	62.50%	
ROD AREA	0.864	SQ IN
HANGING WT[1]	11,000	LB
[1] *MAXIMUM RECOMMENDED HANGING WEIGHT FOR THE TOP SCREEN JOINT*		
LENGTH (ft)	5	FULL
NO. OF PIECES	1	Joints
TOP FITTING	1.5 in	F/NPT
BTM FITTING	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 ridgid centralizers!

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

10/14/2015

BILFINGER WATER TECHNOLOGIES

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 Pump Specification

PIONEER PUMP
PERFORMANCE THROUGH INNOVATION™

Pioneer Prime

PP66C14L71

Typical Pump Configuration

Performance

Pioneer Prime series - vacuum assisted, end suction centrifugal pump

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

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

Applications

Oil & Gas	Construction
Industrial	Mining
Petrochemical	Rental
Agriculture	Irrigation

PosiValve™ Patent #6,783,730

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

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

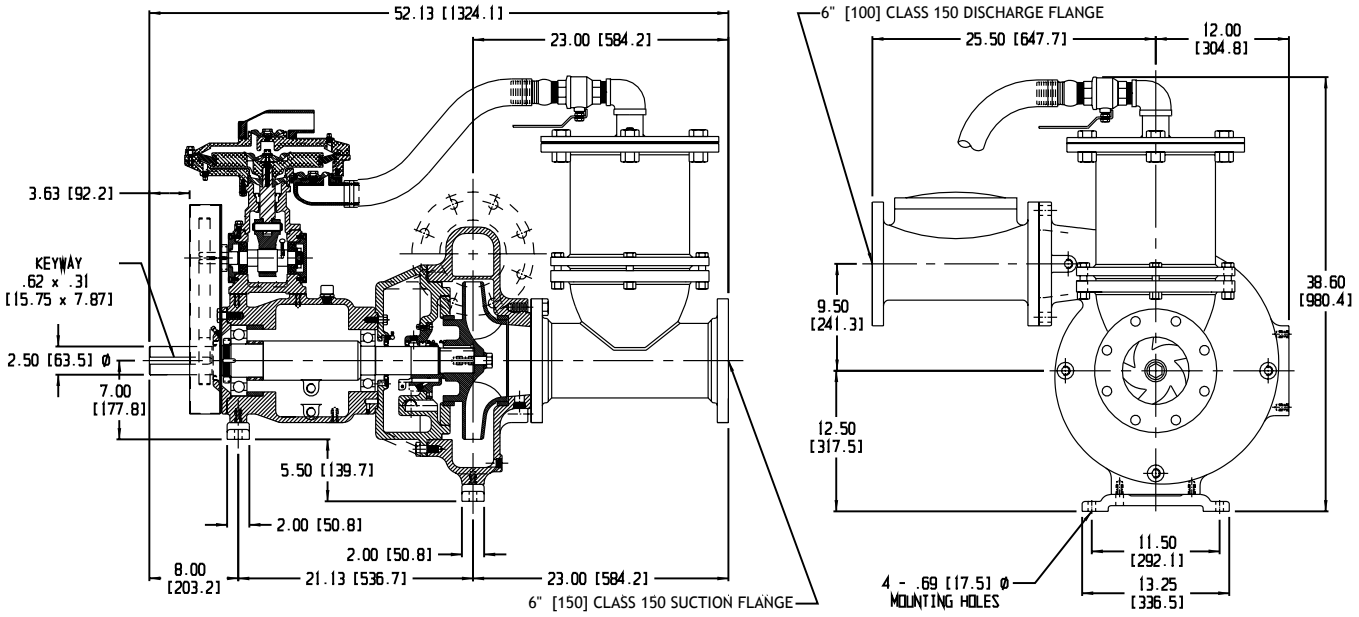
Construction Materials

	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

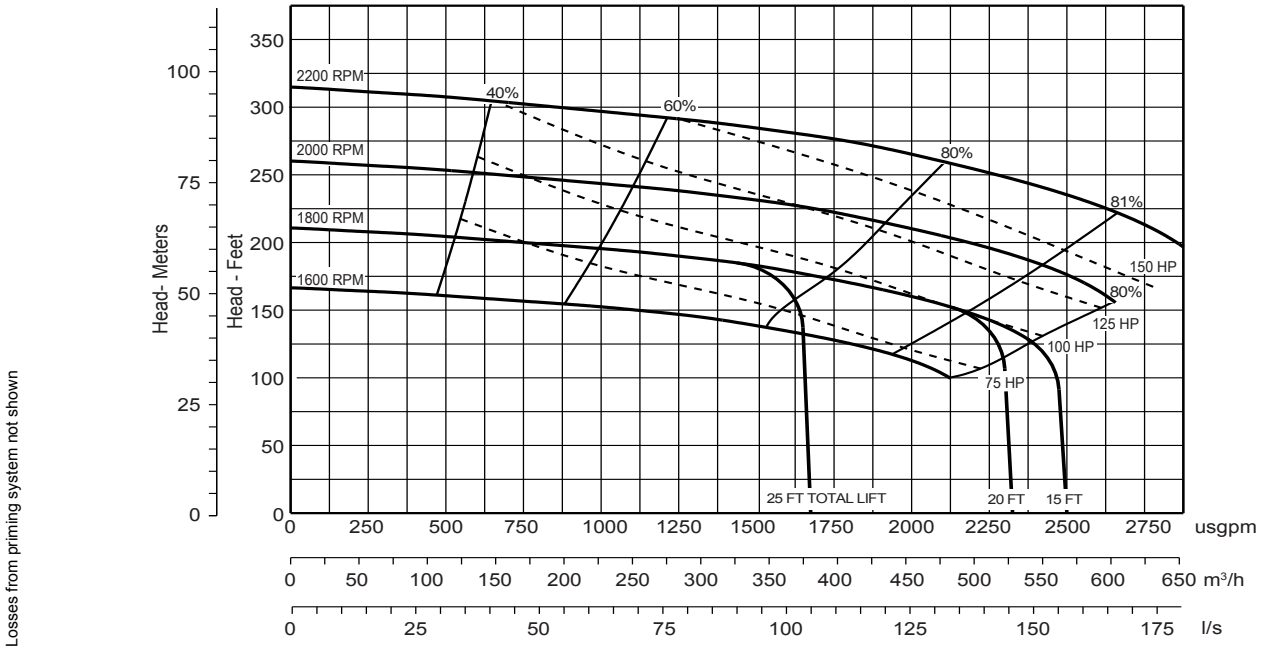
Typical Pump Configuration

PP66C14



Performance Curve

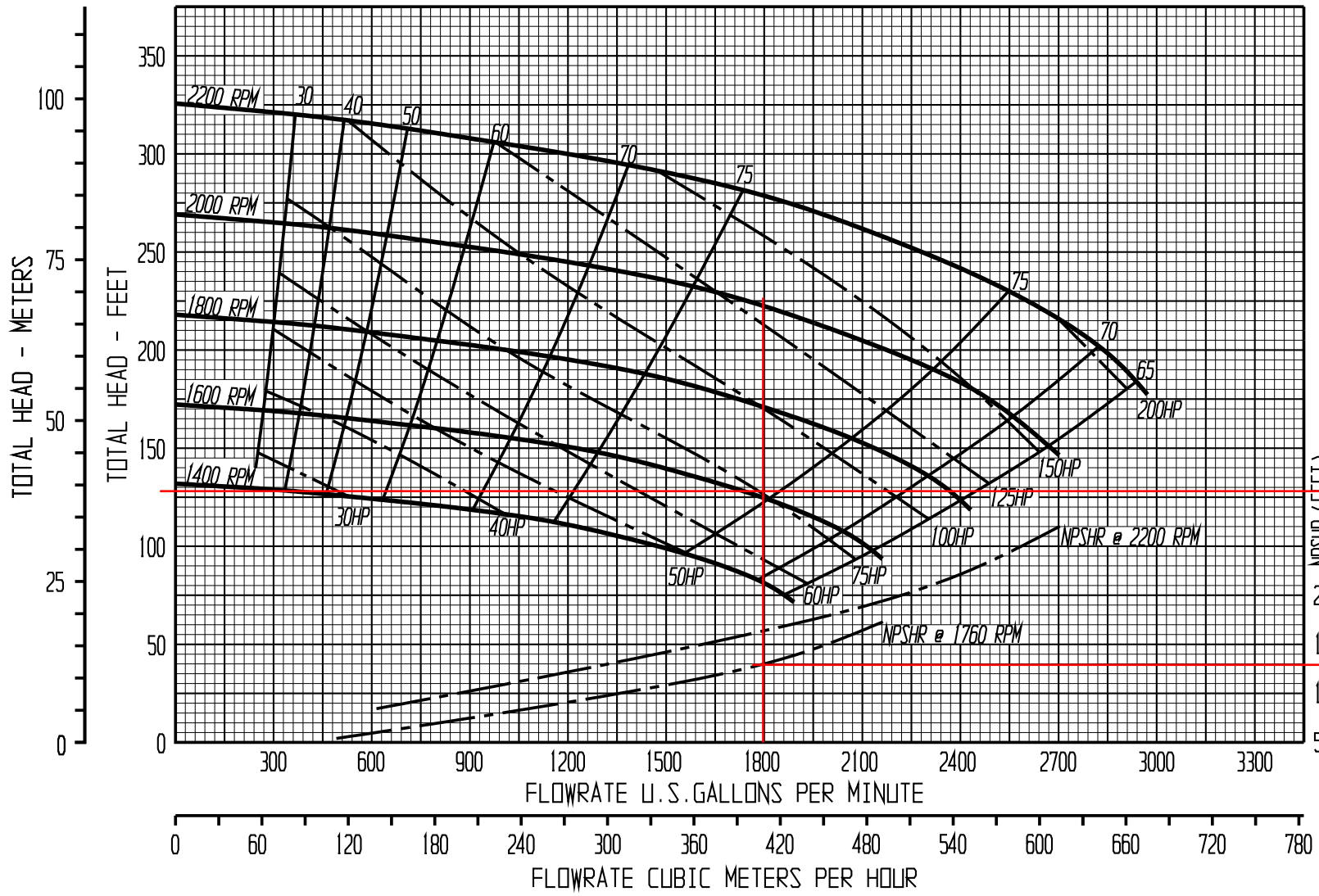
Model: PP66C14	Impeller Dia: 14”	Speed: Variable	Solids Size: 1.0”	Curve #A2578HQ



Note: Losses from priming system not shown

A-4 Pump Head Curves and Pump Selection Justification

Direct Fill to Pipeline



127 ft TDH

<13.0 ft NPSHr

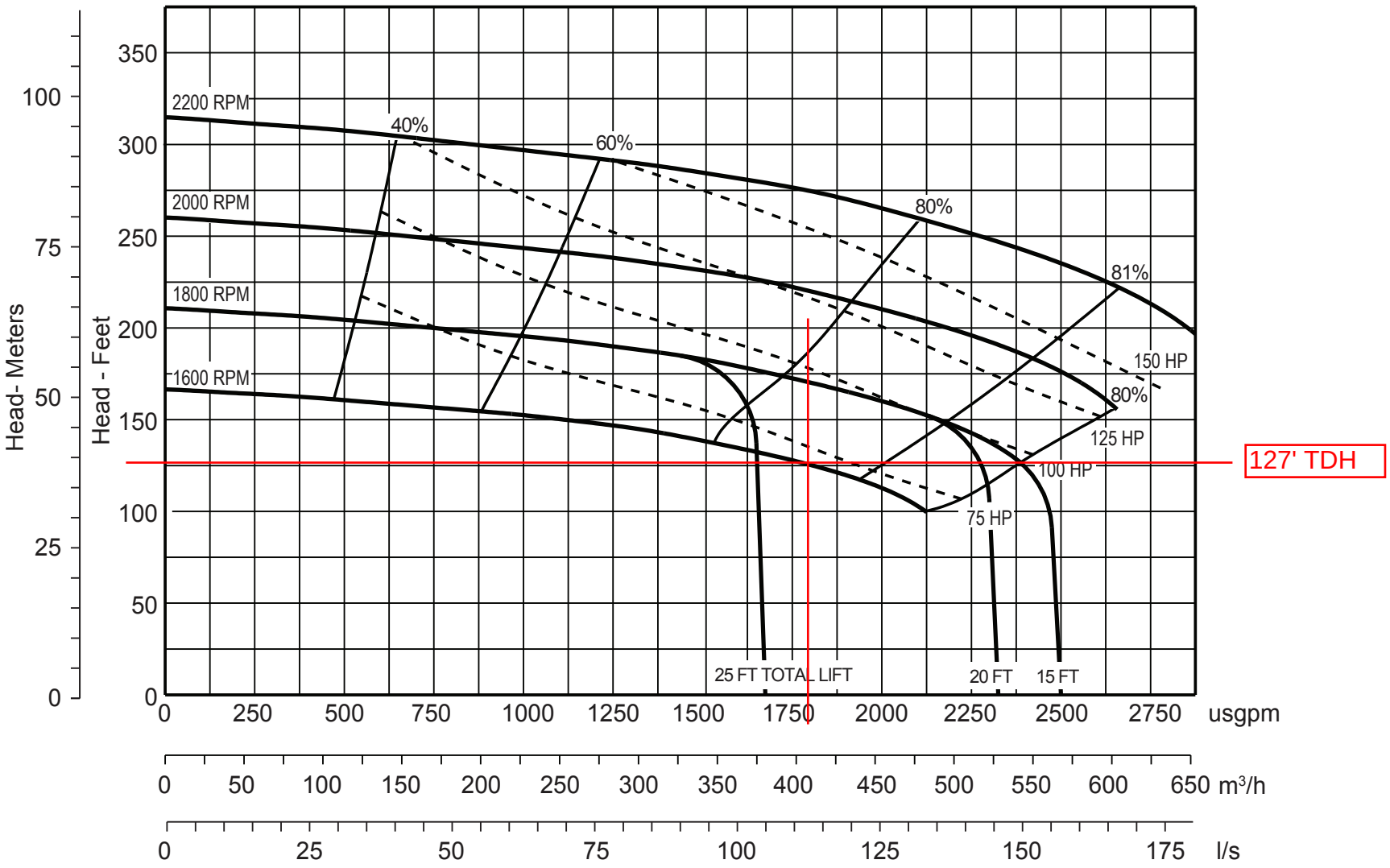
NOTES:

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

PIONEERPUMP
PERFORMANCE THROUGH INNOVATION™

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

PIONEER PUMP
PERFORMANCE THROUGH INNOVATION™

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

Google Earth Pro

File Edit View Tools Add Help

Sign in

Search

Search Google | Parcel Search (APN)

41 28 47.88, -75 54 22.56 Search

ex: 37 25.818' N, 122 05.36' W

Get Directions History

41 28 47.88, -75 54 22.56

Places

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

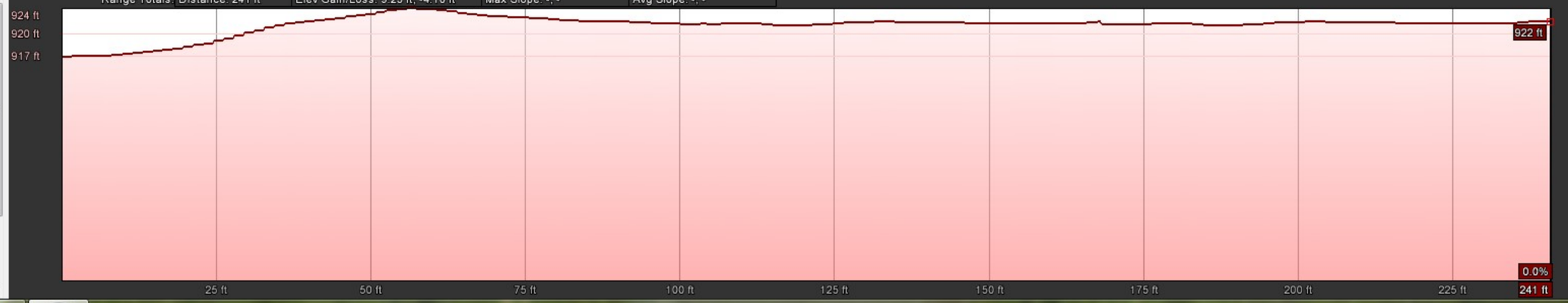
Layers

Earth Gallery

- 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

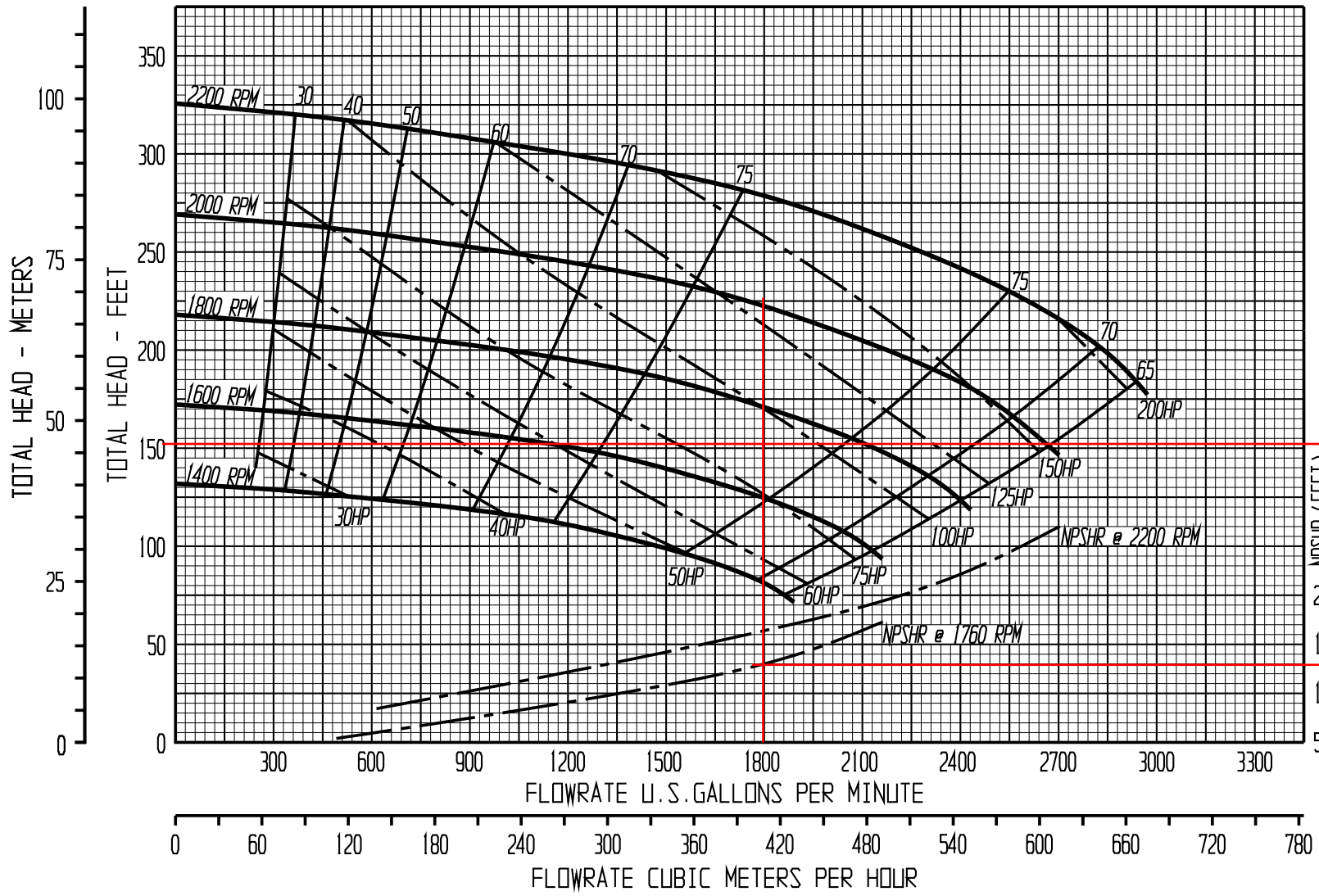
Graph: Min. Avg. Max Elevation: 917, 921, 924 ft

Range Totals: Distance: 241 ft | Elev Gain/Loss: 9.23 ft, -4.10 ft | Max Slope: -, - | Avg Slope: -, -



5:36 PM
10/8/2015

Pumping to Storage Tanks



NOTES:

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

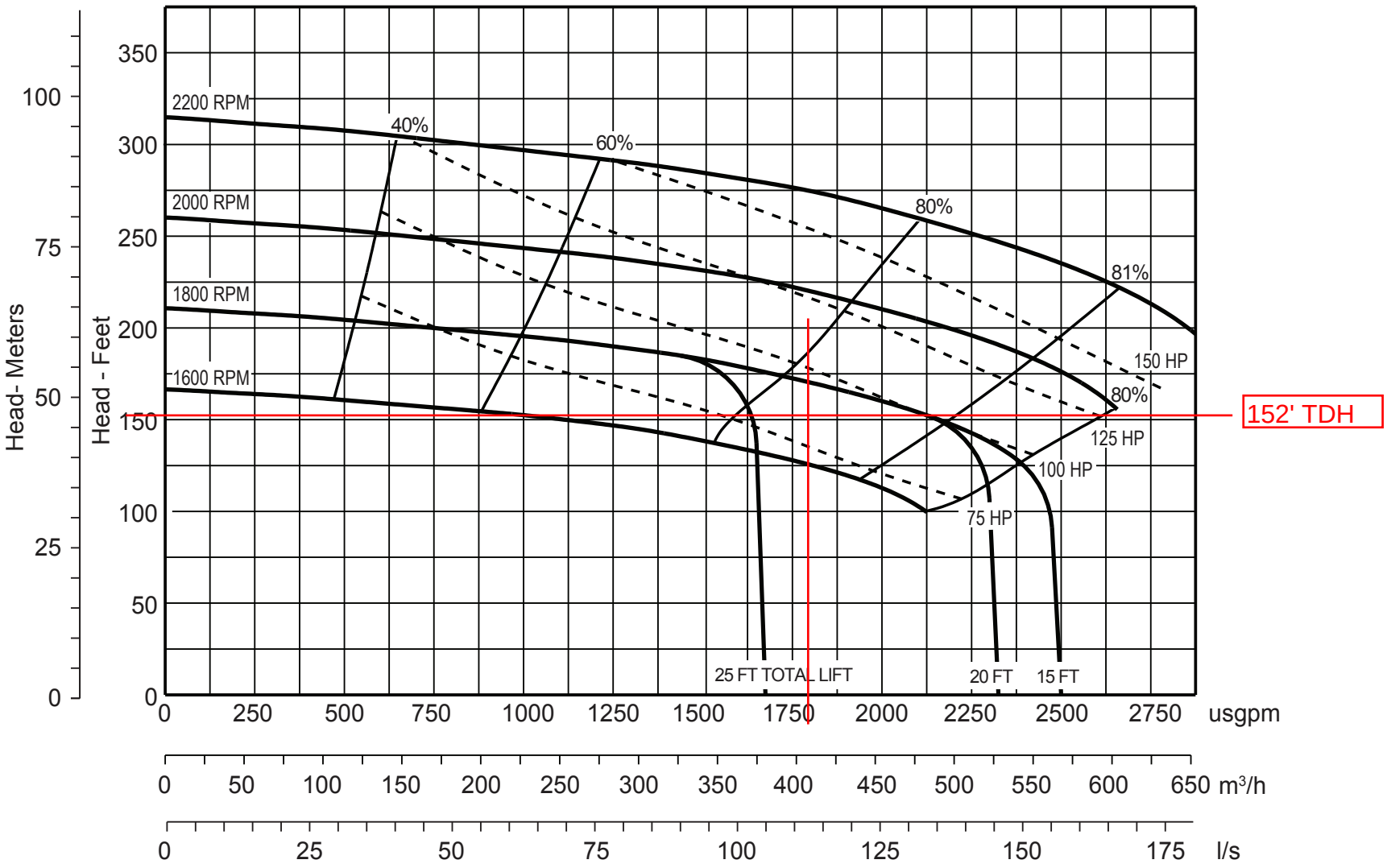
152 ft TDH

<13.0 ft NPSHr

PIONEERPUMP
PERFORMANCE THROUGH INNOVATION™

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

PIONEER PUMP
PERFORMANCE THROUGH INNOVATION™

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


Fishing Creek Withdraw Location
Fishing Creek Fill Location
Fritz-Hill-Rd
Schoolhouse-Rd
Camp-Lavigne-Rd
© 2016 Google
Google earth
Imagery Date: 9/26/2014
1994
41°16'25.12" N 76°22'57.00" W elev 922 ft
Eye alt 5568 ft


Graph: Min, Avg, Max
Elevation: 917, 925, 940 ft
Range Totals:
Distance: 1602 ft
Elev Gain/Loss: 43.6 ft, -42.1 ft
Max Slope: 45.1%, -61.6%
Avg Slope: 4.8%, -4.2%
940 ft
930 ft
922 ft
917 ft
917 ft
0.0%
0 ft
250 ft
500 ft
750 ft
1000 ft
1250 ft
1500 ft
1602 ft

A-5 Flow Control Valve Specification

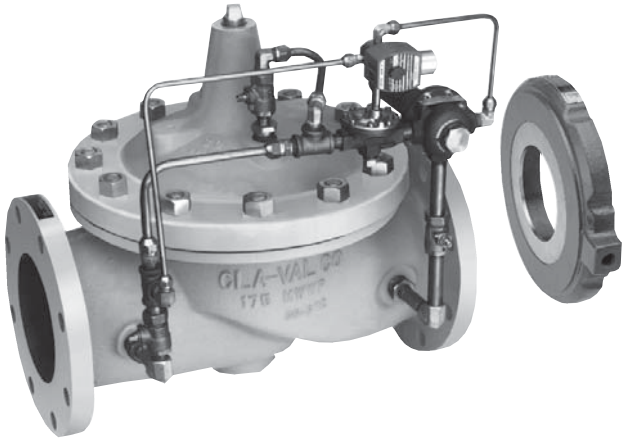
CLA-VAL™

MODEL

43-01
(Full Internal Port)

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.

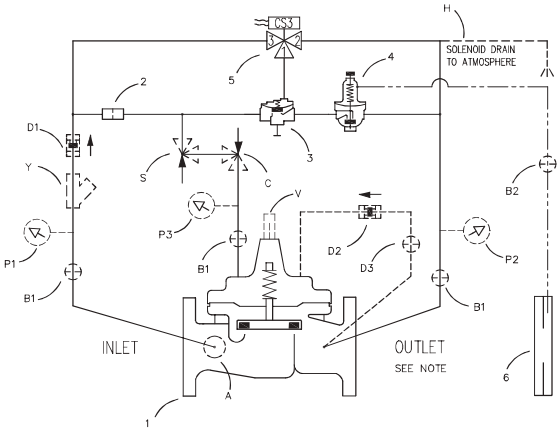
The Model 43-01/643-01 includes a orifice plate with a holder that should be installed one to five pipe diameters downstream of the main valve. If the check feature option is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes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

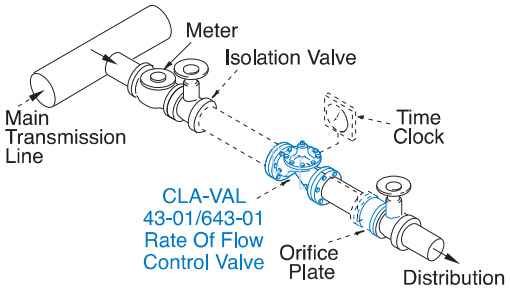
Optional Features

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

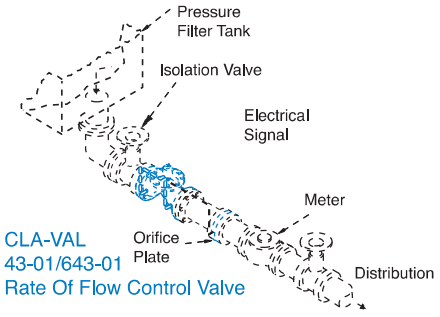


The "D" feature on a vertically installed 6" and larger valves must be horizontally installed.

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.

CLA-VAL™

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

Pressure Ratings (Recommended Maximum Pressure - psi)

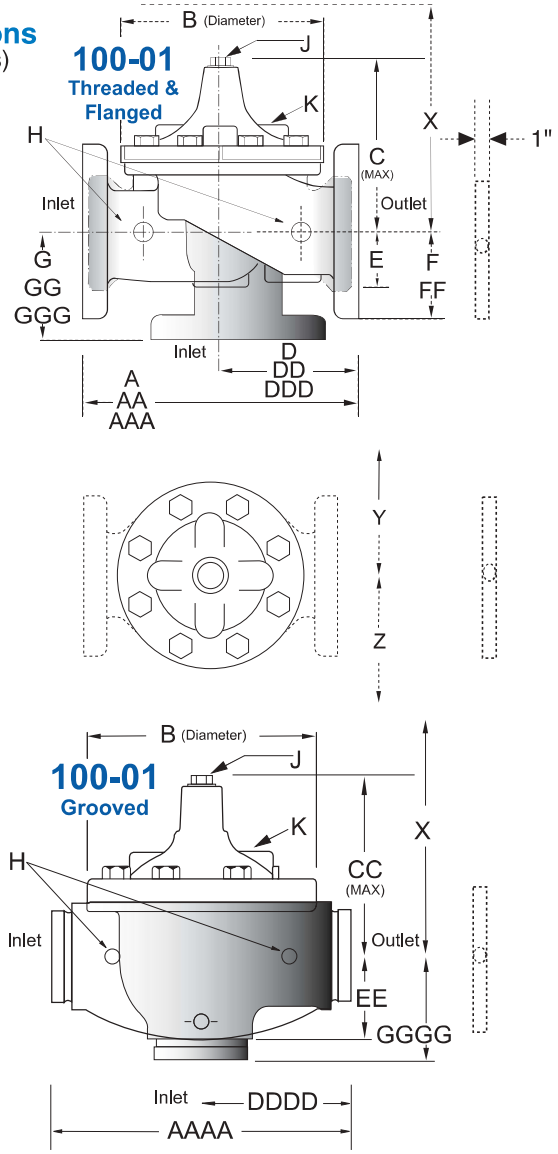
Valve Body & Cover		Pressure Class				
		Flanged			Grooved	Threaded
Grade	Material	ANSI Standards*	150 Class	300 Class	300 Class	End‡ Details
ASTM A536	Ductile Iron	B16.42	250	400	400	400
ASTM A216-WCB	Cast Steel	B16.5	285	400	400	400
ASTM B62	Bronze	B16.24	225	400	400	400

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)

Pressure Ratings (Recommended Maximum Pressure - psi)

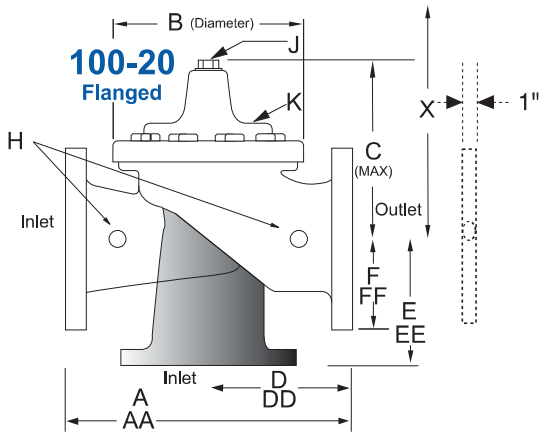
Valve Body & Cover		Pressure Class		
		Flanged		
Grade	Material	ANSI Standards*	150 Class	300 Class
ASTM A536	Ductile Iron	B16.42	250	400
ASTM A216-WCB	Cast Steel	B16.5	285	400
ASTM B62	Bronze	B16.24	225	400

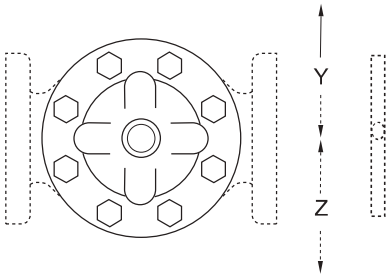
Note: * ANSI standards are for flange dimensions only.
Flanged valves are available faced but not drilled.
Valves for higher pressure are available; consult factory for details

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.			

Dimensions
(In inches)





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.

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.

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

CLA-VAL P.O. Box 1325 • Newport Beach, CA 92659-0325 • Phone: 949-722-4800 • Fax: 949-548-5441 • E-mail: claval@cla-val.com • Website cla-val.com

A-6 Pipeline Sizing Justification

Direct Fill to Pipeline

Title: Fishing Creek Pipe Size Calculation
Project Name: Atlantic Sunrise | Prepare By: DTK | Date: 10/29/2015
Client: TRANSCO | Checked By: LMH | Date: 11/10/2015

Design Flow Rate	1,800	gpm	
Length[1]	241	ft	
Elevation at Start[1]	917	ft MSL	
Elevation at Pump	924	ft MSL	
Elevation at End[1]	922	ft MSL	
Backpressure at Discharge	45	psig	(NOTE: to account for minor losses; throttle discharge valve as required)
Hazen-Williams Coefficient	140		
Suction Pipe Length	100	ft	

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

Estimate Pipe Size based on velocity

Maintain Velocity at 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)	8	10	10		
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)	241	241	100		
Friction Head Loss (dH)	(feet)	18.2	6.2	3.6		
Total Head loss	(feet)	**126.72**	**114.74**	*19.7*	*NPSHa*	*> NPSHr =* 13.0 ft
	(psi)	55	50			

* - includes 6% safety factor on wall thickness

Horsepower Required

Determine Theoretical Hp req'd:	HP	58	52
Pump Efficiency (est)		80%	80%
Motor Efficiency (est)		85%	85%
Motor Horsepower (est)	HP	**85**	**77**

Design Considerations for Hydrotest

CPL Max Elevation: 1526.88 ft MSL
Max Static Head: 605 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

Google Earth Pro

File Edit View Tools Add Help

Sign in

Search

Search Google | Parcel Search (APN)

41 28 47.88, -75 54 22.56 Search

ex: 37 25.818' N, 122 05.36' W

Get Directions History

41 28 47.88, -75 54 22.56

Places

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

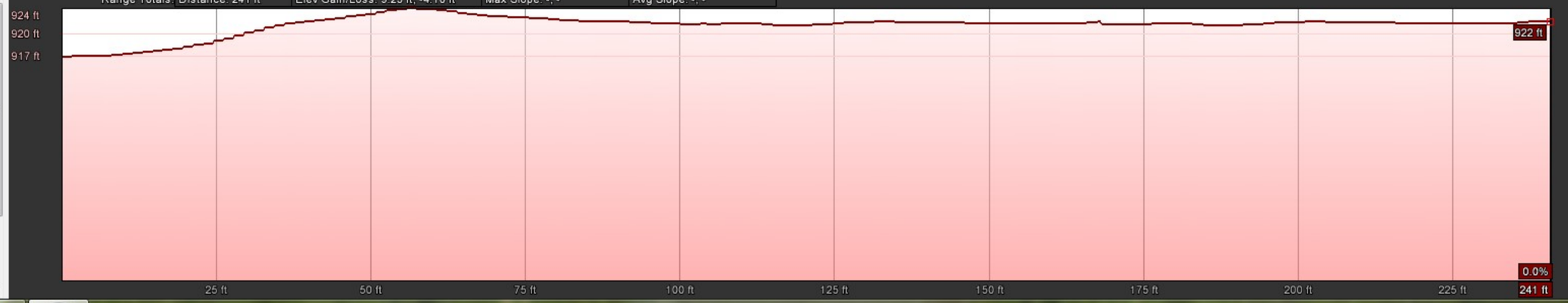
Layers

Earth Gallery

- 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

Graph: Min. Avg. Max Elevation: 917, 921, 924 ft

Range Totals: Distance: 241 ft | Elev Gain/Loss: 9.23 ft, -4.10 ft | Max Slope: -, - | Avg Slope: -, -



5:36 PM
10/8/2015

Pumping to Storage Tanks

Title: Fishing Creek Pipe Size Calculation
Project Name: Atlantic Sunrise | Prepare By: LMH | Date: 7/22/2016
Client: TRANSCO | Checked By: GH | Date: 7/25/2016

Design Flow Rate	1,800	gpm	
Length[1]	1,602	ft	
Elevation at Start[1]	917	ft MSL	
Elevation at Pump	924	ft MSL	
Elevation at End[1]	948	ft MSL	
Backpressure at Discharge	-	psig	(NOTE: to account for minor losses; throttle discharge valve as required)
Hazen-Williams Coefficient	140		
Suction Pipe Length	100	ft	

1 design basis to transfer water to storage tanks. 30 feet was added to the end elevation of the pipe transfer pathway to account for the height of the storage tanks.

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)	8	10	10		
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)	1,602	1,602	100		
Friction Head Loss (dH)	(feet)	121.1	41.5	3.6		
Total Head loss	(feet)	**152.15**	**72.49**	*19.7* *NPSHa*	*> NPSHr =*	13.0 ft
	(psi)	66	32			

* - includes 6% safety factor on wall thickness

Horsepower Required

Determine Theoretical Hp req'd:	HP	69	33
Pump Efficiency (est)		80%	80%
Motor Efficiency (est)		85%	85%
Motor Horsepower (est)	HP	**102**	**48**

Design Considerations for Hydrotest

CPL Max Elevation: 1526.88 ft MSL
Max Static Head: 579 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


Fishing Creek Withdraw Location
Fishing Creek Fill Location
Fritz-Hill-Rd
Schoolhouse-Rd
Camp-Lavigne-Rd
© 2016 Google
Google earth
Imagery Date: 9/26/2014
1994
41°16'25.12" N 76°22'57.00" W elev 922 ft
Eye alt 5568 ft


Graph: Min, Avg, Max
Elevation: 917, 925, 940 ft
Range Totals:
Distance: 1602 ft
Elev Gain/Loss: 43.6 ft, -42.1 ft
Max Slope: 45.1%, -61.6%
Avg Slope: 4.8%, -4.2%
940 ft
930 ft
922 ft
917 ft
917 ft
0.0%
0 ft
250 ft
500 ft
750 ft
1000 ft
1250 ft
1500 ft
1602 ft

A-7 Flow Meter Specification

AG2000
Irrigation Magmeter

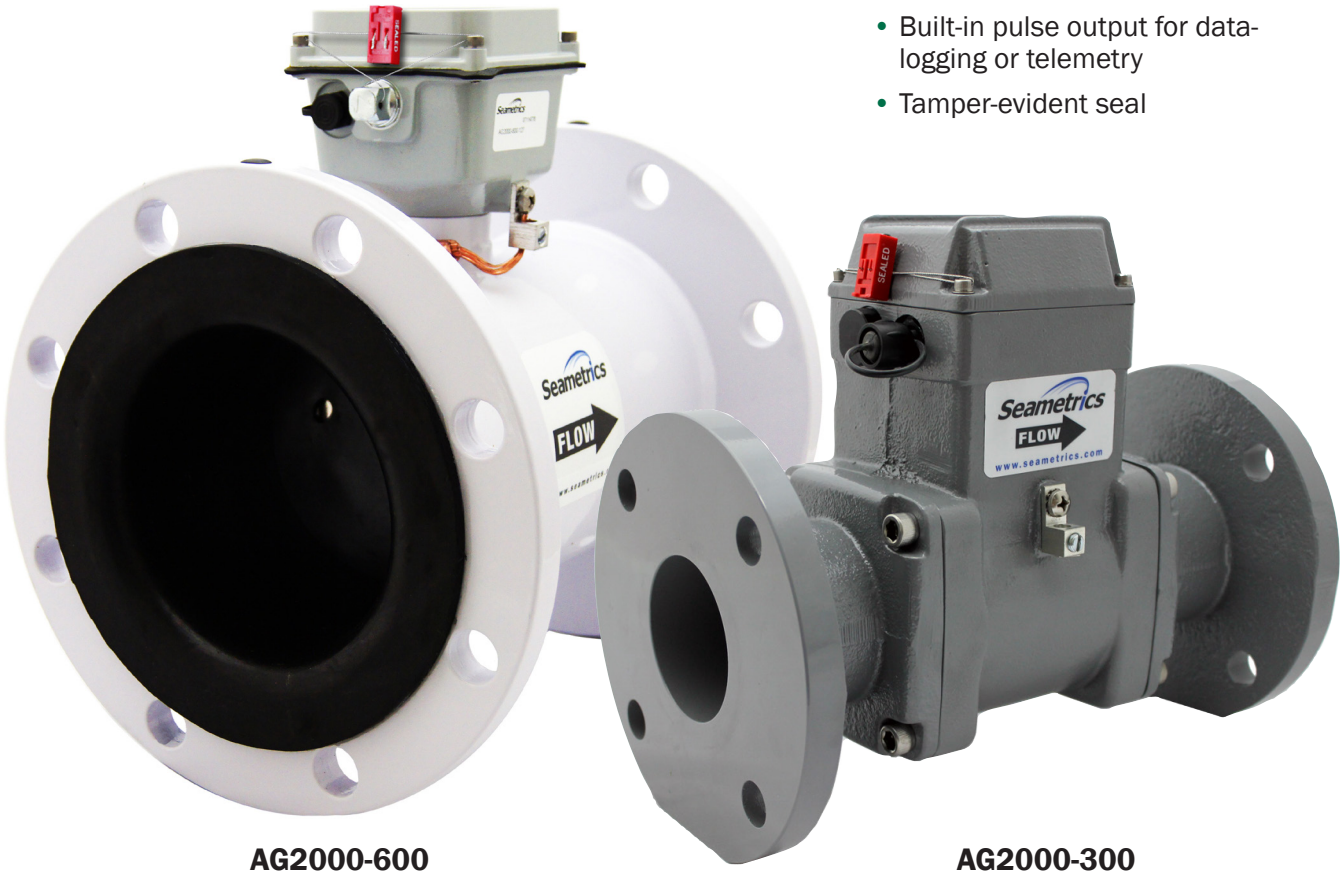
ISO 9001:2008 CERTIFIED COMPANY

APPLICATIONS

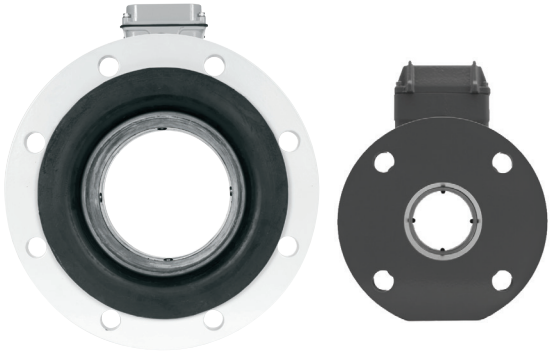
- Irrigation
- Chemigation
- Agricultural automation
- Well usage monitoring
- Dairy Lagoons

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".

AG2000
Irrigation Magmeter

GENERAL INFORMATION

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

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

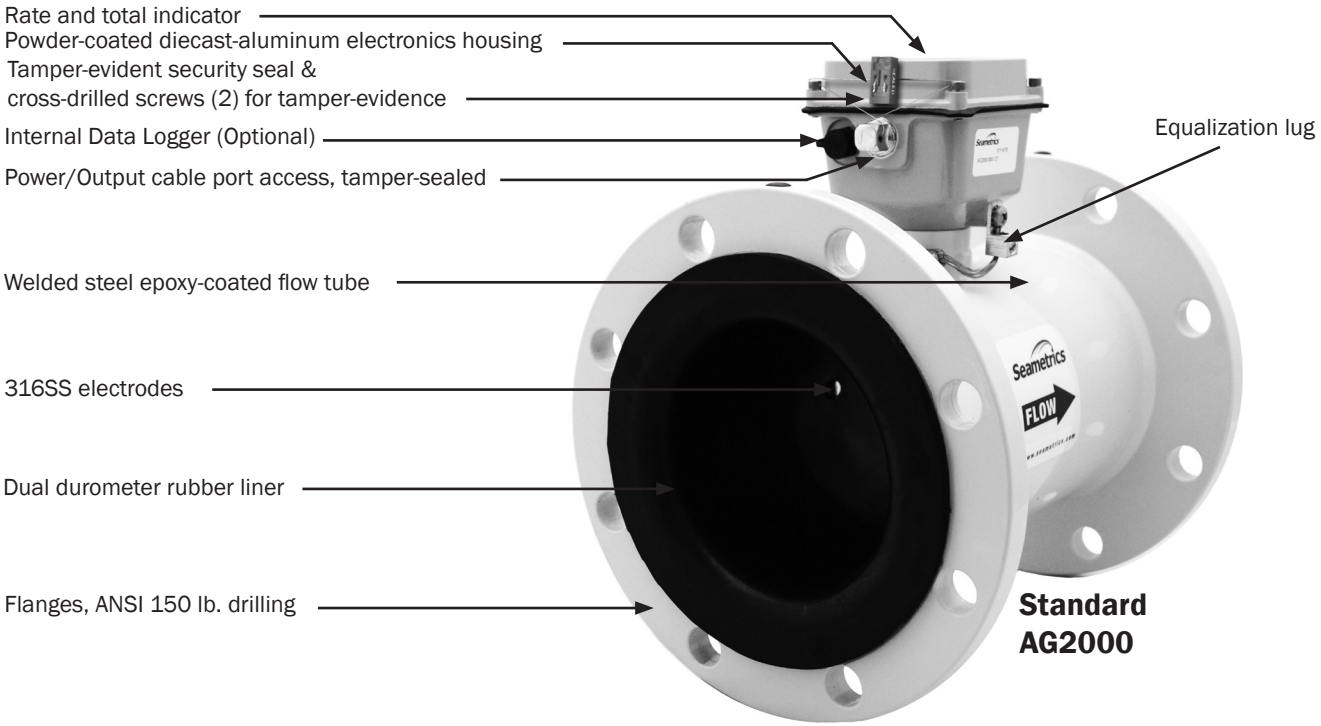
An IP68 version (-168 option) is available for burial or applications where the meter may be under water up to a depth of 3 meters for prolonged periods of time.

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

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

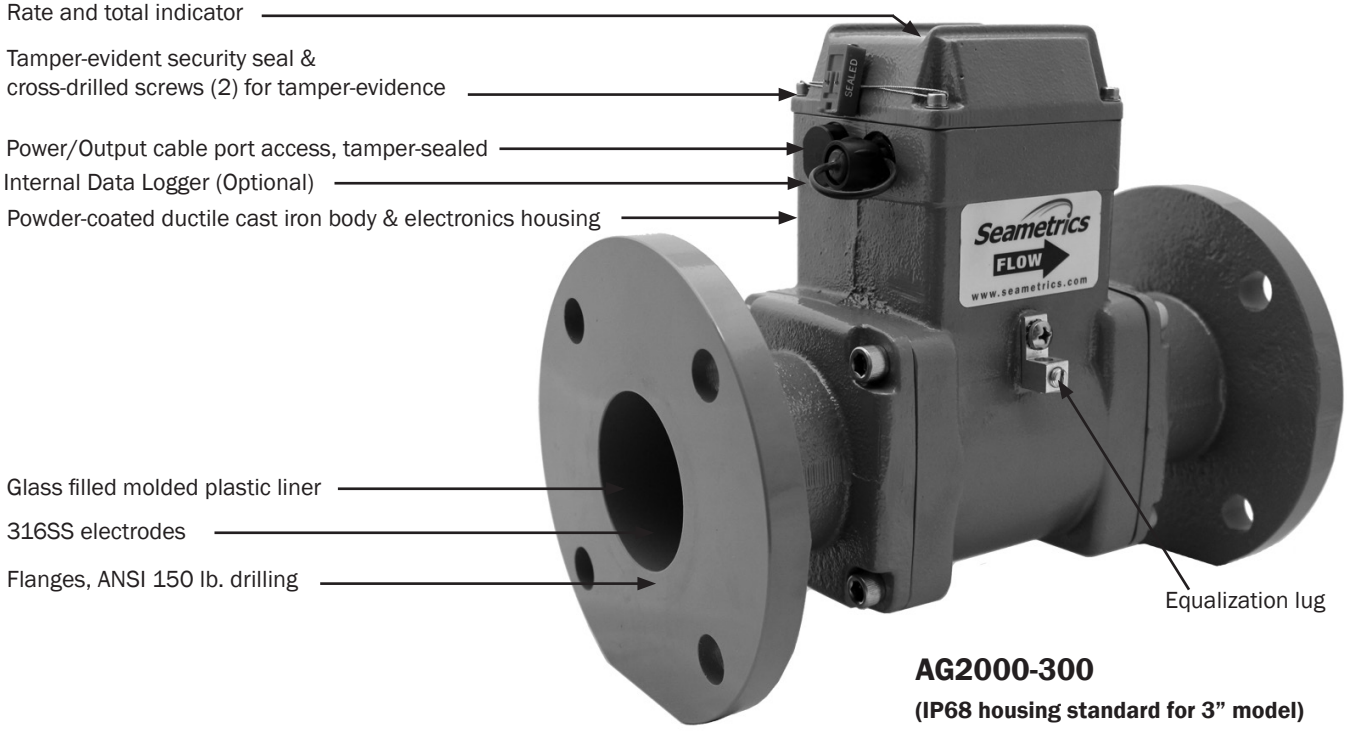
For chemigation applications, the chemical injection point must be placed downstream of the meter **OR** far enough upstream for **complete mixing** to occur before the flow reaches the meter. (See tech bulletin on Seametrics' website, www.seametrics.com).

FEATURES

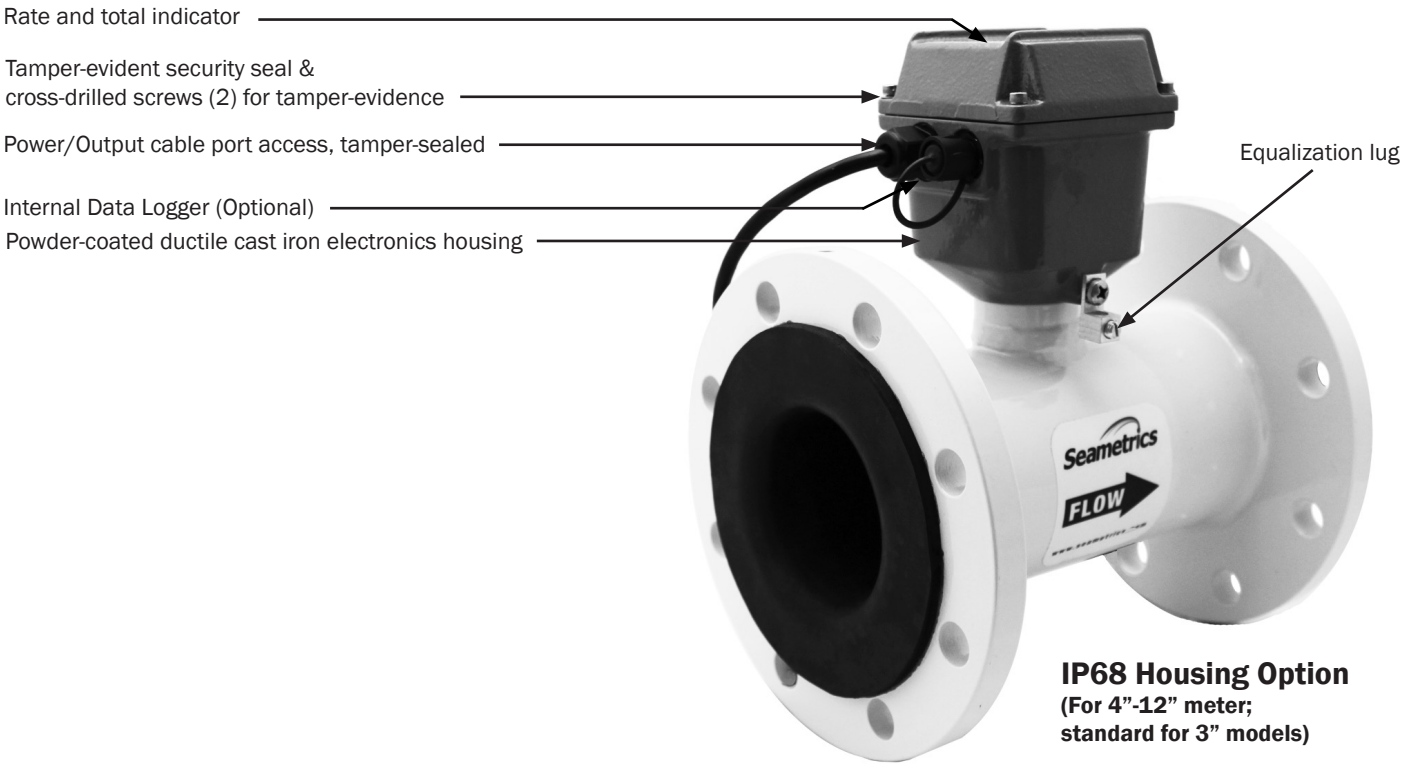


AG2000
Irrigation Magmeter

FEATURES Continued



AG2000-300
(IP68 housing standard for 3" model)



IP68 Housing Option
(For 4"-12" meter;
standard for 3" models)

AG2000
Irrigation Magmeter

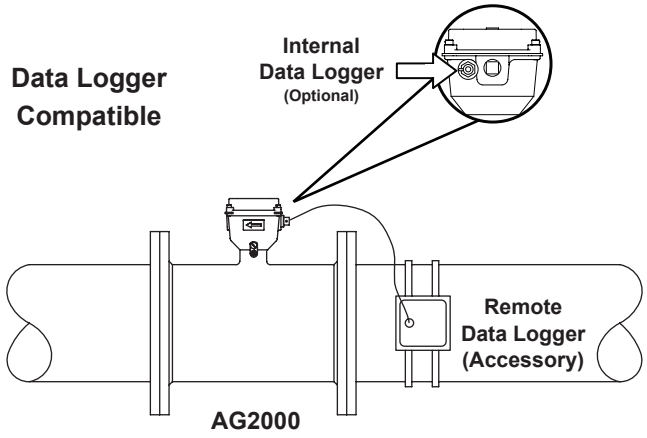
SPECIFICATIONS*

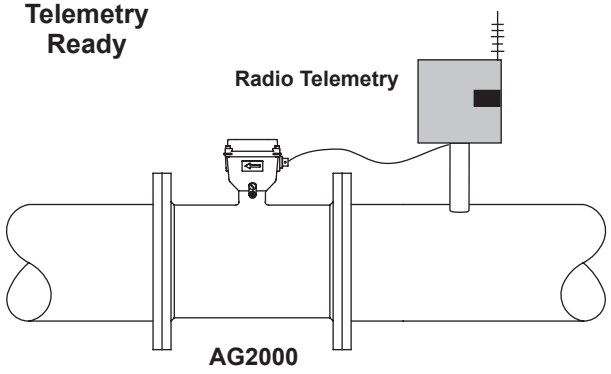
Pipe Sizes		3”, 4” 6” 8”, 10”, 12”					
Fittings		ANSI 150 lb. drilling					
Pressure		150 psi (10.3 bar) working pressure					
Temperature	**Operating**	10˚ to 130˚ F (-12˚ to 54˚ C)					
	Non-Operating	-40˚ to 158˚ F (-40˚ to 70˚ C)					
Accuracy		+/- 1% of reading for flow between 10% to 100% of max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

**Specifications subject to change. Please consult our website for the most current data (www.seametrics.com).*
***Extended battery life option is standard on all IP68 meters.*

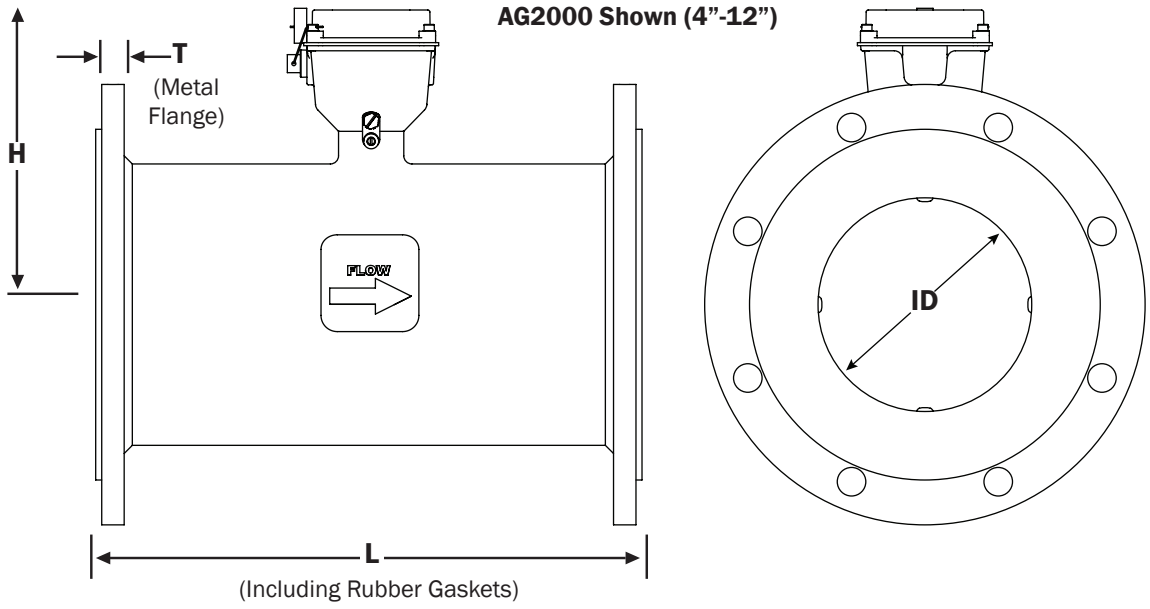
AG2000
Irrigation Magmeter

OUTPUT CAPABILITIES





DIMENSIONS



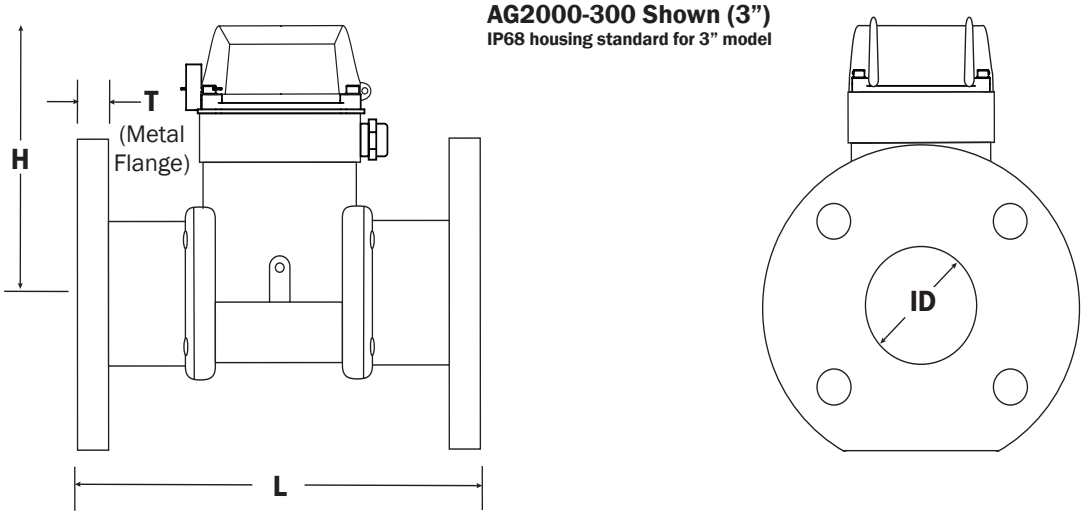
AG2000 (Standard Housing)

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

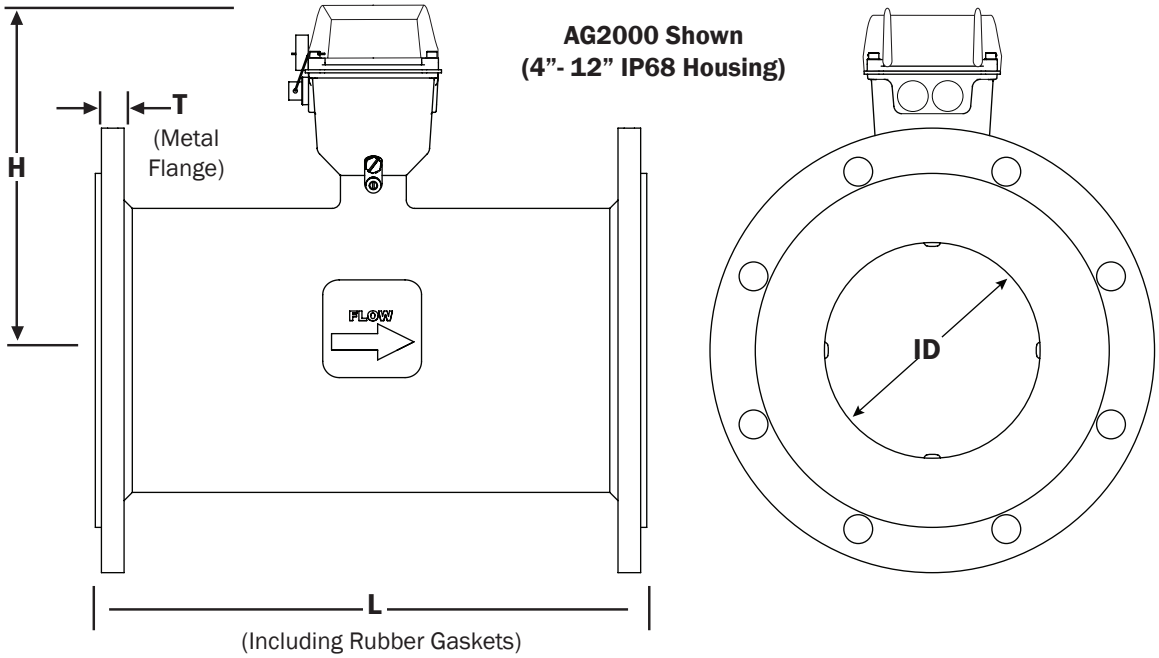
AG2000
Irrigation Magmeter

DIMENSIONS

AG2000-300 Shown (3")
IP68 housing standard for 3" model



AG2000 Shown
(4"- 12" IP68 Housing)



(Including Rubber Gaskets)

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.	

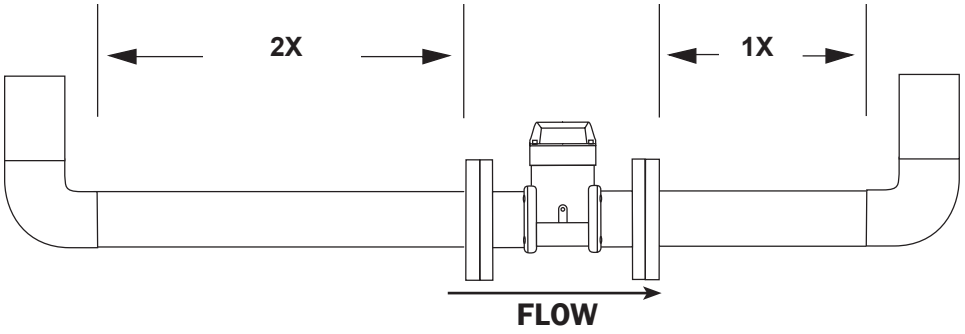
AG2000
Irrigation Magmeter

STRAIGHT PIPE RECOMMENDATIONS

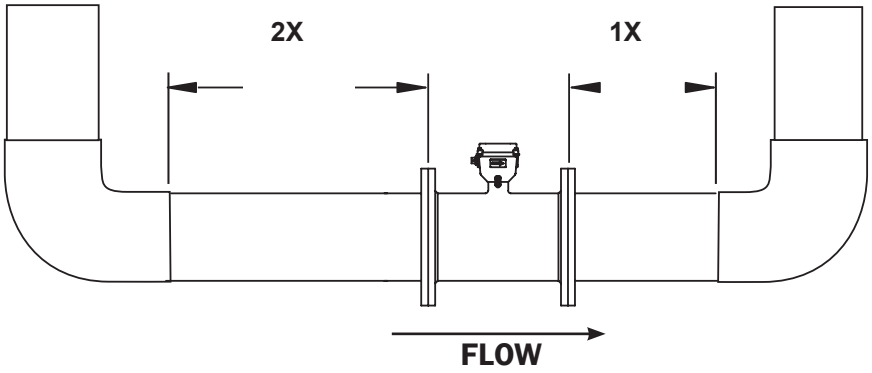
(X = pipe diameter)

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

AG2000
Irrigation Magmeter

HOW TO ORDER

MODEL

AG2000

SIZE

3" = **-300***
4" = **-400**
6" = **-600**
8" = **-800**
10" = **-1000**
12" = **-1200**

*-300 available in IP68 only

OPTIONS

Factory Installed Power/ Output Cable:
6m (20 ft) = **-11/6**
15m (50 ft) = **-11/15**
30m (100 ft) = **-11/30**

Factory Installed IP68 Power/Output Cable:
6m (20 ft) = **-11/6S**
15m (50 ft) = **-11/15S**
30m (100 ft) = **-11/30S**

Internal Data Logger = **-127**
Serial Output = **-131**
IP68 Submersible = **-168**
Extend. Battery Life[1] = **-178**

[1] Extended battery life is standard on all IP68 meters

PULSE RATE
(With Option -11)

10 Units*/Pulse = **-PxX**
100 Units*/Pulse = **-PxH**
1000 Units*/Pulse = **-PxK**
High Frequency**= **-HF**

*Units = Gal or Liter depending on Rate/Total unit selection
**High Frequency pulse rate will shorten battery life

UNITS

Gal/Min	= **GPM**	Gal	= **G**
Liter/Min	= **LPM**	Gal x 1000	= **GT**
Cu Ft/Min	= **CFM**	Liter	= **L**
Cu Meter/Hr	= **CMH**	Liter x 1000	= **LT**
Gal/Sec	= **GPS**	Mega Liters	= **ML**
Liters/Sec	= **LPS**	Cubic Meters	= **CM**
Cu Ft/Sec	= **CFS**	Cu Met x 1000	= **CMT**
Miner's In**	= **MI**	Acre Feet	= **AF**
Cu Met/Min	= **CMM**	Cubic Feet	= **CF**
		Cu Feet x 1000	= **CFT**
		Million Gal	= **MG**
		Miner's Inch Day	= **MID**
		Acre Inch	= **AI**

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

Seametrics Incorporated • 19026 72nd Avenue South • Kent, Washington 98032 • USA
(P) 253.872.0284 • (F) 253.872.0285 • 1.800.975.8153 • www.seametrics.com

LT-65650278-Rev A
2/15

A-8 Plans, Details, and Maps

PGH P:\GIS\WILLIAMS_PIPELINE\MAPDOCS\MXD\TGPC_FISHINGCREEK_USGS.MXD 11/06/15 S

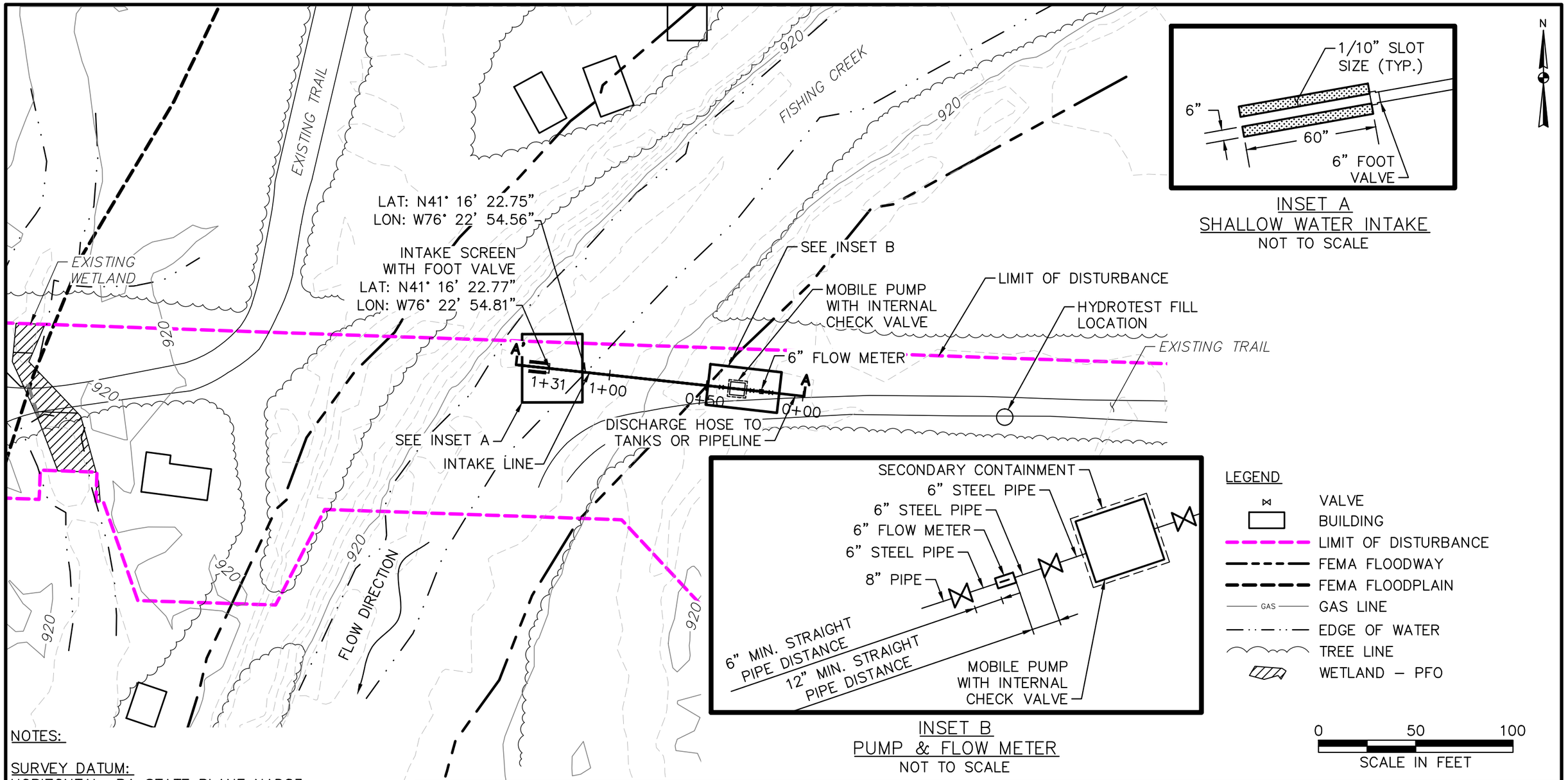
TETRA TECH

USGS LOCATION MAP
TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
FISHING CREEK
SUGAR LOAF TOWNSHIP
COLUMBIA COUNTY, PA

DRAWN BY: S. PAXTON 10/14/15
CHECKED BY: L. HERRING 11/06/15
APPROVED BY:

CONTRACT NUMBER: 212C-PB-00282

FIGURE NUMBER	REV
8-1	0



INSET A
SHALLOW WATER INTAKE
NOT TO SCALE

INSET B
PUMP & FLOW METER
NOT TO SCALE

LEGEND

- VALVE
- BUILDING
- LIMIT OF DISTURBANCE
- FEMA FLOODWAY
- FEMA FLOODPLAIN
- GAS LINE
- EDGE OF WATER
- TREE LINE
- WETLAND – PFO

0 50 100
SCALE IN FEET

NOTES:

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

STORAGE TANKS WILL BE LOCATED IN A FIELD ADJACENT TO SCHOOL HOUSE ROAD APPROXIMATELY 0.2 MILES SOUTHEAST OF THE WITHDRAWAL POINT. STORAGE TANKS WILL BE USED DURING MONTHS WHEN WITHDRAWAL RATES ARE LESS THAN 1,200 GPM.

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

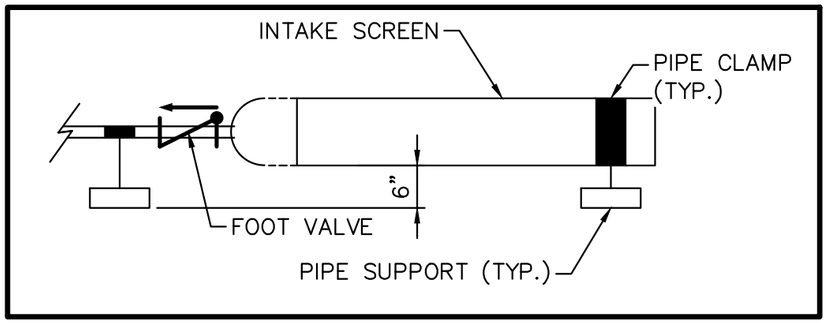
TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
FISHING CREEK, SUGAR LOAF TWP, COLUMBIA CO.

SITE PLAN

DATE:	9/25/15
PROJECT NO.:	212C-PB-00282
DESIGNED BY:	RD
DRAWN BY:	CK
CHECKED BY:	CR
SHEET:	1 OF 2

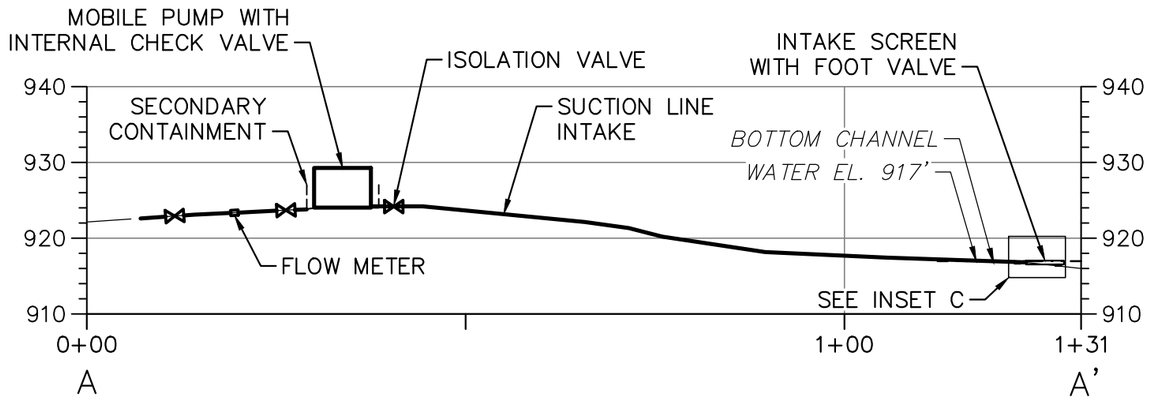
FIGURE 8-2

R:_212 – OGA\O&G\Williams\00282 – Atlantic Sunrise Water Sourcing\Figures\00282FG003.dwg PIT BEN.HOPPE 7/22/2016 2:55:43 PM



INTAKE PROFILE
DETAIL C

NOT TO SCALE



CROSS-SECTION A-A'

0 20 40

SCALE IN FEET

NOTES:

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

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

TRANSCONTINENTAL GAS PIPELINE COMPANY, LLC
FISHING CREEK, SUGAR LOAF TWP., COLUMBIA CO.

CROSS-SECTION OF INTAKE SYSTEM

DATE:	9/16/15
PROJECT NO.:	212C-PB-00282
DESIGNED BY:	RD
DRAWN BY:	CK
CHECKED BY:	CR
SHEET:	2 OF 2

FIGURE 8-3

A-9 Field Photographs

Fishing Creek

Fishing Creek