



DRISCOPEX[®] 5300 SERIES CLIMATE GUARD[®] SYSTEMS



DRISCOPEX[®] Series 5300 Climate Guard[®]
HDPE Pipe and Fitting System for
Closed-Loop Ground-Source
Heat Pump Applications

Bulletin: PP 650

DRISCOPEX® 5300 Series Climate Guard®

HDPE Pipe and Fitting System for
Closed-Loop Ground-Source Heat Pump Applications

Performance Pipe

PERFORMANCE PIPE is the functional successor to the operations of Plexco¹ and Driscopipe². On July 1, 2000, Chevron Chemical Company and Phillips Chemical Company were joined to form Chevron Phillips Chemical Company LP. Performance Pipe, a division of Chevron Phillips Chemical Company LP, succeeds Plexco and Driscopipe as North America's largest producer of polyethylene piping products for geothermal, industrial, municipal, mining, oilfield, gas and utility applications.

Performance Pipe offers more than forty years of polyethylene pipe manufacturing experience with nine ISO certified manufacturing facilities.

The unmatched quality and performance of Performance Pipe polyethylene piping products is enhanced and strengthened with over four decades of quality polyolefin plastic resin production from Chevron Phillips Chemical Company LP.

DRISCOPEX® 5300 Series Climate Guard® Pipe and Fitting System

DriscoPlex® 5300 Series Climate Guard® high-density polyethylene pipe and fittings are the quality piping system for closed-loop, earth-coupled heat pump applications. DriscoPlex® 5300 Series Climate Guard® pipe and fittings are the system of choice for residential, commercial, institutional and industrial installations. Performance Pipe offers a complete system of DriscoPlex® 5300 pressure-rated pipe and fittings that meet applicable IGSHA and ASTM specifications and requirements.

DRISCOPEX® 5300 Climate Guard® Systems - The Key to Performance

Economical - Easy to join, lightweight and flexible to help reduce construction and installation costs.

Tough and Durable - Excellent impact and abrasion resistance. Pressure ratings based on long-term tests. Exceptional resistance to slow crack growth and environmental stress cracking.



¹ Formerly - Plexco, a Division of Chevron Chemical Company

² Formerly - Phillips Driscopipe, A Division of Phillips Petroleum Company

NOTICE - This publication is intended for use as a guide to support the designer of piping systems. It is not intended to be used as installation instructions, and should not be used in place of the advice of a professional engineer. It does not constitute a guarantee or warranty for piping installations. Performance Pipe has made every reasonable effort to ensure the accuracy of this publication, but it may not provide all necessary information, particularly with respect to special or unusual applications. This publication may be changed from time to time without notice. Contact Performance Pipe to determine if you have the most current edition.

Ductile and Flexible - Flexible DriscoPlex® 5300 Climate Guard® Series pipe follows the "lay of the land" to ease trench and down hole installation.

Resistant to Chemicals and Corrosion - Excellent resistance to most chemical compounds and aggressive soils.

Thermally Conductive - DriscoPlex® 5300 Climate Guard® pipe offers high strength PE 3408 to minimize pipe wall thickness and maximize heat transfer.

Leak-Tight Joining - Long, continuous coils or straight lengths reduce joining requirements. Properly made heat fusion joints are as strong as the pipe itself and do not leak.

Excellent Hydraulics - DriscoPlex® 5300 Climate Guard® pipe offers high volume flows with low flow resistance. The hydraulically smooth, non-wetting surface provides excellent flow properties. A Hazen-Williams C-factor of 150-155 is typically used to estimate flow resistance. DriscoPlex® 5300 Climate Guard® pipe does not rust, rot, corrode, tuberculate or support biological growth.

Sequential Footage Markings on coils to assist with proper depth setting in borehole installations.

DRISCOPEX® 5300 Climate Guard® Pipe and Fitting Products

Pipe and Fittings

- PE 3608 DR 11- 3/4" IPS, 1" IPS, 1-1/4" IPS, 1-1/2" IPS, 2" IPS, 3" IPS and 4" IPS standard.
 - PE 3608 DR 15.5 - 3" IPS, 4" IPS, 6" IPS and 8" IPS standard.
 - Other sizes through 54" IPS.
 - DriscoPlex® 5300 Climate Guard® Unicoil™ proprietary twin-coil with patented Polywing™ u-bend for down hole or horizontal loop applications - 3/4" IPS, 1" IPS and 1-1/4" IPS
- DriscoPlex® 5300 Climate Guard® molded fittings for butt fusion through 8" IPS and for socket fusion through 4" IPS.

Materials and Standards

DriscoPlex® 5300 Climate Guard® pipe and molded fittings are manufactured from high-density, high molecular weight PE 3608 polyethylene compound that meets or exceeds ASTM D 3350 cell classification 345464C, and is listed by the Plastic Pipe Institute in PPI TR-4 with HDB ratings of 1600 psi (11.04 MPa) at 73°F (23°C) and 800 psi (5.52 MPa) at 140°F (60°C).

DriscoPlex® 5300 Climate Guard® pipe is manufactured in accordance with ASTM D 3035. Molded fittings are manufactured in accordance with ASTM D 3261 (butt outlet) and ASTM D 2683 (socket outlet).

Secure Joining

DriscoPlex® 5300 Climate Guard® pipe and fittings are joined by socket, butt or saddle heat fusion, electrofusion, or mechanical fittings. Climate Guard® 5300 mechanical connection fittings are available for joining to other materials or to itself. Suitable electrofusion fittings may also be used. Heat fusion joining procedures are available upon request.

Unicoil™ U-Bend Coil

Pre-Fused Polyethylene U-Bend Coils for Efficient, Reliable Installation

Until now, installers have spent precious field time fabricating u-bends from elbows and making-up u-bend coils for down hole and horizontal heat pump piping loops. But no more - Now there is Unicoil™ u-bend coil from Performance Pipe.

Unicoil™ u-bend coil is the original pre-fused polyethylene u-bend coil system created by Performance Pipe. Unicoil™ u-bend coil features the patented one-piece Polywing Unibend that is pre-fused to two coils of DriscoPlex® 5300 Climate Guard® pipe, all in one convenient package.

Unibend with Polywing - It Goes Down Easy, and Stays Down

Unibend is the first tight radius one-piece u-bend designed specifically for geothermal heat pump applications. The unique Unibend is factory pre-fused to two lengths of DriscoPlex® 5300 Climate Guard® pipe (supply and return) that are coiled together and banded into a single package for easy handling and quick field installation. Unibend features a pointed end for self-guiding installation to slide through the toughest borehole conditions. The one-piece Unibend design eliminates the third fusion where two elbows are fused together, thus fewer joints are buried at extreme depths.

Unibend features the patented Polywing anti-buoyancy attachment port to minimize the possibility of a loop assembly "floating" out of the borehole. When an anti-buoyancy wing tube is fitted through the Polywing attachment port, the wing tube folds against the Unibend during down-hole insertion, but the wing tube springs out to resist buoyant forces. The Polywing anti-buoyancy port may also be used to connect weights, stiffeners, or other devices without risking damage or compromising Unibend performance.



Configurations

DriscoPlex® 5300 Climate Guard® Unicoil™ piping systems are available in three pipe sizes and two pressure ratings.

- Pipe sizes: 3/4" IPS, 1" IPS or 1-1/4" IPS
- Working pressure ratings: SDR 11 160 psi water at 73°F (standard) or SDR 9 200 psi water at 73°F (special order) for deep installations or high static pressures.
- Outside width across Unibend†:

3/4" IPS & 1" IPS	3 1/4" wide
1-1/4" IPS	4" wide

† This dimension is the approximate outside width across the Unibend at the end of the Unicoil™ u-bend coil including the fusion beads. When used in downhole applications, appropriate clearance between the borehole and the outside width of the Unibend is required to allow downhole passage.

DriscoPlex® 5300 Climate Guard® Unicoil™ geothermal piping systems sets the standard for reliability, cost-efficiency and ease of installation in the ground source heat pump industry.

General Guidelines for Closed-Loop Ground-Source Heat Pump Applications

- Verify that the total system pressure, operating plus surge, does not exceed the pressure rating of the lowest rated component in the system.
- Carefully inspect the pipe to detect any damage that may have occurred during shipping or handling.
- Conduct hydrostatic leak testing in accordance with Performance Pipe or accepted industry practices and procedures. *Do not test piping with pressurized air.*
- Install DriscoPlex® 5300 Climate Guard® piping products in accordance with accepted standards for water-source heat pump applications and ASTM D 2774 *Underground Installation of Thermoplastic Pressure Piping*.
- When laid in a trench, ensure that the trench bottom is smooth and free from sharp or angular objects. Embedment soils must be free from refuse, organic material, cobbles, boulders, large rocks or stones, and frozen clods. Blocking must not be used to change pipe grade or to intermittently support pipe across excavated sections.
- When installed down-hole, such as in a vertical loop, be sure any ballast used to facilitate down-hole insertion does not impinge, gouge or cut into the pipe.

Technical Information

Heat Transfer

Heat transfer properties of various materials can be expressed by a "K-Value". A higher K-Value reflects greater heat transfer properties.

Material	K-Value, BTU/h-ft-°F
DriscoPlex [®] 5300 Climate Guard [®] PE 3608	0.225
PVC	0.087

Table 1 Approximate Water Volume for 100 Feet of Pipe†

Nominal Pipe Size	Gallons	Nominal Pipe Size	Gallons
3/4" IPS DR 11	2.93	3" IPS DR 11	32.57
1" IPS DR 11	4.60	4" IPS DR 11	53.84
1-1/4" IPS DR 11	7.33	6" IPS DR 15.5	133.47
1-1/2" IPS DR 11	9.60	8" IPS DR 15.5	226.17
2" IPS DR 11	15.00		

* Approximate volume of water in U.S. gallons at 73°F for ASTM D 3035 nominal outside diameter and average wall thickness for pipe.

Table 2 Climate Guard[®] 5300 Pressure Rating (psi) vs. Temperature (°F)‡

Temp, °F	DR 15.5	SDR 11	SDR 9**
73	110	160	200
80	104	151	189
90	95	138	173
100	87	126	157
110	78	114	142
120	70	102	128
130	63	91	114
140	55	80	100

* PE 3408 pressure ratings for water. PE 3408 HDB = 1600 psi at 73°F and 800 psi at 140°F. Intermediate temperature LTHS interpolated in accordance with PPI TN-18. ** Optional SDR 9 for Unicoil™.

Table 3 Estimated Flow Properties for 100 Feet of Pipe - GPM, Pressure Drop (psi), Velocity (fps), Velocity (ft/min)

GPM	3/4" IPS DR 11		1" IPS DR 11		1-1/4" IPS DR 11		1-1/2" IPS DR 11		2" IPS DR 11		3" IPS DR 11		4" IPS DR 11		6" IPS DR 15.5		8" IPS DR 15.5	
	psi	fps	psi	fps	psi	fps	psi	fps	psi	fps	psi	fps	psi	fps	psi	fps	psi	fps
2	0.34	1.14	0.11	0.73	0.04	0.46	0.02	0.35	0.01	0.22								
3	0.73	1.71	0.24	1.09	0.08	0.68	0.04	0.52	0.01	0.33								
4	1.24	2.27	0.41	1.45	0.13	0.91	0.07	0.69	0.02	0.44								
5	1.87	2.84	0.63	1.81	0.20	1.14	0.10	0.87	0.04	0.56	0.01	0.26						
6	2.62	3.41	0.88	2.18	0.28	1.37	0.15	1.04	0.05	0.67	0.01	0.31						
7	3.48	3.98	1.17	2.54	0.38	1.59	0.19	1.22	0.07	0.78	0.01	0.36						
8	4.46	4.55	1.49	2.90	0.48	1.82	0.25	1.39	0.08	0.89	0.01	0.41						
9	5.54	5.12	1.85	3.26	0.60	2.05	0.31	1.56	0.10	1.00	0.02	0.46						
10	6.74	5.69	2.25	3.63	0.73	2.28	0.38	1.74	0.13	1.11	0.02	0.51	0.01	0.31				
12			3.16	4.35	1.02	2.73	0.53	2.08	0.18	1.33	0.03	0.61	0.01	0.37				
15			4.77	5.44	1.54	3.41	0.80	2.60	0.27	1.67	0.04	0.77	0.01	0.46				
18			6.69	6.53	2.15	4.10	1.12	3.13	0.38	2.00	0.06	0.92	0.02	0.56				
21					2.86	4.78	1.48	3.65	0.50	2.33	0.08	1.07	0.02	0.65				
24					3.66	5.46	1.90	4.17	0.64	2.67	0.10	1.23	0.03	0.74				
27					4.56	6.14	2.36	4.69	0.80	3.00	0.12	1.38	0.04	0.84				
30					5.54	6.83	2.87	5.21	0.97	3.33	0.15	1.54	0.04	0.93				
35					7.37	7.96	3.82	6.08	1.29	3.89	0.20	1.79	0.06	1.08	0.01	0.44		
40							4.89	6.95	1.65	4.45	0.25	2.05	0.07	1.24	0.01	0.50		
45							6.08	7.81	2.05	5.00	0.31	2.30	0.09	1.39	0.01	0.56		
50							7.39	8.68	2.49	5.56	0.38	2.56	0.11	1.55	0.01	0.62		
55									2.97	6.11	0.45	2.81	0.13	1.70	0.01	0.69		
60									3.49	6.67	0.53	3.07	0.16	1.86	0.02	0.75		
70									4.65	7.78	0.70	3.58	0.21	2.17	0.02	0.87	0.01	0.52
80									5.95	8.89	0.90	4.09	0.27	2.48	0.03	1.00	0.01	0.59
90									7.40	10.00	1.12	4.61	0.33	2.79	0.04	1.12	0.01	0.66
100											1.36	5.12	0.40	3.10	0.04	1.25	0.01	0.84
110											1.63	5.63	0.48	3.41	0.05	1.37	0.01	0.81
120											1.91	6.14	0.56	3.72	0.06	1.50	0.02	0.88
130											2.21	6.65	0.65	4.02	0.07	1.82	0.02	0.96

H.U.S. gallons of water. ASTM D 3035 nominal outside diameter & average wall thickness. Pressure drop estimated using Hazen-Williams C = 150 for water at 60°F.

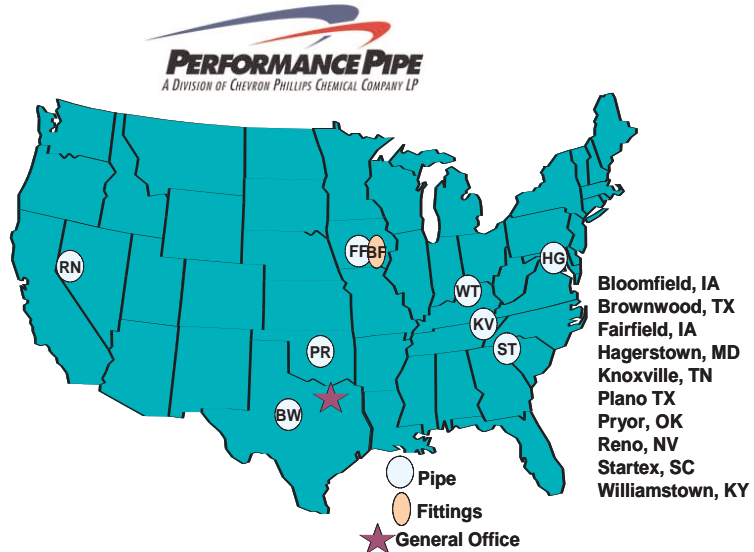
CONTACT INFORMATION:

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To secure product information
or technical assistance:

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www.performancepipe.com

PERFORMANCE PIPE PLANTS



Strategically Located Plants
To Better Serve Your Needs!



PERFORMANCE PIPE Product Literature

Technical Notes & Bulletins:

- PP 102-DS DRISCOPLEX® 5300 Series Climate Guard® Geothermal Piping System Data Sheet
- PP 652 Model Specifications for DRISCOPLEX® 5300 Climate Guard® System
- PP 653 Warranty
- PP 655 Submittal

Visit www.performancepipe.com for the latest literature.



DRISCOPEX[®] 5300 Series Climate Guard[®] Polyethylene Pipe and Fusion Fittings Limited Warranty

5300 Series Products:

Performance Pipe warrants DriscoPlex[®] 5300 Series Climate Guard[®] pipe and fusion fittings for a period of 50 years against defects in workmanship and materials. This warranty is valid when pipe and/or fittings are utilized and installed in a closed loop geothermal heat pump system in accordance with accepted and approved industry guidelines and practices. This warranty applies only to Performance Pipe DriscoPlex[®] 5300 Series Climate Guard[®] pipe and fusion fittings. It does not apply to any fusion joining process or any other method or device used to join the pipe or fusion fitting performed by any other party. It does not apply to the design or installation of the system or any other component of the system.

Subject to the price adjustments described below, Performance Pipe will replace, with a like quantity of new products, any DriscoPlex[®] 5300 Series Climate Guard[®] pipe or fusion fittings that were installed and utilized as described above and that subsequently fail within fifty (50) years from the date of purchase due to a defect in workmanship or materials. For warranty claims occurring within one year after the date of purchase, the defective product(s) shall be replaced free of product and freight charges. For warranty claims occurring during the second (2nd) through eleventh (11th) years after the date of purchase, the replacement product cost and freight expense borne by Performance Pipe shall be calculated by reducing the then current price by eight percent (8%) per year. For warranty claims occurring during the twelfth (12th) through the fiftieth (50th) years after the date of purchase, the replacement product cost and freight expense borne by Performance Pipe shall be calculated by reducing the then current price by eighty percent (80%) plus one half percent (0.5%) per year for each year after the 11th year.

SUBJECT TO ANY EXPRESS WARRANTIES CONTAINED IN PERFORMANCE PIPE'S SALES ORDER APPLICABLE TO THE PRODUCT(S) IN QUESTION, THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, EXPRESS OR IMPLIED, AND PERFORMANCE PIPE DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. PERFORMANCE PIPE SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES RELATING TO DEFECTS OF PERFORMANCE PIPE DRISCOPEX[®] 5300 SERIES CLIMATE GUARD[®] PIPE AND FUSION FITTINGS, WHETHER USED SINGULARLY OR IN COMBINATION WITH OTHER PRODUCTS OR MATERIALS. Some states do not allow this exclusion, so it may not apply to you. This limited warranty gives the purchaser specific legal rights and there may be other rights, which vary from state to state.

Model Specifications DRISCOPLEX[®] 5300 Series Climate Guard[®] Systems for Geothermal Applications

Scope: This specification designates requirements for geothermal (ground source heat pump) pipe and fittings.

Material: All pipe and heat fused materials shall be manufactured from high density, extra-high molecular weight PE 3608 material. The material shall have a 1600 psi Hydrostatic Design Basis at 73.4 degrees F per ASTM D-2837, and shall be listed in PPI TR4 as a PE3608 piping formulation. The material shall have a cell classification of 345464C or greater as specified in ASTM D-3350.

Pipe: The extruded pipe shall conform to the specifications and requirements of ASTM D-3035. Clean rework material from the manufacturer's own production may be used provided the pipe or fittings meet all requirements of this specification. Recycled and reclaimed materials from outside the manufacturer's plant shall not be used. Pipe used for vertical bore applications shall include a fused, single, piece, injection molded U-bend Polywing fitting. The approved pipe product is DRISCOPLEX[®] 5300 Series Climate Guard[®] Pipe from Performance Pipe.

Fittings: Molded fittings shall be manufactured to the specifications and requirements of ASTM D-2683 for socket fittings, ASTM D-3261 for butt fittings. All fittings shall be rated for pressure service equivalent to SDR 11 PE 3608 pipe.

The approved fittings are DRISCOPLEX[®] 5300 Series Climate Guard[®] Systems from Performance Pipe.

Joints: Where heat fusion is used for joining, persons performing heat fusion shall be qualified in accordance with the manufacturer's recommended fusion joining procedures. Electrofusion and mechanical joints shall be made in accordance with the fitting manufacturer's instructions.

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Manufacturer: The pipe and fittings manufacturer shall have in place a functional quality assurance program shall and be ISO (the International Organization for Standardization) Certified.

The approved manufacturer for pipe and fittings is Performance Pipe

Marking: Each pipe shall be durably marked with the manufacturer's name, nominal size, pressure rating, ASTM standard, material designation or cell classification number and date and location of manufacture. Coils shall be marked with footage marks at intervals no greater than two feet. Each fitting shall be identified with the manufacturer's name, nominal size, ASTM standard and lot number.

Installation: Construction and installation shall be in compliance with IGSHPA Standards and all applicable local, state and federal regulations. The Contractor shall observe all appropriate safety requirements in accordance with local, state and federal codes and regulations.

Hydrotesting: The completed system shall be hydrostatically tested at a pressure not greater than 150% of the pipe pressure rating in accordance with industry accepted hydrostatic leak testing procedures. Testing with compressed air or a compressed gas is prohibited.

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PerformancePipe.com

DRISCOPLEX® 5300 Climateguard® HDPE PIPE DATA SHEET

DriscoPlex® 5300 Pipe meets or exceeds:

ASTM D3035
ASTM D3350, cell classification PE345464C
PPI TR-4 designation PE3608

DriscoPlex® 5300 Pipe for:

Groundsource Heat Pumps, Icerink Piping, Snowmelt
Iron Pipe Size OD (IPS) ¾" to 24"
20', 40' and 50' Joints / Solid Black
Coils available in various lengths in sizes through 6"
UniCoils® available in ¾", 1" and 1 ¼"

NOMINAL PIPE PROPERTIES ⁽¹⁾		UNIT	TEST METHOD	VALUE
Density		gms / cm ³	ASTM D1505	0.955 (black)
Melt Index (MI)	Condition 190°C / 2.16kg	gms / 10 minutes	ASTM D1238	0.08
Hydrostatic Design Basis	73° F (23° C)	psi	ASTM D2837	1600
Hydrostatic Design Basis	140° F (60° C)	psi	ASTM D2837	800
Color: UV Stabilizer [C]		---	ASTM D3350	Min 2% Carbon Black
NOMINAL MATERIAL PROPERTIES ^{(1) (2)}		UNIT	TEST METHOD	VALUE
Flexural Modulus	2% Secant – 16:1 span: depth. 0.5 in / min.	psi	ASTM D790	>110,000
Tensile Strength at Yield		psi	ASTM D638 Type IV	3200
Elongation at Break	2 in / min., Type IV Bar	%	ASTM D638	>800
Elastic Modulus		psi	ASTM D638	>150,000
Hardness		Shore D	ASTM D2240	62
PENT		hrs	ASTM F1473	>100
Vicat Softening Temperature		°F	ASTM D1525	256
Brittleness Temperature		°F	ASTM D746	< -103
Thermal Expansion		in / in / °F	ASTM D696	1.0 x 10 ⁻⁴

1. This is not a product specification and does not guarantee or establish specific minimum or maximum values or manufacturing tolerance for material or piping products to be supplied.
2. Values obtained from tests of specimens taken from piping product may vary from these typical values.

When Performance Matters Rely on
Performance Pipe

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This data sheet provides typical properties for Performance Pipe DriscoPlex® pipe and fittings. Before using this product, the user is advised and cautioned to make their own determination and assessment of the safety and suitability of the product for the specific use in question and is further advised against relying on the information contained herein as it may relate to any specific use or application. It is the ultimate responsibility of the user to ensure that the product is suited and the information is applicable to the user's specific application. Chevron Phillips Chemical Company LP does not make, and expressly disclaims, all warranties, including warranties of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, allegedly arising from any usage of any trade or from any course of dealing in connection with the use of information contained herein or the product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with the use of the information contained herein or the product itself. Further, information contained herein is given without reference to any intellectual property issues, as well as federal, state or local laws which may be encountered in the use thereof. Such questions should be investigated by the user. The data sheet may change periodically. Visit www.PerformancePipe.com for the most current data sheet.

TechData

PRODUCT SPECIFICATION SHEET

The Viega logo consists of the word "viega" in a lowercase, sans-serif font, colored yellow, set against a black rectangular background. Below this black rectangle is a solid yellow horizontal bar.

ProGeo High Density Polyethylene Socket Heat Fusion Fittings For Water Source Earth-Coupled Heat Pump Systems

Scope

This product specification designates the requirements for ProGeo high density polyethylene (HDPE) socket heat fusion fittings to be used as connections for Iron Pipe Size outside diameter (IPS-OD) controlled HDPE pipe in ¾", 1", 1 ¼", 1 ½", and 2" sizes.

Materials

ProGeo HDPE socket heat fusion fittings are manufactured from a bimodal polyethylene resin PE4710 with a cell classification, PE345564C per ASTM D-3350. This high performance resin exhibits enhanced performance properties including superior Slow Crack Growth (SCG) resistance plus improved tensile strength and modulus.

ProGeo socket fusion by metallic adapter fittings are manufactured using machined components of brass alloy B360 per ASTM B-16.

Recommended Uses

ProGeo socket heat fusion fittings are intended and recommended for use in open or closed loop, water source earth coupled heat pump systems installed with IPS-OD, HDPE pipe manufactured to a minimum pressure rating of SDR11 or Schedule 40.

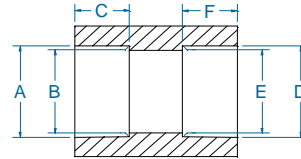
Handling and Installation

ProGeo socket heat fusion fittings shall be installed in accordance with industry accepted and approved procedures, applicable code requirements and current assembly guidelines available from Viega, LLC. Prior to installation, ProGeo socket heat fusion fittings should be stored in a clean, dry location.



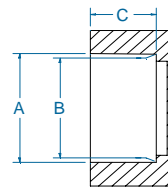
ProGeo

Couplers



SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657294	YFPC44	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.			
657295	YFPC54	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.			
657296	YFPC55	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.			
657297	YFPC64	1.620±.008	1.612 +.008 -.016	.875 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.			
657298	YFPC65	1.620±.008	1.612 +.008 -.016	.875 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.			
657299	YFPC66	1.620±.008	1.612 +.008 -.016	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.			
657301	YFPC74	1.860±.010	1.849 +.010 -.020	.875 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.			
657302	YFPC75	1.860±.010	1.849 +.010 -.020	.875 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.			
657303	YFPC76	1.860±.010	1.849 +.010 -.020	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.			
657304	YFPC77	1.860±.010	1.849 +.010 -.020	.875 Min.	1.860±.010	1.849 +.010 -.020	.875 Min.			
657305	YFPC85	2.235±.010	2.324 +.010 -.020	.875 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.			
657306	YFPC86	2.235±.010	2.324 +.010 -.020	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.			
657307	YFPC87	2.235±.010	2.324 +.010 -.020	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.			
657308	YFPC88	2.235±.010	2.324 +.010 -.020	.875 Min.	2.235±.010	2.324 +.010 -.020	.875 Min.			

Caps

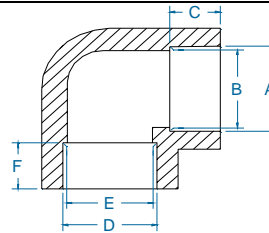


SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657309	YFPCP4	1.020 ±.008	1.012 +.008 -.012	.625 Min.						
657310	YFPCP5	1.275 ±.008	1.267 +.008 -.012	.687 Min.						
657311	YFPCP6	1.620±.008	1.612 +.008 -.016	.875 Min.						
657312	YFPCP7	1.860±.010	1.849 +.010 -.020	.875 Min.						
657313	YFPCP8	2.235±.010	2.324 +.010 -.020	.875 Min.						



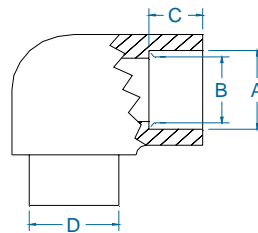
ProGeo

90° Elbows



SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657315	YFPE44	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.			
657317	YFPE54	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.			
657318	YFPE55	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.			
	YFPE64	1.620±.008	1.612 +.008 -.016	.875 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.			
657322	YFPE65	1.620±.008	1.612 +.008 -.016	.875 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.			
657323	YFPE66	1.620±.008	1.612 +.008 -.016	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.			
657326	YFPE77	1.860±.010	1.849 +.010 -.020	.875 Min.	1.860±.010	1.849 +.010 -.020	.875 Min.			
657327	YFPE86	2.235±.010	2.324 +.010 -.020	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.			
657945	YFPE88	2.235±.010	2.324 +.010 -.020	.875 Min.	2.235±.010	2.324 +.010 -.020	.875 Min.			

90° U-Bend Elbows

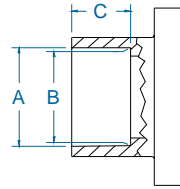


SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657331	YFPEU44	1.020 ±.008	1.012 +.008 -.012	.625 Min.	3/4" PIPE STUB					
657332	YFPEU55	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1" PIPE STUB					
657333	YFPEU66F	1.620±.008	1.612 +.008 -.016	.875 Min.	1 1/4" FEMALE					
657334	YFPEU66M	1.620±.008	1.612 +.008 -.016	.875 Min.	1 1/4" PIPE STUB					



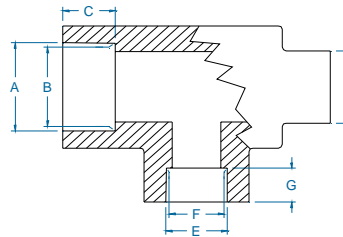
ProGeo

Flanges



SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657335	YFPF45	1.020 ±.008	1.012 +.008 -.012	.625 Min.	* SLIM FLANGE					
657337	YFPFF4	1.020 ±.008	1.012 +.008 -.012	.625 Min.						
657338	YFPFF5	1.275 ±.008	1.267 +.008 -.012	.687 Min.						
657340	YFPFF6	1.620±.008	1.612 +.008 -.016	.875 Min.						
657341	YFPFF8	2.235±.010	2.324 +.010 -.020	.875 Min.						

Header Tees

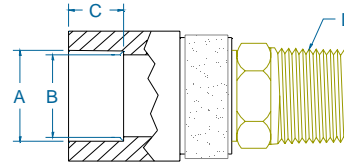


SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657342	YFPFT554	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1" PIPE STUB	1.020 ±.008	1.012 +.008 -.012	.625 Min.		
657343	YFPFT555	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1" PIPE STUB	1.275 ±.008	1.267 +.008 -.012	.687 Min.		
657344	YFPFT654	1.620±.008	1.612 +.008 -.016	.875 Min.	1" PIPE STUB	1.020 ±.008	1.012 +.008 -.012	.625 Min.		
	YFPFT655	1.620±.008	1.612 +.008 -.016	.875 Min.	1" PIPE STUB	1.275 ±.008	1.267 +.008 -.012	.687 Min.		
657346	YFPFT664	1.620±.008	1.612 +.008 -.016	.875 Min.	1 1/4" PIPE STUB	1.020 ±.008	1.012 +.008 -.012	.625 Min.		
657347	YFPFT665	1.620±.008	1.612 +.008 -.016	.875 Min.	1 1/4" PIPE STUB	1.275 ±.008	1.267 +.008 -.012	.687 Min.		



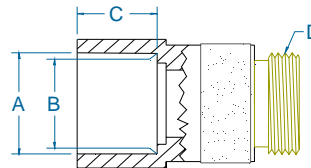
ProGeo

Male Pipe Thread Adapters



SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657348	YFPMA44	1.020 ±.008	1.012 +.008 -.012	.625 Min.	3/4" MPT					
657349	YFPMA45	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1" MPT					
657350	YFPMA54	1.275 ±.008	1.267 +.008 -.012	.687 Min.	3/4" MPT					
657351	YFPMA55	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1" MPT					
657352	YFPMA64	1.620±.008	1.612 +.008 -.016	.875 Min.	3/4" MPT					
657353	YFPMA65	1.620±.008	1.612 +.008 -.016	.875 Min.	1" MPT					
657354	YFPMA66	1.620±.008	1.612 +.008 -.016	.875 Min.	1 1/4" MPT					
657355	YFPMA67	1.620±.008	1.612 +.008 -.016	.875 Min.	1 1/2" MPT					
657356	YFPMA77	1.860±.010	1.849 +.010 -.020	.875 Min.	1 1/2" MPT					
657357	YFPMA86	2.235±.010	2.324 +.010 -.020	.875 Min.	1 1/4" MPT					
657358	YFPMA87	2.235±.010	2.324 +.010 -.020	.875 Min.	1 1/2" MPT					
657359	YFPMA88	2.235±.010	2.324 +.010 -.020	.875 Min.	2" MPT					

Male Nominal Thread Adapter Couplers

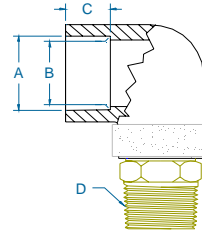


SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657360	YFPMC45S	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1" MNT					
	YFPMC55S	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1" MNT					
657362	YFPMC56S	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1 1/4" MNT					
657363	YFPMC65S	1.620±.008	1.612 +.008 -.016	.875 Min.	1" MNT					
657364	YFPMC66S	1.620±.008	1.612 +.008 -.016	.875 Min.	1 1/4" MNT					



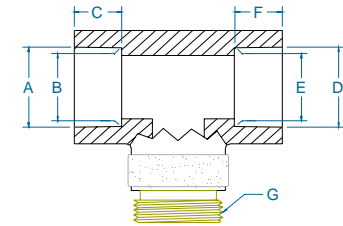
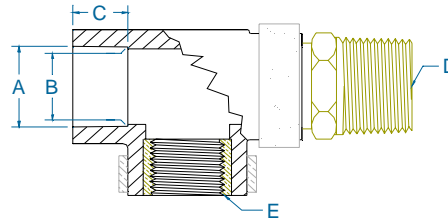
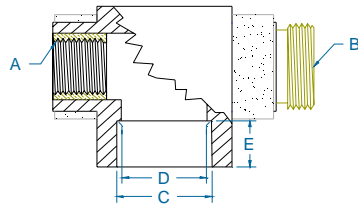
ProGeo

90° Male Adapter Elbows



SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657365	YFPME45S	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1" MNT					
657368	YFPME55S	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1" MNT					
657366	YFPME54	1.275 ±.008	1.267 +.008 -.012	.687 Min.	3/4" MPT					
657367	YFPME55	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1" MPT					
657369	YFPME65	1.620±.008	1.612 +.008 -.016	.875 Min.	1" MPT					
657370	YFPME66	1.620±.008	1.612 +.008 -.016	.875 Min.	1 1/4" MPT					

Male Thread Adapter Tees

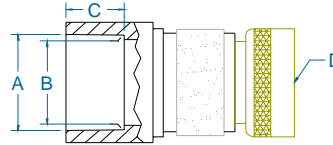


SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657371	YFPMT355	1/2" FPT	1" MNT	1.275 ±.008	1.267 +.008 -.012	.687 Min.				
657372	YFPMT453	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1" MNT	1/2" FPT				
657373	YFPMT553	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1" MPT	1/2" FPT				
657374	YFPMT555S	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1" MNT		
657375	YFPMT665S	1.620±.008	1.612 +.008 -.016	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.	1" MNT		



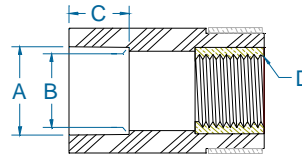
ProGeo

Female Thread Swivel Adapters



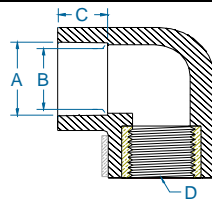
SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657376	YFPSA45	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1" FNT SWIVEL					
657377	YFPSA55	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1" FNT SWIVEL					
657378	YFPSA65	1.620±.008	1.612 +.008 -.016	.875 Min.	1" FNT SWIVEL					

Female Pipe Thread Adapters



SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657379	YFPSC42	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1/4" FPT					
657380	YFPSC43	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1/2" FPT					
657381	YFPSC52	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1/4" FPT					
657382	YFPSC53	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1/2" FPT					
657383	YFPSC54	1.275 ±.008	1.267 +.008 -.012	.687 Min.	3/4" FPT					

Female Pipe Thread Adapter 90° Elbows

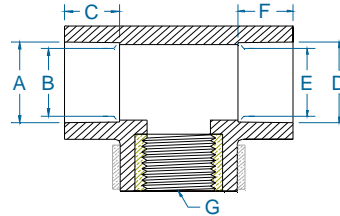


SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657384	YFPSE43	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1/2" FPT					
657385	YFPSE44	1.020 ±.008	1.012 +.008 -.012	.625 Min.	3/4" FPT					



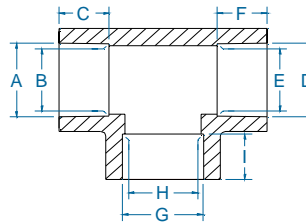
ProGeo

Female Pipe Thread Adapter Tees



SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657386	YFPST443	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1/2" FPT		
657387	YFPST553	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1/2" FPT		

Tees



SAP NUMBER	DRAWING NUMBER	DIMENSIONS								
		A	B	C	D	E	F	G	H	I
657388	YFPT444	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.
657389	YFPT554	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.
657390	YFPT555	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.
657391	YFPT644	1.620±.008	1.612 +.008 -.016	.875 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.
657392	YFPT655	1.620±.008	1.612 +.008 -.016	.875 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.
657393	YFPT664	1.620±.008	1.612 +.008 -.016	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.
657394	YFPT665	1.620±.008	1.612 +.008 -.016	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.
657396	YFPT666	1.620±.008	1.612 +.008 -.016	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.
657397	YFPT775	1.860±.010	1.849 +.010 -.020	.875 Min.	1.860±.010	1.849 +.010 -.020	.875 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.
657398	YFPT777	1.860±.010	1.849 +.010 -.020	.875 Min.	1.860±.010	1.849 +.010 -.020	.875 Min.	1.860±.010	1.849 +.010 -.020	.875 Min.
657399	YFPT866	2.235±.010	2.324 +.010 -.020	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.
657400	YFPT884	2.235±.010	2.324 +.010 -.020	.875 Min.	2.235±.010	2.324 +.010 -.020	.875 Min.	1.020 ±.008	1.012 +.008 -.012	.625 Min.
657401	YFPT885	2.235±.010	2.324 +.010 -.020	.875 Min.	2.235±.010	2.324 +.010 -.020	.875 Min.	1.275 ±.008	1.267 +.008 -.012	.687 Min.
657402	YFPT886	2.235±.010	2.324 +.010 -.020	.875 Min.	2.235±.010	2.324 +.010 -.020	.875 Min.	1.620±.008	1.612 +.008 -.016	.875 Min.
657403	YFPT888	2.235±.010	2.324 +.010 -.020	.875 Min.	2.235±.010	2.324 +.010 -.020	.875 Min.	2.235±.010	2.324 +.010 -.020	.875 Min.

PRESSURE RATING:

PE4710 Socket Fusion Fittings are typically produced in SDR 7 and are pressure rated in accordance with industry and regulatory guidelines for natural gas or water @73°F. Pressure ratings are subject to change depending on ambient temperatures. Pressure ratings vary according to wall thickness and the design factor for the intended application, see below for ratings:

Fitting SDR	Pressure Rating (PSI) @ 73° F (23° C)			
	Water (.63 DSF)	Water (.5 DSF)	Natural Gas (.32 DSF) US	Natural Gas (.4 DSF) Canada
7	335	265	170*	215*
9	250	200	125*	160*
11	200	160	100	125
13.5	160	125	80	100
17	125	100	65	80
21	100	80	50	65
26	80	65	40	50
32.5	65	50	30	40

* Subject to maximum operating pressure limits of regulatory requirements.

Minimum wall thickness for plastic piping gas distribution systems is limited to .062".

Above listed pressure ratings based on 73°F ambient temperature. Pressure ratings subject to derating depending on temperature.

PRESSURE TESTING:

Pressure testing can be conducted in accordance with the recommendations of the pipe manufacturer, or as described in ASTM F2164 STANDARD PRACTICE FOR FIELD LEAK TESTING OF POLYETHYLENE (PE) PRESSURE PIPING SYSTEMS USING HYDROSTATIC PRESSURE, typically 1.5 x's the rated working pressure not exceeding 8 hours in duration for a single test.

MAXIMUM OPERATING TEMPERATURE:

The maximum operating temperature of PE4710 Socket Fusion Fittings is 140°F. Pressure de-rating factors should be considered when operating systems above the 73°F stated pressure rating, to maintain the 50 year substantiated long-term hydrostatic strength of the polyethylene material.

STORAGE/SHELF LIFE:

Black high density polyethylene resin contains a minimum of 2% of a finely dispersed concentration of carbon black which provides protection from UV effects. Even so, it is recommended that fittings which are stored for extended periods (two years or greater) be stored indoors in their original packaging. Fittings stored indoors in their original packaging have a virtually unlimited shelf-life.

CHEMICAL RESISTANCE:

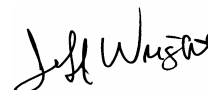
Polyethylene generally exhibits strong resistance to many chemical compounds. Known chemical resistance characteristics at specified temperatures can be found in PPI Technical Report TR-19.

INSTALLATION:

These fittings are intended to be installed by the Socket Heat Fusion method. Fusion jointing procedures can be obtained from Central Plastics upon request and may also be available from the pipe or tubing manufacturer. These fittings can be socket fusion joined to pipe or fittings manufactured from any like or similar resin. Fusion jointing should only be attempted by persons who have been trained and have qualified joints through destructive testing.

Note: This Specification supercedes all previous Product Specifications and is subject to change without notice.

Approved By:



Jeff Wright
Director of Product Management



PRODUCT SPECIFICATION

BUTT FUSION FITTINGS (IPS) PE3408 / PE4710 HDPE BLACK

FAMILY: BUTT FUSION
PRODUCT: PE FITTING
TYPE: SPECIFICATION
DOC: PS-102
REV: 4
FILE: PE BF FIT-PE3408
DATE: 4/17/2009
PAGES: 2

SCOPE:

This document describes the standard specifications and features related to Georg Fischer Central Plastics' injection molded PE4710 (formerly PE3408) Butt Fusion Fittings for pressure piping systems.

SIZES:

1/2" CTS through 2" CTS. TEE, 90 DEGREE ELBOW, REDUCER, CAP,
1/2" IPS through 12" IPS. TEE, 90 DEGREE ELBOW, 45 DEGREE ELBOW, REDUCER, CAP, PURGE FITTING,

REQUIREMENTS:

ASTM D2513 Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings
ASTM D3350 Specification for Polyethylene Plastic Pipes and Fittings Materials
ASTM D3261 Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastics Pipe and Tubing

REFERENCE DOCUMENTS:

PPI TR-19 Thermoplastics Piping for the Transport of Chemicals
PPI TR-31 Underground Installation of Polyolefin Pipe
PPI TR-33 Generic Butt Fusion Procedure for Polyethylene Gas Pipe
ASTM D2657 Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings

CERTIFICATIONS/LISTINGS:

FM 1613 Approval Standard: Plastic Pipe and Fittings for Underground Fire Protection Service
AWWA C906 Standard for Polyethylene Pressure Pipe and Fittings, 4 in. Through 63 in., for Water Distribution
FM 1613 Approval Standard: Plastic Pipe and Fittings for Underground Fire Protection Service
ANSI/NSF 14 Plastic Piping System Components and Related Materials

MATERIALS:

PE Resin: Pre-blended black high density virgin resin. Recognized by the Plastic Pipe Institute as having a PE3408 / PE4710 / PE100 rating and a Hydrostatic Design Basis of 1600 psi @ 73°F. This resin has a cell classification of 445574C* in accordance with ASTM D3350.

Note* Previous editions of ASTM D3350 resulted in cell classifications of 345464C and 345564C.

TEST METHODS:

ASTM D1598 Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.
Must exceed 170 hours in 80°C bath @ 670psi Hoop Stress, or
Must exceed 1000 hours in 80°C bath @ 580psi Hoop Stress, or
Must exceed 1000 hours in 23°C bath @ 1600psi Hoop Stress.
(All methods are considered equivalent)

ASTM D1599 Short-Term Hydraulic Pressure Failure of Plastics Pipe, Tubing, and Fittings.
Uniform pressurization until failure between 60 and 70 seconds from start of test. Most result in ductile failure at a pressure great enough to create a 2520psi Hoop Stress.

ASTM D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
Determination of diameter, wall thickness, and length dimensions including procedures for dimensioning molded thermoplastic pipe fittings.

FEATURES:

Made in USA from pre-blended virgin materials. These fittings are available in various configurations and DR and are primarily intended for use in pressure piping applications. These fittings are compatible for heat fusion to any PE material

made from a like or similar resin. Select sizes can be supplied with AWWA or FM marking. Designed for use on pipe conforming to ASTM F714, D2513, and D3035.

PRESSURE RATING:

PE4710 Butt Fusion Fittings are pressure rated in accordance with industry and regulatory guidelines for natural gas or water @73°F. Pressure ratings are subject to change depending on ambient temperatures. Pressure ratings vary according to wall thickness and the design factor for the intended application, see below for ratings:

Fitting SDR	Pressure Rating (PSI) @ 73° F (23° C)			
	Water (.63 DSF)	Water (.5 DSF)	Natural Gas (.32 DSF) US	Natural Gas (.4 DSF) Canada
7	335	265	170*	215*
9	250	200	125*	160*
11	200	160	100	125
13.5	160	125	80	100
17	125	100	65	80
21	100	80	50	65
26	80	65	40	50
32.5	65	50	30	40

* Subject to maximum operating pressure limits of regulatory requirements.

Minimum wall thickness for plastic piping gas distribution systems is limited to .062".

Above listed pressure ratings based on 73°F ambient temperature. Pressure ratings subject to derating depending on temperature.

PRESSURE TESTING:

Pressure testing can be conducted in accordance with the recommendations of the pipe manufacturer, or as described in ASTM F2164 *STANDARD PRACTICE FOR FIELD LEAK TESTING OF POLYETHYLENE (PE) PRESSURE PIPING SYSTEMS USING HYDROSTATIC PRESSURE*, typically 1.5 x's the rated working pressure not exceeding 8 hours in duration for a single test.

MAXIMUM OPERATING TEMPERATURE:

The maximum operating temperature of PE4710 Butt Fusion Fittings is 140°F. Pressure de-rating factors should be considered when operating systems above the 73°F stated pressure rating, to maintain the 50 year substantiated long-term hydrostatic strength of the polyethylene material.

STORAGE/SHELF LIFE:

Black high density polyethylene resin contains a minimum of 2% of a finely dispersed concentration of carbon black which provides protection from UV effects. Even so, it is recommended that fittings which are stored for extended periods (two years or greater) be stored indoors in their original packaging. Fittings stored indoors in their original packaging have a virtually unlimited shelf-life.

CHEMICAL RESISTANCE:

Polyethylene generally exhibits strong resistance to many chemical compounds. Known chemical resistance characteristics at specified temperatures can be found in PPI Technical Report TR-19.

INSTALLATION:

These fittings are compatible for heat fusion by butt, socket, or electrofusion joining products. They can be heat fusion joined to pipe or fittings manufactured from like or similar resin. Qualified mechanical joining products can be used to join these fittings, consult the manufacturer for recommendations. Fusion jointing should only be attempted by persons who have been trained and have qualified joints through destructive testing.

Note: This Specification supercedes all previous Product Specifications and is subject to change without notice.

Approved By:



Jeff Wright
Director of Product Management



PRODUCT SPECIFICATION

BUTT FUSION FLANGE ADAPTER PE3408/PE4710/PE100 HDPE BLACK

FAMILY:	BUTT FUSION
PRODUCT:	PE FA
TYPE:	SPECIFICATION
DOC:	PS-104
REV:	2
FILE:	PE BF FA-PE3408-PE4710
DATE:	8/23/2006
PAGES:	2

SCOPE:

This document describes the standard specifications and features related to Central Plastics' IPS and DIPS sized PE4710 Butt Fusion Flange Adapter for pressure piping systems.

SIZES:

2" IPS through 24" IPS
4" DIPS through 24" DIPS.

REQUIREMENTS:

ASTM D2513	<u>Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings</u>
ASTM D3350	<u>Specification for Polyethylene Plastic Pipes and Fittings Materials</u>
ASTM D3261	<u>Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastics Pipe and Tubing</u>

REFERENCE DOCUMENTS:

PPI TR-19	<u>Thermoplastics Piping for the Transport of Chemicals</u>
PPI TR-31	<u>Underground Installation of Polyolefin Pipe</u>
PPI TR-33	<u>Generic Butt Fusion Procedure for Polyethylene Gas Pipe</u>
ASTM D2657	<u>Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings</u>
ASTM F714	<u>Standard Specification for Polyethylene (PE) Plastic Pipe Based on Outside Diameter</u>

CERTIFICATIONS/LISTINGS:

FM 1613	<u>Approval Standard: Plastic Pipe and Fittings for Underground Fire Protection Service</u>
AWWA C906	<u>Standard for Polyethylene Pressure Pipe and Fittings, 4 in. Through 63 in., for Water Distribution</u>

MATERIALS:

PE Resin: Pre-blended black high density virgin resin. Recognized by the Plastic Pipe Institute as having a PE3408 / PE4710 / PE100 rating and a Hydrostatic Design Basis of 1600 psi @ 73°F. This resin has a cell classification of 445574C* in accordance with ASTM D3350.

Note* Previous editions of ASTM D3350 resulted in cell classifications of 345464C and 345564C.

TEST METHODS:

ASTM D1598	<u>Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.</u> Must exceed 170 hours in 80°C bath @ 670psi Hoop Stress, or Must exceed 1000 hours in 80°C bath @ 580psi Hoop Stress, or Must exceed 1000 hours in 23°C bath @ 1600psi Hoop Stress. <i>(All methods are considered equivalent)</i>
ASTM D1599	<u>Short-Term Hydraulic Pressure Failure of Plastics Pipe, Tubing, and Fittings.</u> Uniform pressurization until failure between 60 and 70 seconds from start of test. Must result in ductile failure at a pressure great enough to create a 2520psi Hoop Stress.
ASTM D2122	<u>Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings</u> Determination of diameter, wall thickness, and length dimensions including procedures for dimensioning molded thermoplastic pipe fittings.

FEATURES:

Made in USA from pre-blended virgin materials. These fittings are available in various configurations and DR and are primarily intended for use in pressure piping applications. These fittings are compatible for heat fusion to any PE material made from a like or similar resin. Supplied with AWWA C906 marking. Can be supplied with FM certification marking. Can be supplied beveled for butterfly valves.

PRESSURE RATING:

Central Plastics PE3408 Butt Fusion Flange Adapters are pressure rated in accordance with industry and regulatory guidelines for gas (where applicable) and water @73°F. Pressure ratings are subject to de-rating depending on ambient temperatures. Pressure ratings vary according to wall thickness, see below for ratings:

Fitting SDR	Pressure Rating (PSI) @ 73° F (23° C)			
	Water (.63 DSF)	Water (.5 DSF)	Natural Gas (.32 DSF) US	Natural Gas (.4 DSF) Canada
7	335	265	170*	215*
9	250	200	125*	160*
11	200	160	100	125
13.5	160	125	80	100
17	125	100	65	80
21	100	80	50	65
26	80	65	40	50
32.5	65	50	30	40

* Subject to maximum operating pressure limits of regulatory requirements.

Above listed pressure ratings based on 73°F ambient temperature. Pressure ratings subject to derating depending on temperature.

PRESSURE TESTING:

Pressure testing can be conducted in accordance with the recommendations of the pipe manufacturer, or as described in ASTM F2164 STANDARD PRACTICE FOR FIELD LEAK TESTING OF POLYETHYLENE (PE) PRESSURE PIPING SYSTEMS USING HYDROSTATIC PRESSURE, typically 1.5 x's the rated working pressure not exceeding 8 hours in duration for a single test.

MAXIMUM OPERATING TEMPERATURE:

The maximum operating temperature of PE3408 Butt Fusion Fittings is 140°F. Pressure de-rating factors should be considered when operating systems above the 73°F stated pressure rating, to maintain the 50 year substantiated long-term hydrostatic strength of the polyethylene material.

STORAGE/SHELF LIFE:

Black high density polyethylene resin contains a minimum of 2% of a finely dispersed concentration of carbon black which provides some degree of protection from UV effects. Even so, it is recommended that fittings which are stored for extended periods (two years or greater) be stored indoors in their original packaging. Fittings stored indoors in their original packaging have a virtually unlimited shelf-life.

CHEMICAL RESISTANCE:

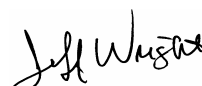
Polyethylene exhibits strong resistance to many chemical compounds. Known chemical resistance characteristics at specified temperatures can be found in PPI Technical Report TR-19.

INSTALLATION:

These fittings are compatible for heat fusion by butt, socket, or electrofusion joining products. They can be heat fusion joined to pipe or fittings manufactured from like or similar resin. Qualified mechanical joining products can be used to join these fittings, consult the manufacturer for recommendations. Fusion jointing should only be attempted by persons who have been trained and have qualified joints through destructive testing. Care should be used when installing to butterfly valves to ensure that there is no interference, verification is the responsibility of the user.

Note: This Specification supercedes all previous Product Specifications and is subject to change without notice.

Approved By:



Jeff Wright
Director of Product Management



PRODUCT SPECIFICATION

BUTT FUSION MECHANICAL JOINT (MJ) ADAPTER PE3408/PE4710/PE100 HDPE BLACK

FAMILY: BUTT FUSION
PRODUCT: PE MJ Adapter
TYPE: SPECIFICATION
DOC: PS-105
REV: 2
FILE: PE BF MJ-PE3408
DATE: 8/30/2006
PAGES: 2

SCOPE:

This document describes the standard specifications and features related to Central Plastics' IPS and DIPS sized PE3408 Butt Fusion Mechanical Joint (MJ) Adapter for pressure piping systems.

SIZES:

3" IPS through 24" IPS
3" DIPS through 24" DIPS.

REQUIREMENTS:

ASTM D3350 Specification for Polyethylene Plastic Pipes and Fittings Materials
ASTM D3261 Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastics Pipe and Tubing

REFERENCE DOCUMENTS:

PPI TR-19 Thermoplastics Piping for the Transport of Chemicals
PPI TR-31 Underground Installation of Polyolefin Pipe
PPI TR-33 Generic Butt Fusion Procedure for Polyethylene Gas Pipe
ASTM D2657 Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe Based on Outside Diameter

CERTIFICATIONS/LISTINGS:

FM 1613 Approval Standard: Plastic Pipe and Fittings for Underground Fire Protection Service
AWWA C906 Standard for Polyethylene Pressure Pipe and Fittings, 4 in. Through 63 in., for Water Distribution

MATERIALS:

PE Resin: Pre-blended black high density virgin resin. Recognized by the Plastic Pipe Institute as having a PE3408 / PE4710 / PE100 rating and a Hydrostatic Design Basis of 1600 psi @ 73 °F. This resin has a cell classification of 445574C* in accordance with ASTM D3350. NSF Listed.

Note* Previous editions of ASTM D3350 resulted in cell classifications of 345464C and 345564C.

TEST METHODS:

ASTM D1598 Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.
Must exceed 170 hours in 80°C bath @ 670psi Hoop Stress, or
Must exceed 1000 hours in 80°C bath @ 580psi Hoop Stress, or
Must exceed 1000 hours in 23°C bath @ 1600psi Hoop Stress.
(All methods are considered equivalent)

ASTM D1599 Short-Term Hydraulic Pressure Failure of Plastics Pipe, Tubing, and Fittings.
Uniform pressurization until failure between 60 and 70 seconds from start of test. Must result in ductile failure at a pressure great enough to create a 2520psi Hoop Stress.

ASTM D2122 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
Determination of diameter, wall thickness, and length dimensions including procedures for dimensioning molded thermoplastic pipe fittings.

FEATURES:

Made in USA from pre-blended virgin materials. These fittings are available in various configurations and DR and are primarily intended for use in pressure piping applications. These fittings are compatible for heat fusion to any PE material made from a like or similar resin. Supplied with AWWA C906 marking. Can be supplied with FM certification marking. Can be supplied beveled for butterfly valves. Can be supplied with accessory kit including gasket, ring, and special length bolts.

PRESSURE RATING:

Central Plastics PE3408/PE4710 Butt Fusion Mechanical Joint Adapters are pressure rated in accordance with industry and regulatory guidelines for water @73°F. Pressure ratings are subject to de-rating depending on ambient temperatures. Pressure ratings vary according to wall thickness, see below for ratings:

Fitting DR	Pressure Rating (PSI) @ 73° F (23° C)	
	Water (.63 DSF)	Water (.5 DSF)
7	335	265
9	250	200
11	200	160
13.5	160	130
17	125	100
21	100	80
26	80	65
32.5	65	50

Above listed pressure ratings based on 73°F ambient temperature. Pressure ratings subject to derating depending on temperature.

PRESSURE TESTING:

Pressure testing can be conducted in accordance with the recommendations of the pipe manufacturer, or as described in ASTM F2164 *STANDARD PRACTICE FOR FIELD LEAK TESTING OF POLYETHYLENE (PE) PRESSURE PIPING SYSTEMS USING HYDROSTATIC PRESSURE*, typically 1.5 x's the rated working pressure not exceeding 8 hours in duration for a single test.

MAXIMUM OPERATING TEMPERATURE:

The maximum operating temperature of PE3408 Butt Fusion Fittings is 140°F. Pressure de-rating factors should be considered when operating systems above the 73°F stated pressure rating, to maintain the 50 year substantiated long-term hydrostatic strength of the polyethylene material.

STORAGE/SHELF LIFE:

Black high density polyethylene resin contains a minimum of 2% of a finely dispersed concentration of carbon black which provides some degree of protection from UV effects. Even so, it is recommended that fittings which are stored for extended periods (two years or greater) be stored indoors in their original packaging. Fittings stored indoors in their original packaging have a virtually unlimited shelf-life.

CHEMICAL RESISTANCE:

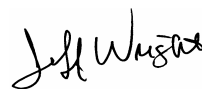
Polyethylene exhibits strong resistance to many chemical compounds. Known chemical resistance characteristics at specified temperatures can be found in PPI Technical Report TR-19.

INSTALLATION:

These fittings are compatible for heat fusion by butt, socket, or electrofusion joining products. They can be heat fusion joined to pipe or fittings manufactured from like or similar resin. Qualified mechanical joining products can be used to join these fittings, consult the manufacturer for recommendations. Fusion jointing should only be attempted by persons who have been trained and have qualified joints through destructive testing. Care should be used when installing to butterfly valves to ensure that there is no interference, verification is the responsibility of the user.

Note: This Specification supercedes all previous Product Specifications and is subject to change without notice.

Approved By:



Jeff Wright
Director of Product Management



PRODUCT SPECIFICATION

SADDLE FUSION FITTINGS HDPE PE3408/PE4710 BLACK

FAMILY:	PE SADDLE
PRODUCT:	SADDLE
TYPE:	SPECIFICATION
DOC:	PS-201
REV:	0
FILE:	SF FIT-PE3408/PE4710
DATE:	4/17/2009
PAGES:	2

SCOPE:

This document describes the standard specifications and features related to Georg Fischer Central Plastics' PE3408/PE4710 Saddle Fusion Fittings for pressure piping systems. This specification covers Tapping Tees and Branch Saddles labeled as ASTM D2513, D3261, and D2683.

SIZES:

Butt Fusion Outlet: 1 1/4" through 12" (Main Size) X 1/2" CTS through 4" (Outlet Size)
Socket Fusion Outlet: 1 1/4" through 8" (Main Size) x 1/2" through 2" (Outlet Size)

REQUIREMENTS:

ASTM D2513	<u>Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings</u>
ASTM D3350	<u>Specification for Polyethylene Plastic Pipes and Fittings Materials</u>
ASTM D3261	<u>Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene Plastic Pipe</u>
ASTM D2683	<u>Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe</u>
ASTM D2837	<u>Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.</u>
ASTM F714	<u>Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter</u>

REFERENCE DOCUMENTS:

ASTM D2657	<u>Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings</u>
PPI TR-19	<u>Thermoplastics Piping for the Transport of Chemicals</u>
PPI TR-31	<u>Underground Installation of Polyolefin Pipe</u>
ANSI/NSF 61	<u>Standard for Drinking Water System Components and Health Effects</u>
ASTM D3035	<u>Standard for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter</u>
ASTM F1290	<u>Standard for Electrofusion Joining Polyolefin Pipe and Fittings</u>
AWWA C906	<u>Standard for Polyethylene Pressure Pipe and Fittings, 4 in. Through 63 in., for Water Distribution</u>
ANSI/NSF 61	<u>Standard for Drinking Water System Components and Health Effects</u>
ASTM F2164	<u>Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure</u>
IGSHPA	<u>Closed-Loop/Geothermal Heat Pump Systems</u>

CERTIFICATIONS/LISTINGS:

ANSI/NSF 14	<u>Plastic Piping System Components and Related Materials</u>
AWWA C906	<u>Standard for Polyethylene Pressure Pipe and Fittings, 4 in. Through 63 in., for Water Distribution</u>
FM 1613	<u>Approval Standard: Plastic Pipe and Fittings for Underground Fire Protection Service</u>

MATERIALS:

PE Resin: Pre-blended black high density virgin resin. Recognized by the Plastic Pipe Institute as having a PE3408 / PE4710 / PE100 rating and a Hydrostatic Design Basis of 1600 psi @ 73°F. This resin has a cell classification of 445574C* in accordance with ASTM D3350.

Note* Previous editions of ASTM D3350 resulted in cell classifications of 345464C and 345564C.

TEST METHODS:

ASTM D1598	<u>Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.</u> Must exceed 170 hours in 80°C bath @ 670psi Hoop Stress, or Must exceed 1000 hours in 80°C bath @ 580psi Hoop Stress, or Must exceed 1000 hours in 23°C bath @ 1600psi Hoop Stress. <i>(All methods are considered equivalent)</i>
ASTM D1599	<u>Short-Term Hydraulic Pressure Failure of Plastics Pipe, Tubing, and Fittings.</u> Uniform pressurization until failure between 60 and 70 seconds from start of test. Most result in ductile failure at a pressure great enough to create a 2520psi Hoop Stress.

FEATURES:

Made in USA from pre-blended virgin materials. These fittings are available in various configurations and DR and are intended for use in pressure piping applications for gas, water, process piping, geothermal, sanitary, or other PE systems. These fittings are compatible for heat fusion to any PE material made from a like or similar resin. These fittings can be joined with qualified mechanical fittings deemed suitable by their manufacturer.

PRESSURE RATING:

PE4710 Butt Fusion Fittings are pressure rated in accordance with industry and regulatory guidelines for natural gas or water @73°F. Pressure ratings are subject to change depending on ambient temperatures. Pressure ratings vary according to wall thickness and the design factor for the intended application, see below for ratings:

Fitting SDR	Pressure Rating (PSI) @ 73° F (23° C)			
	Water (.63 DSF)	Water (.5 DSF)	Natural Gas (.32 DSF) US	Natural Gas (.4 DSF) Canada
7	335	265	170*	215*
9	250	200	125*	160*
11	200	160	100	125
13.5	160	125	80	100
17	125	100	65	80
21	100	80	50	65
26	80	65	40	50
32.5	65	50	30	40

* Subject to maximum operating pressure limits of regulatory requirements.

Minimum wall thickness for plastic piping gas distribution systems is limited to .062".

Above listed pressure ratings based on 73°F ambient temperature. Pressure ratings subject to derating depending on temperature.

PRESSURE TESTING:

Pressure testing can be conducted in accordance with the recommendations of the pipe manufacturer, or as described in ASTM F2164 STANDARD PRACTICE FOR FIELD LEAK TESTING OF POLYETHYLENE (PE) PRESSURE PIPING SYSTEMS USING HYDROSTATIC PRESSURE, typically 1.5 x's the rated working pressure not exceeding 8 hours in duration for a single test.

MAXIMUM OPERATING TEMPERATURE:

The maximum operating temperature of PE4710 Butt Fusion Fittings is 140°F. Pressure de-rating factors should be considered when operating systems above the 73°F stated pressure rating, to maintain the 50 year substantiated long-term hydrostatic strength of the polyethylene material.

STORAGE/SHELF LIFE:

Black high density polyethylene resin contains a minimum of 2% of a finely dispersed concentration of carbon black which provides protection from UV effects. Even so, it is recommended that fittings which are stored for extended periods (two years or greater) be stored indoors in their original packaging. Fittings stored indoors in their original packaging have a virtually unlimited shelf-life.

CHEMICAL RESISTANCE:

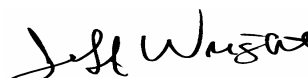
Polyethylene generally exhibits strong resistance to many chemical compounds. Known chemical resistance characteristics at specified temperatures can be found in PPI Technical Report TR-19.

INSTALLATION:

These fittings are compatible for heat fusion by butt, socket, or electrofusion joining products. They can be heat fusion joined to pipe or fittings manufactured from like or similar resin. Qualified mechanical joining products can be used to join these fittings, consult the manufacturer for recommendations. Fusion jointing should only be attempted by persons who have been trained and have qualified joints through destructive testing.

Note: This Specification supercedes all previous Product Specifications and is subject to change without notice.

Approved By:



Jeff Wright
Director of Product Management



Figure # 937

Ductile Iron Wafer Style Butterfly Valve

Product Features

- 200 PSI Sizes 2"-12"
- 150 PSI Sizes 14" - UP
- Ductile Iron Body
- Wafer Style Body
- Cartridge Seat
- ISO 5211 Mounting Flange
- MSS-SP-67



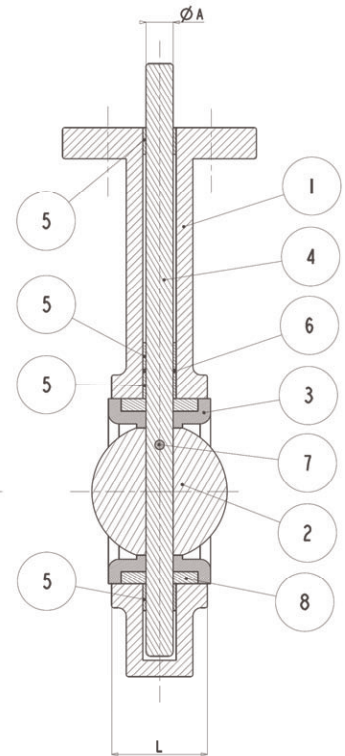
Figure Number Breakdown (Example 937DNSL)

Disc Matl.	Seat Matl.	Stem Matl.	Topworks
B = Aluminum Bronze	E = EPDM	M = 316 SS.	L = Lever
D = Ductile Iron w/ Nickel plating	N = Buna N	S = 416 SS.	G = Gear
M = 316 Stainless Steel	-----	-----	X = Bare Stem

Materials & Specifications

Item	Description	Material
1	Body	Ductile Iron
2	Disc	Alum. Bronze, Ductile Iron or 316 SS.
3	Seat	Buna or EPDM
4	Stem	416 or 316 Stainless Steel
5	Bushings	PTFE
6	O-Ring	NBR
7	Taper Pin	Stainless Steel
8	Seat Support	Plastic

Note: Ductile Iron Disc are electroless Nickel plated



Dimensions, Weights (inches-lbs.) & Valve Data

Size	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
HA	2.99	3.5	3.74	4.49	5.0	5.51	6.81	7.99	9.57	10.51	11.73	12.52	13.74	16.14
HB	6.38	6.89	7.13	7.87	8.39	8.86	10.24	11.5	13.27	14.49	15.75	16.61	18.86	22.13
HC	1.26	1.26	1.26	1.26	1.26	1.26	1.77	1.77	1.77	1.77	2.01	2.01	2.52	2.8
L	1.69	1.81	1.81	2.05	2.2	2.2	2.36	2.68	3.07	3.07	4.02	4.49	5.0	6.0
ØK	4.75	5.5	6.0	7.5	8.5	9.5	11.75	14.25	17.0	18.75	21.25	22.75	25.0	29.5
ØF	.75	.75	.75	.75	.88	.88	.88	1.0	1.0	1.12	1.12	1.25	1.25	1.38
ØA	.5	.5	.5	.63	.75	.75	.87	1.13	1.25	1.25	1.31	1.5	1.62	1.99
N	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Wt. lever	8	9	12	15	20	22	36	46	74	-	-	-	-	-
Wt. Gear	24	25	28	31	36	38	55	65	93	118	177	225	373	538

Seating torques (inch/lbs.)

PSI	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
50	100	150	207	290	423	599	1060	1671	2568	2640	4260	6287	8360	15427
100	106	163	220	323	481	691	1183	1872	2795	3070	4880	7243	9180	16813
150	111	176	232	357	540	783	1307	2074	3023	3500	5500	8200	10000	18200
200	117	189	244	390	598	875	1430	2275	3250	-	-	-	-	-

All torque values shown are for wet (water and other non-lubricating media) on-off service. For dry services (dry gas, etc.) multiply values by 1.15. For lubed service (clean, non-abrasive lubricating media) multiply values by .85. These values do not include a safety factor. An appropriate safety factor should be used when sizing any actuator.

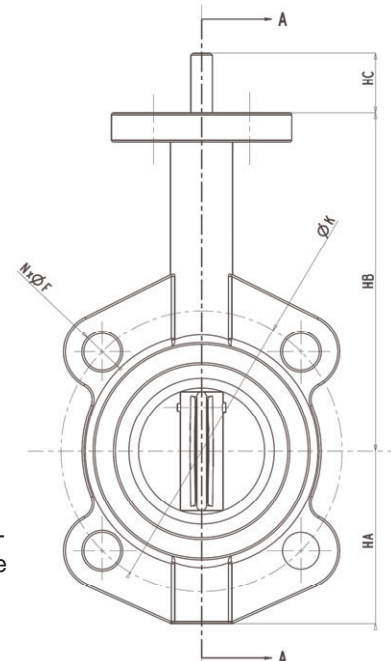
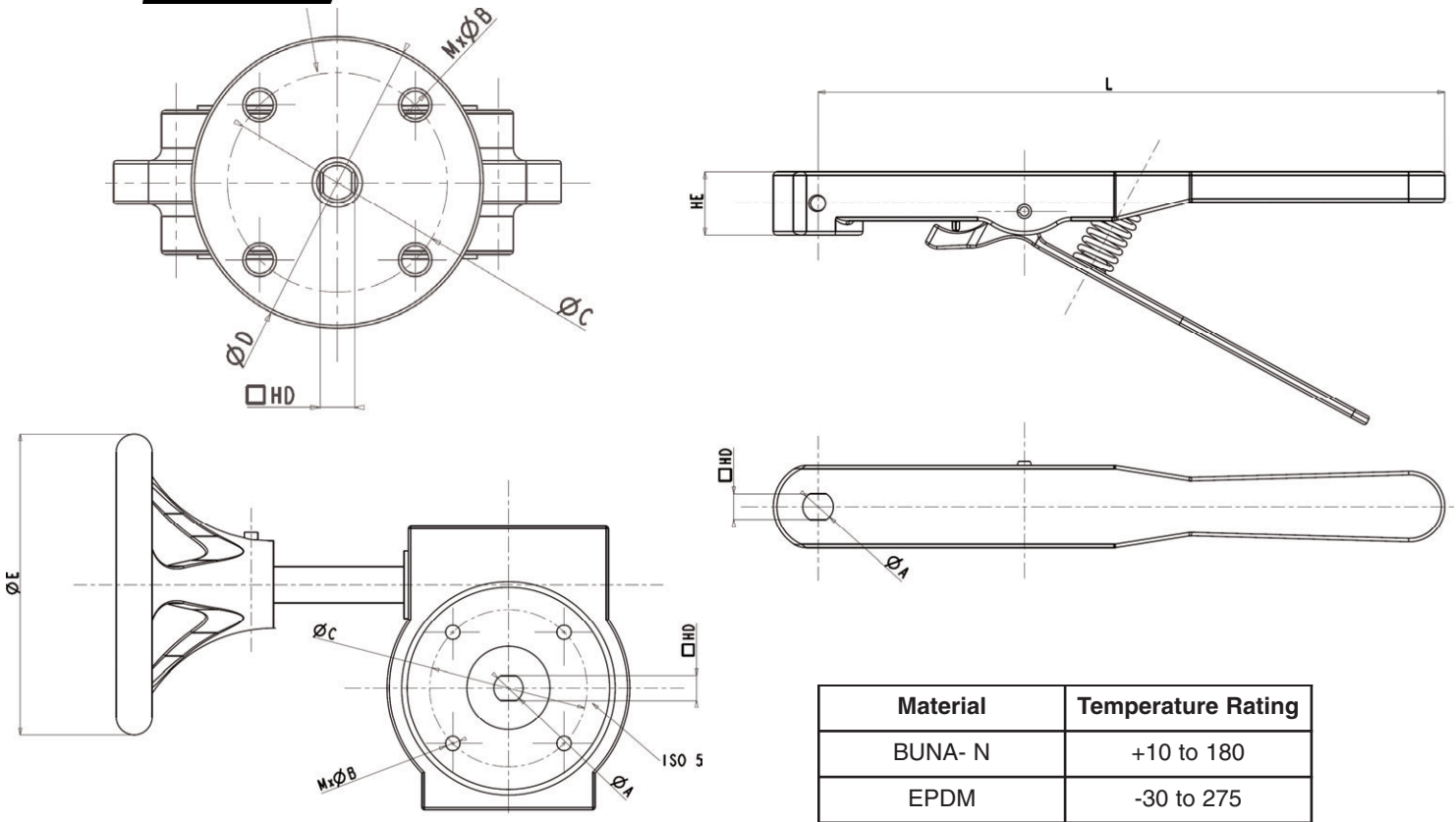




Figure # 937

Ductile Iron Wafer Style Butterfly Valve



Material	Temperature Rating
BUNA- N	+10 to 180
EPDM	-30 to 275

Dimensions (inches) of Stem, Lever and Gear Mounting Information

Size	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
ØA	.5	.5	.5	.63	.75	.75	.87	1.13	1.25	1.25	1.31	1.5	1.62	1.99
HD	.39	.39	.39	.47	.55	.55	.67	.87	.94	.94	1.06	1.06	1.26	1.42
HE	1.06	1.06	1.06	1.06	1.06	1.06	1.22	1.22	1.22	-	-	-	-	-
L	10.51	10.51	10.51	10.51	10.51	10.51	14.13	14.13	14.13	-	-	-	-	-
E	5.91	5.91	5.91	5.91	5.91	5.91	11.81	11.81	11.81	11.81	11.81	11.81	15.75	15.75
ØC	2.76	2.76	2.76	2.76	2.76	2.76	4.02	4.02	4.92	4.92	6.5	6.5	6.50	10.0
ØD	3.62	3.62	3.62	3.62	3.62	3.62	4.92	4.92	5.91	5.91	8.27	8.27	8.27	11.81
ISO	F07	F07	F07	F07	F07	F07	F10	F10	F12	F12	F16	F16	F16	F25

Cv Values - Valve Sizing (US Gallons/minute at 1PSI drop)

Size	Degrees Open									
	10	20	30	40	50	60	70	80	90	
2"	.06	3	7	15	27	44	70	105	115	
2-1/2"	.1	6	12	25	45	75	119	178	196	
3"	.2	9	18	39	70	116	183	275	302	
4"	.3	17	36	78	139	230	364	546	600	
5"	.5	29	61	133	237	392	620	930	1022	
6"	.8	34	94	153	257	422	706	1154	1320	
8"	2	56	154	251	422	693	1158	1892	2165	
10"	3	87	238	385	654	1073	1794	2931	3353	
12"	4	153	417	681	1145	189	3142	5132	5827	
14"	6	183	500	816	1372	2252	3765	6150	7037	
16"	8	271	740	1208	2031	3333	5573	9104	10416	
18"	11	318	867	1417	2382	3909	6535	10676	12215	
20"	14	415	1133	1851	3112	5107	8538	13948	15959	
24"	22	543	1482	2421	4069	668	11165	18240	20869	





Figure # 938

Ductile Iron Lug Style Butterfly Valve

Product Features

- 200 PSI Sizes 2"-12"
- 150 PSI Sizes 14" - UP
- Ductile Iron Body
- Lug Style Body
- Cartridge Seat
- ISO 5211 Mounting Flange
- MSS-SP-67



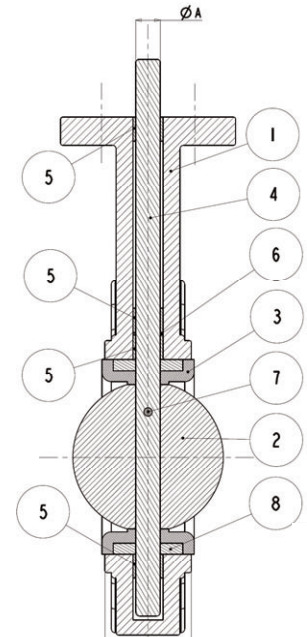
Figure Number Breakdown (Example 938DNSL)

Disc Matl.	Seat Matl.	Stem Matl.	Topworks
B = Aluminum Bronze	E = EPDM	M = 316 SS.	L = Lever
D = Ductile Iron w/ Nickel plating	N = Buna N	S = 416 SS.	G = Gear
M = 316 Stainless Steel	-----	-----	X = Bare Stem

Materials & Specifications

Item	Description	Material
1	Body	Ductile Iron
2	Disc	Alum. Bronze, Ductile Iron or 316 SS.
3	Seat	Buna or EPDM
4	Stem	416 or 316 Stainless Steel
5	Bushings	PTFE
6	O-Ring	NBR
7	Taper Pin	Stainless Steel
8	Seat Support	Plastic

Note: Ductile Iron Disc are electroless Nickel plated



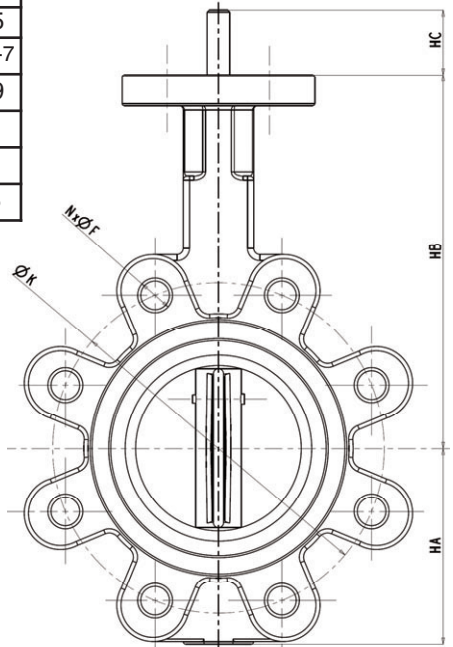
Dimensions, Weights (inches-lbs.) & Valve Data

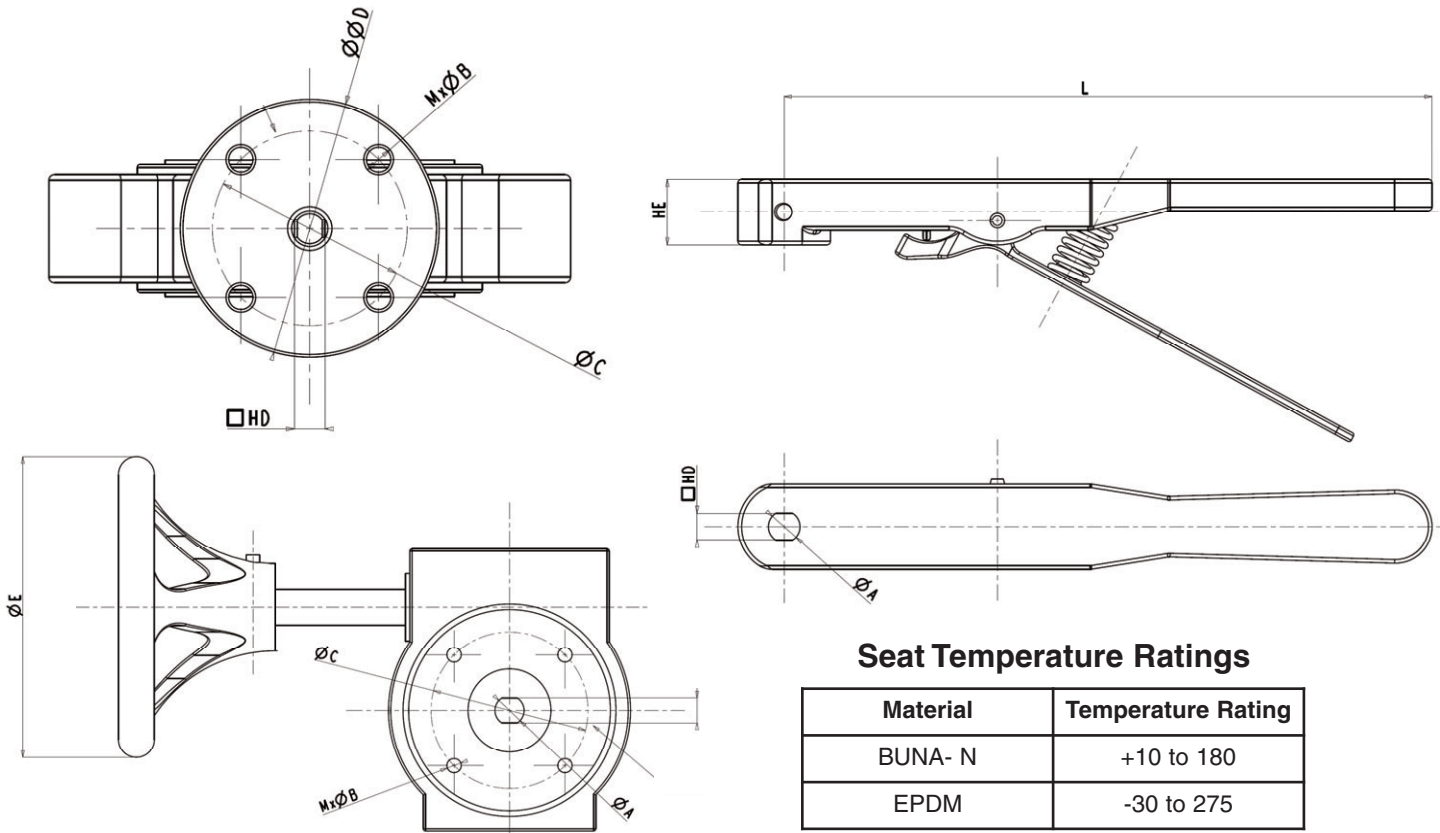
Size	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
HA	2.99	3.5	3.74	4.49	5.0	5.51	6.81	7.99	9.33	10.98	11.97	14.25	14.49	17.48
HB	6.38	6.89	7.13	7.87	8.39	8.86	10.24	11.5	13.27	14.49	15.75	16.61	18.86	22.13
HC	1.26	1.26	1.26	1.26	1.26	1.26	1.77	1.77	1.77	1.77	2.01	2.01	2.52	2.8
L	1.69	1.81	1.81	2.05	2.2	2.2	2.36	2.68	3.07	3.07	4.02	4.49	5.0	6.0
ØK	4.75	5.5	6.0	7.5	8.5	9.5	11.75	14.25	17.0	18.75	21.25	22.75	25.0	29.5
ØF	5/8-11	5/8-11	5/8-11	5/8-11	3/4-10	3/4-10	3/4-10	7/8-9	7/8-9	1"-8	1"-8	1-1/8-8	1-1/8-8	1-1/4-7
ØA	.5	.5	.5	.63	.75	.75	.87	1.13	1.25	1.25	1.31	1.5	1.62	1.99
N # holes	4	4	4	8	8	8	8	12	12	12	16	16	20	20
Wt. lever	9	10	16	28	30	33	53	76	109	-	-	-	-	-
Wt. Gear	25	26	32	44	46	49	72	95	128	178	255	290	494	708

Seating torques (inch/lbs.)

PSI	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
50	100	150	207	290	423	599	1060	1671	2568	2640	4260	6287	8360	15427
100	106	163	220	323	481	691	1183	1872	2795	3070	4880	7243	9180	16813
150	111	176	232	357	540	783	1307	2074	3023	3500	5500	8200	10000	18200
200	117	189	244	390	598	875	1430	2275	3250	-	-	-	-	-

All torque values shown are for wet (water and other non-lubricating media) on-off service. For dry services (dry gas, etc.) multiply values by 1.15. For lubed service (clean, non-abrasive lubricating media) multiply values by .85. These values do not include a safety factor. An appropriate safety factor should be used when sizing any actuator.





Seat Temperature Ratings

Material	Temperature Rating
BUNA- N	+10 to 180
EPDM	-30 to 275

Dimensions (inches) of Stem, Lever and Gear Mounting Information

Size	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
ØA	.5	.5	.5	.63	.75	.75	.87	1.13	1.25	1.25	1.31	1.5	1.62	1.99
HD	.39	.39	.39	.47	.55	.55	.67	.87	.94	.94	1.06	1.06	1.26	1.42
HE	1.06	1.06	1.06	1.06	1.06	1.06	1.22	1.22	1.22	-	-	-	-	-
L	10.51	10.51	10.51	10.51	10.51	10.51	14.13	14.13	14.13	-	-	-	-	-
E	5.91	5.91	5.91	5.91	5.91	5.91	11.81	11.81	11.81	11.81	11.81	11.81	15.75	15.75
ØC	2.76	2.76	2.76	2.76	2.76	2.76	4.02	4.02	4.92	4.92	6.5	6.5	6.50	10.0
ØD	3.62	3.62	3.62	3.62	3.62	3.62	4.92	4.92	5.91	5.91	8.27	8.27	8.27	11.81
ISO	F07	F07	F07	F07	F07	F07	F10	F10	F12	F12	F16	F16	F16	F25

Cv Values - Valve Sizing (US Gallons/minute at 1PSI drop)

Size	Degrees Open									
	10	20	30	40	50	60	70	80	90	
2"	.06	3	7	15	27	44	70	105	115	
2-1/2"	.1	6	12	25	45	75	119	178	196	
3"	.2	9	18	39	70	116	183	275	302	
4"	.3	17	36	78	139	230	364	546	600	
5"	.5	29	61	133	237	392	620	930	1022	
6"	.8	34	94	153	257	422	706	1154	1320	
8"	2	56	154	251	422	693	1158	1892	2165	
10"	3	87	238	385	654	1073	1794	2931	3353	
12"	4	153	417	681	1145	189	3142	5132	5827	
14"	6	183	500	816	1372	2252	3765	6150	7037	
16"	8	271	740	1208	2031	3333	5573	9104	10416	
18"	11	318	867	1417	2382	3909	6535	10676	12215	
20"	14	415	1133	1851	3112	5107	8538	13948	15959	
24"	22	543	1482	2421	4069	668	11165	18240	20869	

8901

1/4" - 3"

**BRASS BALL VALVE
TWO-PIECE, FULL-PORT
600 WOG / 150 SWP
THREADED ENDS ***

**MSS-SP110
NSF61-8
FED. SPEC.
WW-V-35C, II, BZ, 3, C**

SA
C US
ANSI Z 21.15-1997 Z CGA 9.1-M97
3-88 IAS, CR91-002
ASME 16.33-1990
CAN/CGA-3.16-M88

UL US
UL 125
UL 842
Subject 258

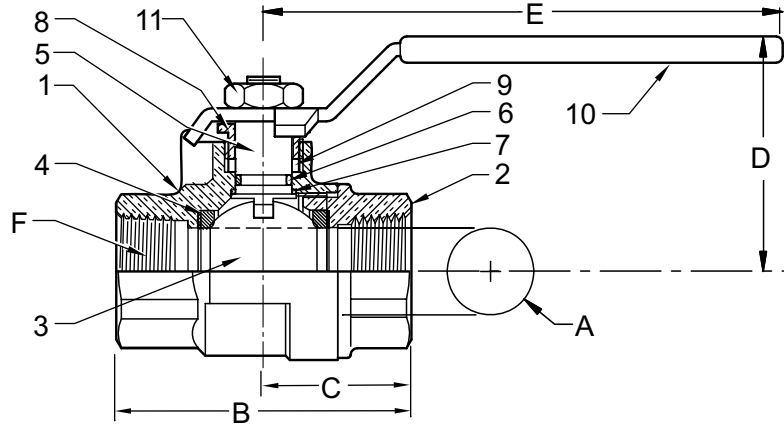
FM
APPROVED
1140

1/2" through 2" (8901)

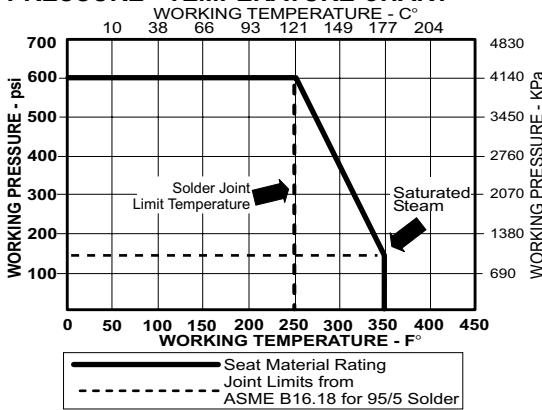
MATERIALS LIST

ITEM	PART	MATERIALS	ASTM SPEC.
1	Body	Brass, Forged	B283
2	Tailpiece	Brass, Forged	B283
3	Ball	Brass w/Chrome Plating	B584
4	Ball Seal	PTFE	Commercial
5	Stem	Brass	B16
6	O-Ring	Buna-N	D2006
7	ThrustWasher	PTFE	Commercial
8	Gland Nut	Brass	B16
9	Packing	PTFE	Commercial
10	Handle	Zinc Die Cast	B633
11	Handle Nut	Brass	B16

* Also Available 8901-07
(Locks only in closed position)



PRESSURE - TEMPERATURE CHART



VACUUM SERVICE TO 29 INCHES Hg

DIMENSIONS

VALVE SIZE	UNITS	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3
A (DIA)	INCHES	.39	.39	.51	.76	1.00	1.26	1.50	2.00	2.48	2.95
	mm	9.9	9.9	13.0	20.1	25.4	32.0	38.1	50.8	63.0	74.9
B	INCHES	1.84	1.84	2.28	2.68	3.11	3.72	4.03	4.72	5.16	6.00
	mm	46.7	46.7	57.9	68.1	79.0	94.5	102.4	119.9	131.1	152.4
C	INCHES	0.92	0.92	1.14	1.34	1.55	1.86	2.02	2.36	2.58	3.00
	mm	23.4	23.4	29.0	34.0	39.4	47.2	51.2	59.9	65.5	76.2
D	INCHES	1.50	1.50	1.61	2.09	2.24	2.76	2.91	3.66	3.94	4.37
	mm	38.1	38.1	40.9	53.1	56.9	70.1	73.9	93.0	100.1	111.0
E	INCHES	3.31	3.31	3.31	4.65	4.65	5.28	5.28	7.87	7.87	7.87
	mm	84.1	84.1	84.1	118.1	118.1	134.1	134.1	199.9	199.9	199.9
F	THREAD SIZE	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT	2-1/2" NPT	3" NPT
Cv	GPM	11.5	11.5	17.9	40.3	71.6	111.9	161.2	286.6	447.8	644.8
TORQUE	in-lb	19	19	19	58	69	89	124	201	445	563
WEIGHT	lbs	0.37	0.33	0.50	1.03	1.40	2.10	2.86	5.94	7.40	10.47
	Kg	0.17	0.15	0.22	0.47	0.63	0.95	1.30	2.69	3.35	4.75

Rev. 1

The information presented on this sheet is correct at the time of publication. Hammond Valve reserves the right to change design, and/or material specifications without notice. For the most current information access www.hammondvalve.com

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