Clickable bookmarks

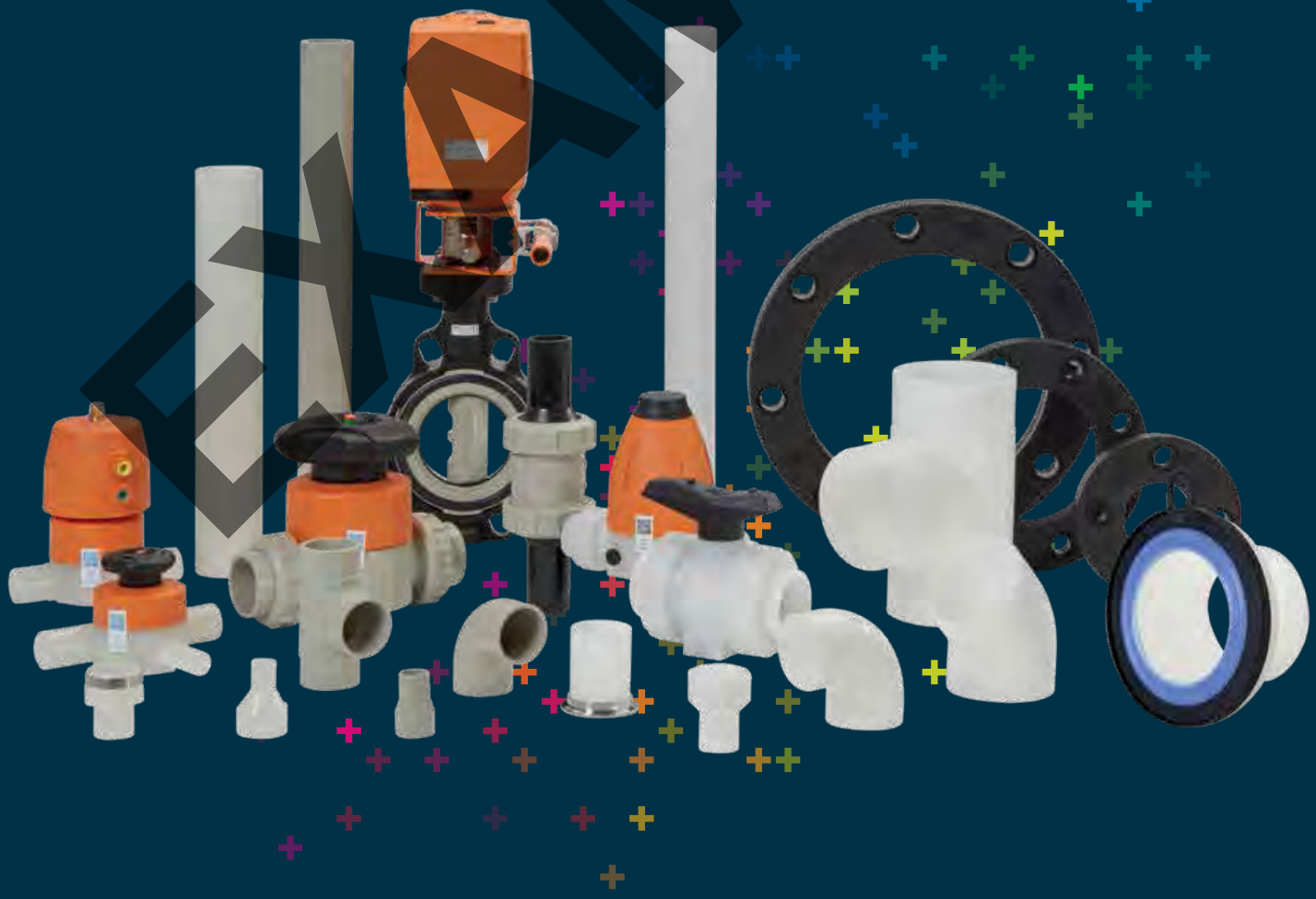
GF Piping Systems

+GF+

Engineered Piping Systems Catalog 2018

Pressure Piping Systems

PROGEF® Standard PP
PROGEF® Natural PP
PPro-Seal™ Natural PP
SYGEF® PVDF
AquaTap™
Fusion Technology



Other Price Lists Available from GF Piping Systems

Valves and Actuation

Manual Valves
Actuated Valves
Pressure Regulating Valves
Rotameters

Vinyl Piping Systems

Schedule 40 and 80 PVC
Schedule 40 and 80 CPVC
Schedule 40 and 80 Clear PVC
Harvel Specialty Pipe
Extruded Shapes
Metric PVC

Signet Instrumentation

Chlorine
Dissolved Oxygen
Turbidity
Flow/Batch
pH/ORP
Conductivity/Resistivity
Pressure
Temperature
Level

Pipe Metric-To-Inch Conversion Chart

16 mm	=	⅜"	40 mm	=	1¼"	90 mm	=	3"	225 mm	=	9"	400 mm	=	16"
20 mm	=	½"	50 mm	=	1½"	110 mm	=	4"	250 mm	=	10"	450 mm	=	18"
25 mm	=	¾"	63 mm	=	2"	160 mm	=	6"	315 mm	=	12"	500 mm	=	20"
32 mm	=	1"	75 mm	=	2½"	200 mm	=	8"	355 mm	=	14"			

Visit www.gfpiping.com for up-to-date versions of our price lists!

GF Piping Systems

+GF+

Technical Handbook for Pressure Piping Systems

PROGEF® Standard Polypropylene
PROGEF® Natural Polypropylene
PPro-Seal™ Natural Polypropylene
SYGEF® Standard Polyvinylidene Fluoride
SYGEF® Plus Polyvinylidene Fluoride

Clickable table of contents

Table of Contents

Overview Polypropylene Piping Systems

General Information

Polypropylene is a thermoplastic belonging to the polyolefin group. It is a semi-crystalline material. Its density is lower than that of other well-known thermoplastics. Its mechanical characteristics, its chemical resistance, and especially its relatively high heat deflection temperature have made polypropylene one of the most important materials used in piping installations today.

PP is formed by the polymerisation of propylene (C_3H_6) using Ziegler-Natta catalysts.

There are three different types which are conventionally supplied for piping installations:
- Isotactic PP Homopolymeride (PP-H)
- PP block co-polymeride (PP-B)
- PP random co-polymeride (PP-R)

Because of its high internal pressure resistance, PP-H is preferred for industrial applications. On the other hand, PP-R is used predominantly in sanitary applications because of its low e-modulus (flexible piping) and its high internal pressure resistance at high temperatures. PP-B is mainly used for sewage piping systems because of its high impact strength, especially at low temperatures and its low thermal endurance.

PROGEF Standard Polypropylene (PP-H)

Most of the grades are offered with nucleating agents (crystallization seeds), because PP crystallizes at least 10 times slower than PE. This way, we achieve lower internal stress and a finer structure. We differentiate between α and β nucleation.

Nucleation is realized by merely adding ppm (parts per million) of nucleating agents. PP is a non-polar material whose surface hardly swells or dissolves. Cementing is not possible without special surface treatment. On the other hand, PP welds very well. Pressure piping systems can use heating element socket welding, heating element butt welding or the no-contact infrared (IR-Plus®) fusion technology developed by GF.

Internal pressure resistance is ensured through long-term testing in accordance with EN ISO 15494 and with the value of MRS 10 MPa (minimum required strength).

The PP-H resin used by GF for PROGEF Standard PP industrial piping systems is characterized by

Advantages
- good chemical resistance
- high internal pressure resistance
- high impact strength
- high thermal ageing and thermal forming resistance
- high stress fracture resistance
- outstanding weldability
- homogeneous, fine structure

PROGEF Natural Polypropylene (PP-R)

Specially for applications related to the BCF® Plus (bead and crevice-free) welding technology, such as the life science/ pharmaceutical industry, GF offers the PROGEF® Natural PP system in addition to our PROGEF Standard PP system.

For such requirements, the welding technology plays a decisive role. With BCF® Plus welding technology, beads and dead zones are eliminated. This prevents micro-organisms from accumulating, thus improving water quality.

For less demanding purity requirements and all other industrial applications, especially those involving aggressive media, high impact and temperature stress, GF recommends PROGEF Standard PP, which has optimal characteristics.

The material used for the PROGEF Natural system is an unpigmented random copolymer, particularly distinguished by the following characteristics:

Advantages
- excellent resistance against certain disinfectants and chemicals (mainly alkaline solutions)
- translucence
- very high surface finish quality
- good weldability (BCF® Plus and IR Plus® weldable)
- high temperature resistance

PPro-Seal Natural Polypropylene (PP-R)

Specifically for applications such as lab grade DI water, reverse osmosis and chemical distribution systems where electrofusion or threaded joining is appropriate.

The material used for the PPro-Seal Natural system is an unpigmented random copolymer, particularly distinguished by the following characteristics:

Advantages
- excellent resistance against certain disinfectants and chemicals (mainly alkaline solutions)
- translucence
- very high surface finish quality
- electrofusion (same fusion machine that Fuseal® PP & Fuseal 25/50™ PVDF use)
- high temperature resistance

Mechanical Properties

PP-H has the highest crystallinity and therefore the highest hardness, tensile strength and stiffness, so the pipes hardly sag and a greater distance between supports is possible. PP-R has a very good long-term creep strength at higher temperatures, such as, for example, 80°C at continuous stress.

Unlike PE, PP is not as impact-resistant below 0°C. Because of this, GF recommends ABS or PE for low temperature applications.

The long-term behavior for internal pressure resistance is provided by the hydrostatic strength curve based on the EN ISO 15494 standard. The application limits for pipes and fittings, as shown in the pressure-temperature diagram, can be derived from these curves.

Chemical, Weathering, and Abrasion Resistance

Due to its non-polar nature, polypropylene shows a high resistance against chemical attack.

The resistance of PP is nevertheless lower than that of PE because of its tertiary C atoms.

PP is resistant against many acids, alkaline solutions, solvents, alcohol and water. Fats and oils swell PP slightly. PP is not resistant to oxidizing acids, ketones, petrol, benzene, halogens, aromatic hydrocarbons, chlorinated hydrocarbons and contact with copper.

For detailed information, please refer to the detailed list of chemical resistance from GF or contact your local GF subsidiary.

If polypropylene is exposed to direct sunlight over a long period of time, it will, like most natural and plastic materials, be damaged by the short-wave UV portion of sunlight together with oxygen in the air, causing photo-oxidation.

PP fittings and valves are highly heat stabilized. As per approvals, polypropylene has no special additive against the effects of UV radiation. The same applies to PP piping. Piping which is exposed to UV light should therefore be protected. This is achieved by covering the pipes, e.g. with insulation or also by painting the piping system with a UV absorbing paint.

Thermal Properties

In general polypropylene can be used at temperatures from 0°C to +80°C (32°F to 176°F). Below –10°C, the outstanding impact strength of the material is reduced. On the other hand, the stiffness is even higher at low temperatures. Please consult the pressure-temperature diagram for your maximum working temperature. For temperatures below 0°C it must be ensured, as for every other material, that the medium does not freeze, consequently damaging the piping system.

As with all thermoplastics, PP shows a higher thermal expansion than metal. As long as this is taken into account during the planning of the installation, there should be no problems in this regard.

The thermal conductivity is lower than metal. Because of the resulting insulation properties, a PP piping system is notably more economical in comparison to a system made of a metal like copper.

Combustion Behavior

Polypropylene is a flammable plastic. The oxygen index amounts to 19%. (Materials that burn with less than 21% of oxygen in the air are considered to be flammable).

PP drips and continues to burn without soot after removing the flame. Basically, toxic substances are released by all burning processes. Carbon monoxide is generally the combustion product most dangerous to humans. When PP burns, primarily carbon dioxide, carbon monoxide and water are by-products of combustion.

The following classifications in accordance with differing combustion standards are used:

- According to UL94, PP is classified as HB (Horizontal Burning) and according to DIN 53438-1 as K2. According to DIN 4102-1 and EN 13501-1, PP is listed as B2 (normally flammable).
- According to ASTM D 1929, the self-ignition temperature is 360°C.
- Suitable fire-fighting agents are water, foam or carbon dioxide.

Electrical Properties

Since PP is a non-polar hydrocarbon polymer, it is an outstanding insulator. These properties, however, can be worsened considerably as a result of pollution, effects of oxidizing media or weathering.

The dielectric characteristics are essentially independent of temperature and frequency.

The specific volume resistance is > 10^{16} Ωcm; the dielectric strength is 75 kV/mm.

Because of the possible development of electrostatic charges, caution is recommended when using PP in applications where the danger of fires or explosion is given.

Complete System of Pipe, Valves and Fittings

GF's Polypropylene piping system easily transitions between PE, PVC, and PVDF, and is available with pipes, fittings and valves in sizes from 20 mm to 500 mm (metric), ½" to 2" (ASTM).

This system includes all commonly required pressure pipe fittings, including threaded adaptors and flanges for ease of mating to equipment or other piping materials. A large portfolio of ball, check, diaphragm, butterfly, pressure reduction, and pressure relief valves are also available from GF. Please refer to the GF Valve Technical Handbook for more details.

Reliable Fusion Joining

Assembly and joining of this system is performed by heat fusion. Fusion joints are made by heating and melting the pipe and fitting together. This type of joint gives a homogeneous transition between the two components without the lowering of chemical resistance associated with solvent cement joining and without the loss of integrity and loss of pressure handling ability of a threaded joint.

Five different fusion methods for GF's Polypropylene Piping Systems are available and commonly used in today's demanding applications. These include conventional socket fusion, electrofusion, conventional contact butt fusion, IR Plus® butt fusion and BCF® (Bead and Crevice Free) fusion.

General Properties Polypropylene

Material Data

The following table lists typical physical properties of Polypropylene thermoplastic materials. Variations may exist depending on specific compounds and product.

Mechanical

Properties	Unit	PROGEF Standard PP-H	PROGEF Natural PP-R	PPro-Seal Natural PP-R	ASTM Test
Density	lb/in^3	0.0325	0.0325	0.0327	ASTM D792
Tensile Strength @ 73°F (Yield)	PSI	4,500	3,625	4,350	ASTM D638
Tensile Strength @ 73°F (Break)	PSI	5,600	4,500	5,000	ASTM D638
Modules of Elasticity Tensile @ 73°F	PSI	188,500	130,500	150,000	ASTM D638
Compressive Strength @ 73°F	PSI	6,500	5,500	5,500	ASTM D695
Flexural Modulus @ 73°F	PSI	181,250	130,500	130,000	ASTM D790
Izod Impact @ 73°F	Ft-Lbs/In of Notch	11.3	8.0	8.0	ASTM D256
Relative Hardness @ 73°F	Shore	70	70	70	ASTM D2240

Thermodynamics

Properties	Unit	PROGEF Standard	PROGEF Natural	PPro-Seal Natural	ASTM Test
Melt Index	gm/10min	0.25	0.30-0.40	0.40-0.80	ASTM D1238
Melting Point	°F	320	316	316	ASTM D789
Coefficient of Thermal Linear Expansion per °F	in/in/°F	0.89×10^{-4} for T≤121°F 1.0×10^{-4} for T>121°F		0.61×10^{-4}	ASTM D696
Thermal Conductivity	$BTU\text{-}in/ft^2/hr/°F$	1.6	1.6	1.2	ASTM D177
Maximum Operating Temperature	°F	176	176	176	
Heat Distortion Temperature @ 264 PSI	°F	125	125	130	ASTM D648

Other

Properties	Unit	PROGEF Standard	PROGEF Natural	PPro-Seal Natural	ASTM Test
Water Absorption	%	<0.1%	<0.1%	<0.03%	ASTM D570
Poisson's Ratio @ 73°F		0.38	0.38	0.38	
Industry Standard Color		7032	Neutral	Neutral	RAL 9005
Food and Drug Association (FDA)		YES	YES	YES	CFR 21.177.1520
United States Pharmacopeia (USP)		YES	YES	YES	USP 25 Class VI

Note: This data is based on information compiled from multiple sources.

Overview SYGEF® Polyvinylidene Fluoride (PVDF) Piping Systems

General Information

Polyvinylidene Fluoride (PVDF) is a semi-crystalline thermoplastic having outstanding mechanical, physical and chemical properties. These result from the chemical structure of PVDF. Polyvinylidene Fluoride belongs to the class of fluorinated polymers whose best-known representative is polytetrafluoroethylene (PTFE). PTFE is characterized by a superb heat resistance and the best chemical resistance of all polymers; a big disadvantage is that it is not melt processable, e.g., into fittings. PVDF, on the other hand, combines various advantages of PTFE with good workability into structural parts. The fluorine content in PVDF amounts to 59% by weight.

PVDF from GF is characterized by a very good mechanical behavior and high temperature resistance. Because of the exceptionally wide pressure/temperature range in which PVDF can be used, it has opened, in connection with the specific characteristics of this material, completely new areas of application in plastic piping fabrication. These include applications in the semi-conductor, chemical and pharmaceutical industry, electroplating, paper and cellulose processing, the automotive industry and water treatment. Pipes, fittings and valves of PVDF are uncolored and opaque (milky, translucent).

By avoiding the addition of any additives, the outstanding characteristics of the material remain to the fullest extent, especially concerning the chemical resistance and physiological harmlessness.

Advantages

- outstanding mechanical properties, even at high temperatures
- excellent chemical resistance
- no electrochemical corrosion
- long service life, even under intensely corrosive conditions
- outstanding resistance against Sunlight and Y-radiation
- very pure material without additives, stabilizers or plasticizers
- inhospitable to microbial growth
- physiologically harmless
- secure jointing by high-quality welding technology
- produced with smooth inner surfaces
- very low heat conductivity
- excellent flame retardant properties

Mechanical Properties

PVDF has a high tensile strength and stiffness. The impact strength is still good at temperatures around 32°F (0°C). PVDF's advantages are particularly prevalent at higher temperatures. This is due to the high fluorine content which causes strong interactions between the PVDF chains. This, in turn, displaces the softening and the loss of properties to higher temperatures. This also has an effect on the long-term creep strength.

PVDF has the highest long-term creep strength of all the polymers used for GF piping systems. The long-term behavior for internal pressure resistance is provided by the hydrostatic strength curve based on the DVS 2205-1 Guidelines, Supplement 4 (see also the Pressure/Temperature section). The application limits for pipes and fittings, as shown in the pressure and temperature diagram, can be determined from these curves.

Chemical, Weathering, and Abrasion Resistance

PVDF is resistant to most inorganic solvents and additionally to aliphatic and aromatic hydrocarbons, organic acids, alcohol and halogenated solvents. PVDF is also not attacked by dry and moist halogens with the exception of fluorine. PVDF is not resistant against strong basic amines, alkalis, and alkaline metals. Strong polar solvents, such as ketones and esters and organic acids can cause PVDF to swell somewhat.

For detailed information, please refer to the detailed list of chemical resistance from GF or contact your GF subsidiary.

Outstanding resistance against UV light as well as gamma radiation permits, among other applications, the use of PVDF piping outdoors. No loss of properties occurs. Abrasion resistance is considerable and approximately comparable to that of polyamide.

Thermal Properties

PVDF shows its outstanding properties in a temperature range from -4°F (-20°C) to 284°F (140°C). This allows using the material in a wide range of applications. Especially at high temperatures, PVDF provides maximum security. Its high crystalline melting point at around 343°F (173°C) speaks for itself.

Please consult the pressure-temperature diagrams for your operational temperature. For temperatures below 32°F (0°C), the media must be prevented from freezing to avoid damaging the piping (as for other piping materials).

With a thermal coefficient of linear expansion of $0.67–1.00\times10^{-4}$ in/in°F (coefficient depends on temperature), PVDF lies clearly above that of metals. Because of this, its thermal expansion must be taken into account during the planning of the piping system. As for all polymers, PVDF is a good thermal insulator because its heat conductivity of 1.3 BTU-in/ft²/hr/°F is very low. (For comparison, the value for steel is 1733 BTU-in/ft²/hr/°F).

Flammability and Fire Testing

Combustion Behavior

PVDF displays an exceptionally good combustion behavior without the addition of fire protection additives. Material decomposition begins at 716°F (380°C). The oxygen index amounts to 44%. (Materials that burn with less than 21% of oxygen in the air are considered to be flammable).

PVDF thus also falls in the best flammability class V0 according to UL94, and in the building materials class B1 (difficult to ignite) according to DIN 4102-1.

SYGEF® PVDF products show such excellent fire safety behavior that they are accepted and listed by Factory Mutual for use in clean rooms (FM 4910).

Comparative oxygen indices

Material	% Oxygen
PMMA	17.3
PE	17.4
PP	17.4
PIB	17.7
PS	18.1
PC	27.0
PA 6.6	29.0
ETFE	30.0
SYGEF	43.7
PVC	45
PTFE	95

Installation within Designated Return Air Plenums

SYGEF Standard 25/50 PVDF, available in sizes 20mm to 75mm, is officially certified for building air plenum installations according to UL 723 ASTM E-84 25/50. This standard is intended to help protect occupants' safety in the event of a fire. It is a measure of smoke generation and flame spread in the event of a fire. Please contact your local GF sales representative for more information.

Fire Testing

Since the combustion of PVDF produces hydrogen fluoride, which forms a corrosive acid in connection with water, immediate cleaning of areas susceptible to corrosion with water containing detergent is necessary after a fire. Additional combustion products are carbon monoxide and carbon dioxide. Concerning the choice of fire-fighting agents, sand or powder-type extinguishing agents are recommended because the use of water may result in the development of corrosive acids. Test method according to ASTM D635 The end of a test specimen is held horizontally, for 30 seconds, in the flame of a Bunsen burner, the narrow side of the specimen being inclined at an angle of 45°.

PVDF stops burning immediately if the flame is removed. By way of comparison, unplasticised PVC also stops burning immediately, while self-extinguishing polyester continues to burn for 2 seconds after the source of ignition has been removed.

The HOOKER HLT 15 flame test This method of test is much more stringent than the ASTM D635 test. The test permits the classification of non-flammable products into various categories.

A test specimen prepared according to ASTM D635 is clamped vertically and is then periodically exposed to the Bunsen flame, using the following rhythm:

The test specimen must have stopped burning at any rate before the flame is applied again.

SYGEF will withstand four contact cycles with the flame. After the fifth contact it melts, but without burning.

ISO R 181 test according to SCHRAMM

A flat test specimen in horizontal position is pressed for 3 min. against a rod heated to 1742°F (950°C). The loss in weight p in mg is then determined, together with the longitudinal shrinkage L in cm and assessed according to the following equation: Lg = 100,000 pL in degrees SCHRAMM

Duration	Operation
5 seconds	1st contact with flame
10 seconds	Flame removed
7 seconds	2nd contact with flame
14 seconds	Flame removed
10 seconds	3rd contact with flame
20 seconds	Flame removed
15 seconds	4th contact with flame
30 seconds	Flame removed
25 seconds	5th contact with flame
50 seconds	Flame removed

For SYGEF, the result is 2.2 degrees SCHRAMM. By way of comparison, unplasticised PVC shows 2.2 degrees SCHRAMM also, and self-extinguishing polyester 2.5 degrees SCHRAMM

Electrical Properties

PVDF is a good electrical insulator. Because of the possible electrostatic charges, caution is recommended when using PVDF in applications where combustion or explosion dangers exist. The specific volume resistance is $>10^{14}$ Ωcm; the specific surface resistance is 10^{14} Ω.

Physiological Properties

PVDF is physiologically non-toxic as long as it is used below the maximum temperature of 302°F (150°C). During welding, good ventilation is required or alternately the released gases must be extracted.

PVDF can be used in the USA in accordance with the relevant regulations of the Food and Drug Administration (FDA) for food packaging and items that come into contact with food. The Federal Health Ministry of Germany generally recommends that plastic items containing fluorine be thoroughly

rinsed or boiled before their first use—a common procedure usual for other materials too.

Extractables

PVDF is a pure resin. Unlike other plastics, SYGEF PVDF does not contain additives, stabilizers, antioxidants or extrusion/ injection molding aides. It is considered to be chemically inert and is not water soluble. SYGEF Plus HP Grade PVDF pipes and fittings are comprised of only PVDF while SYGEF Plus HP Grade Valves also contain PTFE diaphragms. Testing shows that PVDF is not detectable in water.

SYGEF Plus HP Grade PVDF yields no polymeric extractables at any temperature. At elevated temperatures, fluoride is a detectable ionic extractable in trace amounts yielding water quality well within USP specifications for production of DI, USP and WFI. Testing with hot deionized water shows that trace elements are detectable at extremely low levels as surface contaminants. They virtually disappear after the system is adequately flushed. Dynamic testing under flowing conditions also indicated that the amount of extractables challenge the detection limits of modern analytical test equipment.

Additionally, SYGEF Plus HP Grade PVDF piping system components comply with the recommendations of SEMI F57 Guidelines for extractable levels of metallic and ionic contaminants as well as TOC for polymer components. These levels are far below those seen with traditional metal piping systems used widely in the pharmaceutical industry.

Discoloration Phenomena

PVDF exhibits a more intense degree of color change due to heat history and chemical effects when compared to other thermoplastics. Because PVDF is absent of additives, changes in coloration are exhibited far more readily than otherwise expected.

Coloration changes can vary from beige to dark brown. It is important to recognize that even a major discoloration (brown) does not always relate to a degradation of the polymer. Such discoloration is common for PVDF materials operating in hot ultrapure water systems at 158°F (70°C) to 176°F (80°C) and is the result of minor double bonding of carbon along the PVDF linear molecule chain.

According to a 1993 report by a PVDF raw material supplier, the theoretical effects of such discoloration of PVDF are outlined as follows:

- PVDF becomes completely black when only (1) in (1000) of PVDF monomer (-CH2-CF2-) transform to a (-CH=CF-) molecule
- In a 3.2 ft length of 2 in (63 mm) pipe there are about 2 ft^2. of surface area
- When the discoloration affects .03937 in of the surface (entire pipe appears black), this volume is 11 in^3.
- PVDF has a density of ~ 0.06 lb/in^3, therefore, 11 in^3. Weights ~ 0.7 lb.
- Since 59% of the (-CH2-CF2-) monomer is F2, the loss of 1 atom of F per 1000 results in 2.0×10^{-4} lbs F being removed from the 3.2 ft of pipe material; (0.7 lb × 59%/2 × 1/1000) = 2.0×10^{-4} lbs
- There are 6.02×10^{23} atoms per 0.04 lb F; hence, 2.0×10^{-4} lbs is equivalent to 2.98×10^{21} atoms
- If a 2 in (63 mm) pipe has a velocity of 5 ft/sec., then the flow is approximately 61 gallons/min.
- Because brown discoloration occurs within 2 weeks time in a hot UPW system, the amount of H^2O passing through this 3.2 ft of pipe is about 0.17×10^6 ft^3.
- Therefore, this 0.094 g is diluted to levels challenging detection capabilities even when the PVDF appears black 2.0×10^{-4} lbs/0.17×10^6 ft^3 = ~ 19 ppt
- If a conservative factor of 1000 is used to demonstrate the difference between the first signs of discoloration (brown) and the 1 per 1000 rule (black) the value is easily < 0.019 ppt Fire Rated Construction

Manufacturing

Complete System of Pipe, Fittings and Valves

The production hall for SYGEF Plus HP (PVDF) pipes, fittings and valves shall be maintained at Class 10,000 Cleanroom (ISO Class 7) or better as defined by the current ISO Standard 14644-1. Specific class levels are assigned for each level of production as described later in this section.

SYGEF (PVDF) pipe shall be a Standard Dimensions Ratio (SDR) series which defines the outer pipe diameter, wall thickness and tolerances. GF produces pipe and fittings rated for 232 psi (16 bar) from ⅜" (16 mm) to 8" (225 mm) and 150 psi (10 bar) from 3" (90 mm) to 18" (450 mm) when measured at 68°F (20°C).

Flanged connections have ANSI 150# bolt pattern. All mechanical connections for sample ports, instrumentation or venting have either sanitary or approved ANSI threaded NPT connections.

All SYGEF Plus HP (PVDF) valves have a minimum pressure rating of 150 psi (10 bar) at 68°F (23°C). High purity PVDF valves in sizes through 2" (63 mm) are Type 514/515 Diaphragm Valves as manufactured by GF. Additionally, Type 519 Zero-Static Lateral Valves are available up to 4" (110 mm) along the run. All diaphragm valves are weir style with PTFE diaphragm seals backed with EPDM or FPM.

Compliance with Microelectronics Standards

Compliance with industry standards is very important to GF Piping Systems. This is especially the case in the field of high purity where SYGEF Plus HP Grade (PVDF) piping system components are required to convey ultrapure water (UPW) and high purity chemicals with qualities as characterized within SEMI documentation. Disregard for this requirement would impart serious yield losses to the high tech end-users of piping systems.

For example, SEMI F63 defines the UPW quality used in today's sub-100 nanometer semiconductor factories. SEMI F57 outlines the critical characteristics and performance criteria of polymer raw materials and components. SEMI F40 gives the necessary steps for testing these raw materials and components.

To insure that manufacturing conditions and final product meet or exceed the requirements of SEMI F57 guidelines for extractable levels of metallic, ionic and organic (TOC) contaminants standardized testing regimes have been adopted within GF's high purity facility. This strict compliance to SEMI F57 demands routine sampling of production pipes, fittings and valves, which are submitted to certified laboratories for testing using SEMI F40 protocol. Databases with Cpk (process capability) indices are maintained and monitored for early warning indications of potential problems in either raw material purity or production induced changes.

The leached levels seen in SYGEF Plus HP (PVDF) continue to provide demanding customers with satisfactory results. At the same time, they are far below those found coming from traditional metal piping systems, which are widely used in the pharmaceutical industry.

Compliance with Life Science Standards

SYGEF Plus HP (PVDF) Piping Systems have been installed for use in Deionized (DI) Water, USP Water, and WFI systems and are well suited to these applications. This material can be sanitized using hot water, steam, ozonation or chemicals and does not require passivation for the life of the system. It can also be steam sterilized. Additionally, since SYGEF Plus HP (PVDF) piping components are produced and packaged in a high purity environment, no Clean In Place (CIP) procedures are required at startup, provided that installation occurs in a controlled environment.

SYGEF Plus HP (PVDF) meets the requirements of ASME BPE (Bioprocessing Equipment) Standard, Section PM and Section SF.

Recent changes in the USP XXIII call for water to pass the Total Organic Carbon (TOC) test with limits of ≤ 500 ppb. Historically, the users of PVDF systems have focused on the much more rigorous TOC requirements of the microelectronics industry. These systems typically pass using on-line monitoring equipment at limits of ≤ 5 ppb, 100 times more stringent than the current USP XXIII requirement. Of significant importance, these results have been achieved with virtually no unscheduled down time.

SYGEF Plus HP (PVDF) has measurably smoother surfaces than those found in common grades of stainless steel used in pharmaceutical systems. Piping system components are made from a pure fluoropolymer resin, containing no metals such as iron, copper or nickel. This inert pipe cannot experience rouging or pitting corrosion. Additionally the BCF welding process provides smooth weld surfaces, far superior to the results produced by welding on stainless steel. In stainless steel systems, microscopic pitting from corrosion of the pipe surface, as well as welding beads create rough surfaces which can harbor microorganisms. This smoother surface, combined with the smoother BCF weld result, presents fewer opportunities on the piping system surface for bacteria to adhere and proliferate. Thus, it requires less frequent sanitization and less production down time.

Raw Materials

SYGEF Plus HP (PVDF) pipe, fittings and valves shall be manufactured from natural, unpigmented, virgin polyvinylidene fluoride (PVDF) homopolymer conforming to the standards of ASTM D3222. All raw material utilized for SYGEF Plus HP (PVDF) production shall be specially controlled regarding procurement, shipment, handling and storage prior to production to minimize contact with extraneous contamination.

PVDF raw materials shall be handled in a clean room environment to prevent contamination. The raw material shall be gravity fed into the processing equipment. Pneumatic conveyance of the raw material is prohibited. PVDF raw material shall meet the testing requirements for impurities per SEMI F57.

Manufacturing (Pipe)

Environment

SYGEF Plus HP (PVDF) pipe shall be extruded in a dedicated high purity PVDF production area which is located in an ISO 14644-1 Class 7 (U.S. Fed. Standard 209E Class 10,000) or better environment. All pipes shall be extruded on dedicated production equipment used exclusively for the production of high purity PVDF. Pipe dimensions and tolerances shall be continually monitored with QC sampling at designated time intervals compliant with Good Manufacturing Practices.

Stress Relieving

Extrusion stresses shall be relieved by use of a continuous in-line annealing oven. Stress relief shall be measured and relate to a maximum 0.4% dimensional change when tested according to ISO 10931-2, ISO 10931-2, and max internal stress of 2.5 N/mm^2.

Pipe Identification

SYGEF Plus HP (PVDF) pipe shall be identified on the pipe outer surface (on top) with the production lot, pipe diameter and wall thickness. Pipe identification shall be accomplished by use of heat embossed lettering and without the use of any ink on the pipe surface. After packaging, each pipe length shall have a label adhered to the outside of the outer polyethylene bag. The label shall denote production lot, pipe diameter, wall thickness and surface quality.

Surface Finish

SYGEF Plus HP (PVDF) pipe shall have samples taken which are measured for mean roughness of the interior pipe surface.

Using ISO 4287/4288, SYGEF Plus HP (PVDF) pipe, shall have profilometer mean roughness values compliant with SEMI F57 or better.

Pipe interior shall also be visually inspected for defects on a lighted table prior to fitting with protective polyethylene end caps and double bagged in heat sealed polyethylene liners immediately after production within the cleanroom.

	SYGEF Standard	**SYGEF Plus**
Surface finish Compliant to Semi F57	Inner surface Ra < 0.5 µm (20µin) for injection moulded and extruded components	Inner surface (PN10/ SDR33): •d ≤ 225 Ra ≤ 0.2 µm (8µin) •d = 250 Ra ≤ 0.3 µm (12µin) •d280–315 Ra ≤ 0.4 µm (16µin) •d355–450 Ra ≤ 0.65 µm (26µin) •for injection moulded and extruded components

Manufacturing (Fittings/Valves)

Environment

All high purity PVDF fittings and valves shall be manufactured on dedicated equipment in clean production cells that are Class 100 (ISO Class 5) or better. Any machined valve components shall be performed with no coolant other than filtered air.

Cleaning

Fittings and valves (diaphragm) shall be washed in a Class 100 Cleanroom (ISO Class 5), using DI water with nonionic, phosphate free surfactant solution. After cleaning, the components shall be rinsed with hot (176°F/80°C) UPW water, flushed with ambient UPW water, both meeting SEMI F63-00-0701 requirements, and heat dried with HEPA filtered air or filtered nitrogen.

Identification

All high purity PVDF fittings and valves shall be molded with permanent identification to allow tractability to production lot and raw material batch.

In addition, all high purity PVDF fitting and valve labels shall have an identification code or numbering scheme on the packaging that permits traceability back to the lot and batch cleaning of fittings or valves.

Packaging

After cleaning, fittings and valves shall be immediately and individually heat sealed in PA6/PE double bags while in the cleanroom. Valves shall be assembled in a Class 100 (ISO Class 5) environment. No external markings or labeling shall be permitted except on the outer bag. The production label shall denote production lot, dimension and logistical information.

Manufacturing (Fabricated Products)

Production of PVDF fabricated items are to be done under a minimum Class 10,000 cleanroom as defined in the current Federal Standard. Machine components made from semi-finished PVDF block and rod used in this fabrication of parts or sub-assemblies shall be inspected, cleaned and packaged similar to fittings and valves. Final inspection is made prior to packaging by 100% visual inspection of every weld. Pressure test for welded assemblies as required.

Traceability of Machined Components

Welding of sub-components shall only be done by manufacturers certified technicians. All factory welds shall be labeled using the manufacturers fusion machine printouts from actual welds. All finished parts and assemblies shall be permanently marked with a traceable number which links incoming material, production dates, machines used and welding personnel.

Delivery, Storage and Handling

Any material that becomes damaged and/or contaminated in transit handling or storage shall not be used. It must be rejected by the quality control representative and returned to the manufacturer/distributor.

All material and equipment shall be handled and stored in an indoor location throughout the progress of the job in such a manner as to prevent damage and/or contamination. Room shall be maintained dry and dust free. Room shall be kept at a temperature between 60°F (15°C) and 85°F (30°C).

Piping, fittings, and valves shall be stored in their original factory sealed poly bags. Use nylon or polypropylene rope or soft strand for slings and tie-downs used to let, load, or transport pipe bundles. Do not stack pipe higher than 2 feet.

All fabricated material shall be used within 48 hours of being removed from the storage site. All high-purity PVDF piping system components shall be inspected and approved by fabricator and installer upon arrival into the fabrication clean room and before spool fabrication begins.

Fabricated spool pieces shall be supported and padded to prevent damage during transport.

All pipe fitting ends of fabricated spool pieces shall be double bagged and sealed. Bags shall be secured with cap or cleanroom tape a minimum 6 inches away from pipe end. Cleanroom tape directly over pipe or fitting end is not acceptable.

General Properties SYGEF® Polyvinylidene Fluoride (PVDF)

Material Data

The following table lists typical physical properties of PVDF (Polyvinylidene Flouride) thermoplastic materials. Variations may exist depending on specific compounds and product.

Mechanical

Properties	Unit	SYGEF Plus HP/Standard PVDF	ASTM Test
Density	lb/in^3	0.0643	ASTM D792
Tensile Strength @ 73°F (Yield)	PSI	≥ 7,250	ASTM D638
Tensile Strength @ 73°F (Break)	PSI	≥ 6,500	ASTM D638
Modules of Elasticity Tensile @ 73°F	PSI	≥ 246,560	ASTM D638
Compressive Strength @ 73°F	PSI	12,500	ASTM D695
Flexural Modulus @ 73°F	PSI	267,500	ASTM D790
Izod Impact @ 73°F	ft-lbs/in of notch	≥ 3.8	ASTM D256
Relative Hardness @ 73°F	Durometer "D"	78	ASTM D2240

Thermodynamics

Properties	Unit	SYGEF	ASTM Test
Melt Index	gm/10 min	1.10	ASTM D1238
Melting Point	°F	≥ 336	ASTM D789
Coefficient of Thermal Linear Expansion per °F	in/in/°F	0.67...1.00 ($\times 10^{-4}$)	ASTM D696
Thermal Conductivity	BTU-in/ft^2/hr/°F	1.3	ASTM D177
Specific Heat	CAL/g/°C	0.32	DSC
Maximum Operating Temperature	°F	284	
Heat Distortion Temperature @ 264 PSI	°F	≥ 220	ASTM D648

Other

Properties	Unit	SYGEF	ASTM Test
Water Absorption	%	≤ 0.04	ASTM D570
Limited Oxygen Index (LOI)	%	≥ 43	
Industry Standard Color		Opaque	RAL 9005
Food and Drug Association (FDA)		YES	CFR21.177.1520
United States Pharmacopeia (USP)		YES	USP 25 Class VI
SEMI		YES	F57
Factory Mutual		YES	FM4910

Note: This data is based on information compiled from multiple sources.

Specifications PVDF and PP

Pressure/Temperature

Long-Term Stress

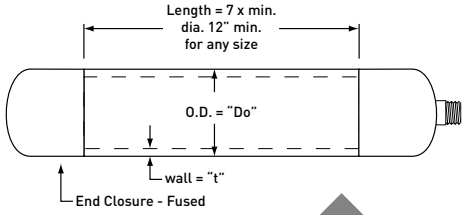
To determine the long-term strength of thermoplastic pipe, lengths of pipe are capped at both ends (Figure 1) and subjected to various internal pressures, to produce circumferential stresses that will predict failure in a few minutes to 50 years. The test is run according to ASTM D1598, "Standard Test for Time to Failure of Plastic Pipe Under Long-Term Hydrostatic Pressure."

The resulting failure points are used in a statistical analysis (outlined in ASTM D2837) to determine the characteristic regression curve that represents the stress/time-to-failure relationship of the particular thermoplastic pipe compound. The curve is represented by the equation

$$\log T = a + b \log S$$

Where *a* and *b* are constants describing the slope and intercept of the curve, and T and S are time-to-failure and stress, respectively.

Figure 1 Test setup for determining long-term stress



The regression curve may be plotted on log-log paper as shown in Figure 2 and extrapolated from 5 years to 25 years. The stress at 25 years is known as the hydrostatic design basis (HDB) for that particular thermoplastic compound. From this HDB the hydrostatic design stress (HDS) is determined by applying the service factor multiplier.

Figure 2 PROGEF Standard (PP-H) Polypropylene

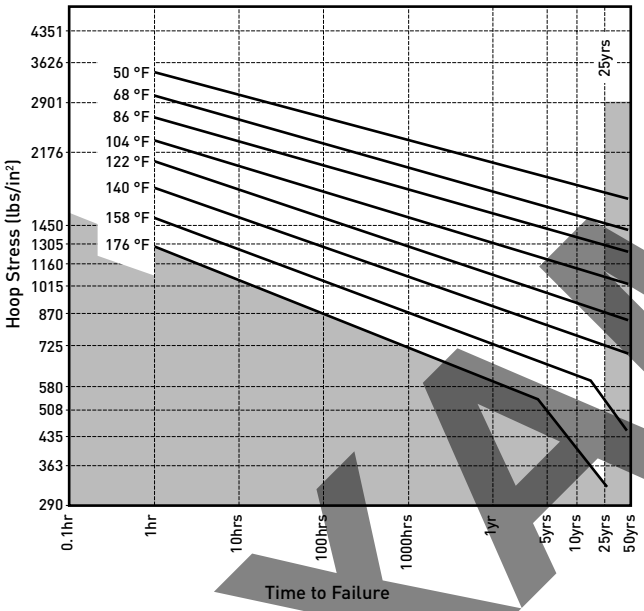


Figure 3 PROGEF Natural (PP-R) Polypropylene

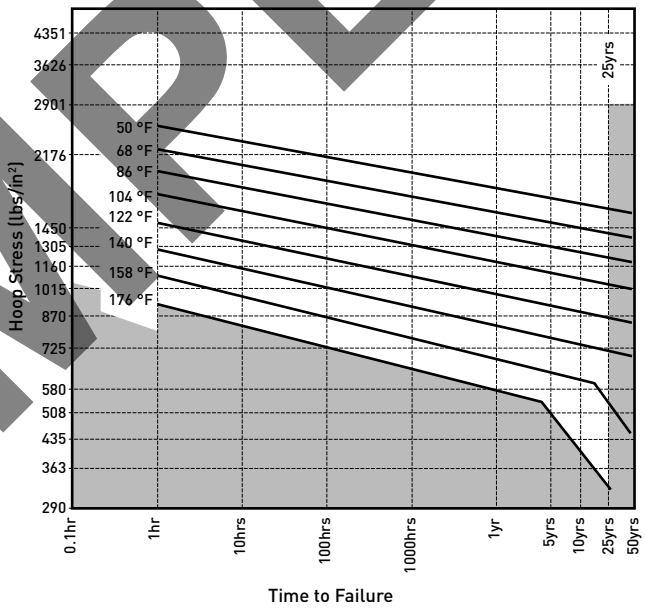


Figure 4 PPro-Seal Natural (PP-R) Polypropylene

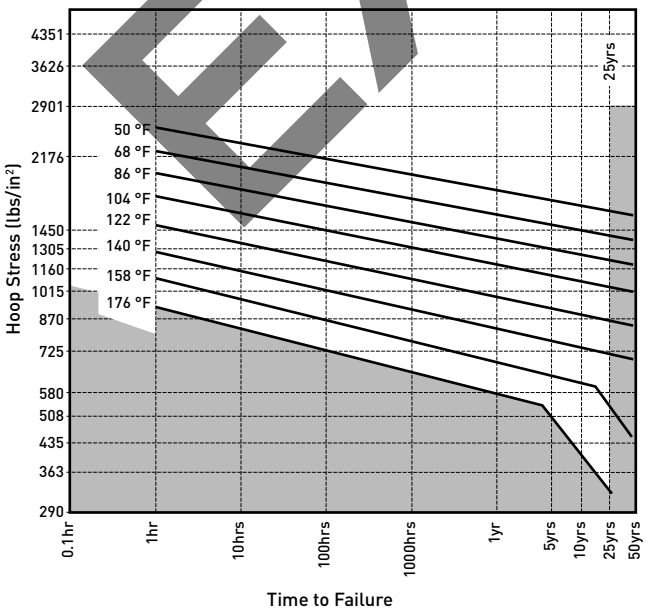


Figure 5 Working Temperature and Pressures for PROGEF Standard (PP-H), PROGEF Natural (PP-R) and PPro-Seal (PP-R)

Based on 25-year service life. Service Factor C=2.0

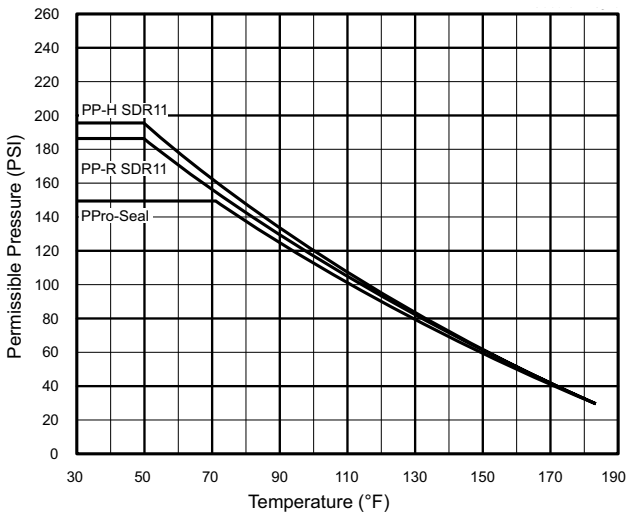


Figure 6 Regression Curve Stress/Time to failure for SYGEF PVDF

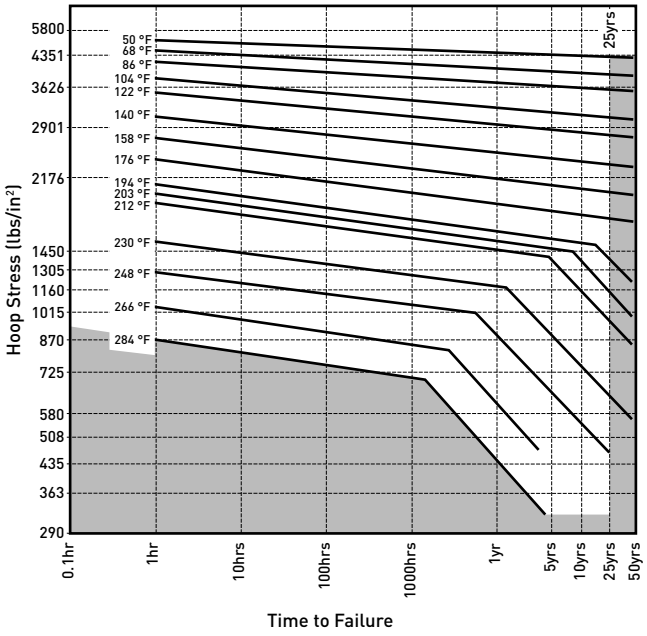
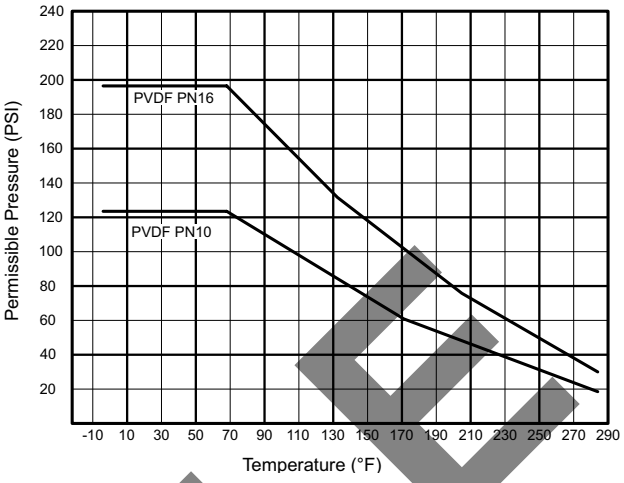


Figure 7 Working Temperature and Pressures for SYGEF PVDF

Based on 25-year service life. Service Factor C=2.0



Dimensional Pipe Size

Pipe Size Comparison: Polypropylene Piping Systems

Nominal Size	Outer Diameter			Wall Thickness			Inner Diameter		
	PROGEF Standard	PROGEF Natural	PPro-Seal	PROGEF Standard	PROGEF Natural	PPro-Seal	PROGEF Standard	PROGEF Natural	PPro-Seal
½" (20 mm)	20.0 mm	20.0 mm	0.840 in	1.9 mm	1.9 mm	0.147 in	16.2 mm	16.2 mm	0.546 in
¾" (25 mm)	25.0 mm	25.0 mm	1.050 in	2.3 mm	2.3 mm	0.154 in	20.4 mm	20.4 mm	0.742 in
1" (32 mm)	32.0 mm	32.0 mm	1.315 in	2.9 mm	2.9 mm	0.179 in	26.2 mm	26.2 mm	0.957 in
1¼" (40 mm)	40.0 mm	40.0 mm	—	3.7 mm	3.7 mm	—	32.6 mm	32.6 mm	—
1½" (50 mm)	50.0 mm	50.0 mm	1.900 in	4.6 mm	4.6 mm	0.200 in	40.8 mm	40.8 mm	1.500 in
2" (63 mm)	63.0 mm	63.0 mm	2.375 in	5.8 mm	5.8 mm	0.218 in	51.4 mm	51.4 mm	1.939 in
2½" (75 mm)	75.0 mm	—	—	6.8 mm		—	61.4 mm	—	—
3" (90 mm)	90.0 mm	90.0 mm		8.2 mm	5.1 mm		73.6 mm	79.8 mm	
4" (110 mm)	110.0 mm	—	—	10.0 mm	—	—	90.0 mm	—	—
6" (160 mm)	160.0 mm	—	—	14.6 mm	—	—	130.8 mm	—	—
8" (200 mm)	200.0 mm	—	—	18.2 mm	—	—	163.6 mm	—	—
9" (225 mm)	225.0 mm	—	—	20.5 mm	—	—	184.0 mm	—	—
10" (250 mm)	250.0 mm	—	—	22.7 mm	—	—	204.6 mm	—	—
12" (315 mm)	315.0 mm	—	—	28.6 mm	—	—	257.8 mm	—	—
14" (355 mm)	355.0 mm	—	—	32.2 mm	—	—	290.6 mm	—	—
16" (400 mm)	400.0 mm	—	—	36.3 mm	—	—	327.4 mm	—	—
18" (450 mm)	450.0 mm	—	—	40.9 mm	—	—	368.2 mm	—	—
20" (500 mm)	500.0 mm	—	—	45.4 mm	—	—	409.2 mm	—	—

Pipe Size Comparison: PVDF Piping Systems

Nominal Size	Outer Diameter		Wall Thickness		Inner Diameter	
	SYGEF PVDF PN16	SYGEF PVDF PN10	SYGEF PVDF PN16	SYGEF PVDF PN10	SYGEF PVDF PN16	SYGEF PVDF PN10
⅜" (16 mm)	16.0 mm	—	1.9 mm	—	12.2 mm	—
½" (20 mm)	20.0 mm	—	1.9 mm	—	16.2 mm	—
¾"- (25 mm)	25.0 mm	—	1.9 mm	—	21.2 mm	—
1" (32 mm)	32.0 mm	—	2.4 mm	—	27.2 mm	—
1¼" (40 mm)	40.0 mm	—	2.4 mm	—	35.2 mm	—
1½" (50 mm)	50.0 mm	—	3.0 mm	—	44.0 mm	—
2" (63 mm)	63.0 mm	—	3.0 mm	—	57.0 mm	—
2½" (75 mm)	75.0 mm	—	3.6 mm	—	67.8 mm	—
3" (90 mm)	90.0 mm	90.0 mm	4.3 mm	2.8 mm	81.4 mm	84.4 mm
4" (110 mm)	110.0 mm	110.0 mm	5.3 mm	3.4 mm	99.4 mm	103.2 mm
6" (160 mm)	160.0 mm	160.0 mm	7.7 mm	4.9 mm	144.6 mm	150.2 mm
8" (200 mm)	200.0 mm	200.0 mm	9.6 mm	6.2 mm	180.8 mm	187.6 mm
9" (225 mm)	225.0 mm	225.0 mm	10.8 mm	6.9 mm	203.4 mm	211.2 mm
10" (250 mm)	—	250.0 mm	—	7.7 mm	—	234.6 mm
12" (315 mm)	—	315.0 mm	—	9.7 mm	—	295.6 mm
14" (355 mm)	—	355.0 mm	—	10.8 mm	—	333.4 mm
16" (400 mm)	—	400.0 mm	—	12.1 mm	—	375.8 mm
18" (450 mm)	—	450.0 mm	—	13.6 mm	—	422.8 mm

Note: All dimensions are nominal. Please refer to detailed GF specifications and applicable standards for tolerances.

Calculating Pipe Size

Friction Loss Characteristics

Sizing for any piping system consists of two basic components: fluid flow design and pressure integrity design. Fluid flow design determines the minimum acceptable diameter of pipe and pressure integrity design determines the minimum wall thickness required. For normal liquid service applications acceptable velocity in pipes is typically 7.0 ±3.0 (ft/sec), with a maximum velocity of 10.0 (ft/sec) at discharge points.

Pressure drops throughout the piping network are designed to provide an optimum balance between the installed cost of the piping system and the operating cost of the pumps.

Pressure loss is caused by friction between the pipe wall and the fluid, minor losses due to obstructions, change in direction, etc. Fluid pressure head loss is added to elevation change to determine pump requirements.

Hazen and Williams Formula

The head losses resulting from various water flow rates in plastic piping may be calculated by means of the Hazen and Williams formula.

C Factors

Tests made both with new pipe and pipe that had been in service revealed that (C) factor values for plastic pipe ranged between 160 and 165. Thus the factor of 150 recommended for water in the equation is on the conservative side. On the other hand, the (C) factor for metallic pipe varies from 65 to 125, depending upon the time in service and the interior roughening. The obvious benefit is that with plastic piping systems, it is often possible to use a smaller diameter pipe and still obtain the same or even lower friction losses.

Independent variable for these tests are gallons per minute and nominal pipe size (OD). Dependent variables for these tests are gallons per minute and nominal pipe size OD. Dependent variables are the velocity friction head and pressure drop per 100ft. of pipe, with the interior smooth.

V = Fluid Velocity (ft/sec)
ΔP = Head Loss (lb/in^2 /100 ft of pipe
ΔH = Head Loss (ft of water /100 ft of pipe)
L = Length of Pipe Run (ft)
L_e = Equivalent Length of Pipe for minor losses (ft)
D_i = Pipe Inside Diameter (in)
Q = Fluid Flow (gal/min)

C = Constant for Plastic Pipes (conservative - 150)

Hazen and Williams Formula

$$\Delta H = (L + L_e) \cdot \left(\frac{V}{1.318 \cdot C \cdot (\frac{D_i}{4})^{0.63}} \right)^{1.852}$$

Step 1: Solve for V

$$V = \frac{4Q(0.1337)}{60\pi \left(\frac{D_i}{12} \right)^2}$$

Step 2: Solve for ΔH

$$\Delta H = (L + L_e) \cdot \left(\frac{V}{1.318 \cdot C \cdot (\frac{D_i}{4})^{0.63}} \right)^{1.852}$$

Step 3: Solve for ΔP

$$\Delta P = \Delta H / 2.31$$

Pressure Loss of Fittings

Pressure loss due to fittings depends on the type. In general it can be calculated from the following formula:

$$L_e = K_r \times \frac{(V^2)}{2 \times g}$$

where

L_e = Head loss in equivalent feet of pipe
K_r = resistance coefficient (dimensionless, depends on fitting type)
g = Gravitational constant 32 ft/sec^2
V = Flow velocity in ft/sec

K_r

Sweep 90	Sharp 90	45 Elbow	Tee	Reducer	Increaser
0.4	1.2	0.3	1.3	1.0	0.5

The pressure loss due to all fittings in the piping system is the sum of each L_e. For example, the pressure loss due to ten sweep 90 elbows in a system flowing at 5 ft/sec is approximately:

$$L_e = (10 \times 0.4) \times \frac{5^2}{2 \times 32} = 1.6 \text{ ft pipe equivalent}$$

Flow Rate vs. Friction Loss

PROGEF Standard Polypropylene (PP)

PROGEF Standard Polypropylene

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
	20 mm			25 mm			32 mm			40 mm			
0.75	0.75	0.51	0.22										**0.75**
1	1.00	0.88	0.38	0.63	0.29	0.12							**1**
2	2.01	3.17	1.37	1.27	1.03	0.45	0.77	0.31	0.13				**2**
3	3.01	6.71	2.90	1.90	2.19	0.95	1.15	0.65	0.28	0.74	0.22	0.10	**3**
4	4.02	11.43	4.95	2.53	3.72	1.61	1.54	1.10	0.48	0.99	0.38	0.16	**4**
5	5.02	17.28	7.48	3.17	5.63	2.44	1.92	1.67	0.72	1.24	0.58	0.25	**5**
6	6.03	24.22	10.48	3.80	7.89	3.42	2.30	2.34	1.01	1.49	0.81	0.35	**6**
7	7.03	32.22	13.95	4.43	10.50	4.54	2.69	3.11	1.34	1.74	1.07	0.46	**7**
8	8.03	41.26	17.86	5.07	13.44	5.82	3.07	3.98	1.72	1.98	1.37	0.59	**8**
9	9.04	51.32	22.22	5.70	16.72	7.24	3.46	4.95	2.14	2.23	1.71	0.74	**9**
10	10.04	62.38	27.00	6.33	20.32	8.80	3.84	6.01	2.60	2.48	2.08	0.90	**10**
15	15.07	132.17	57.22	9.50	43.06	18.64	5.76	12.74	5.52	3.72	4.40	1.90	**15**
20				12.67	73.35	31.75	7.68	21.71	9.40	4.96	7.50	3.25	**20**
30				19.00	155.43	67.29	11.52	46.00	19.92	7.44	15.88	6.88	**30**
40							15.36	78.38	33.93	9.92	27.06	11.72	**40**
50										12.40	40.91	17.71	**50**
60										14.88	57.34	24.82	**60**

Note: Caution should be taken when velocities fall within the shaded levels.

PROGEF Standard Polypropylene

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
	50 mm			63 mm			75 mm			90 mm			
5	0.79	0.19	0.08										**5**
10	1.58	0.70	0.30	1.00	0.23	0.10							**10**
15	2.38	1.48	0.64	1.50	0.48	0.21	1.05	0.20	0.09				**15**
20	3.17	2.52	1.09	2.00	0.82	0.35	1.40	0.34	0.15	0.97	0.14	0.06	**20**
25	3.96	3.80	1.65	2.49	1.24	0.54	1.75	0.52	0.23	1.22	0.22	0.09	**25**
30	4.75	5.33	2.31	2.99	1.73	0.75	2.10	0.73	0.32	1.46	0.30	0.13	**30**
35	5.54	7.09	3.07	3.49	2.31	1.00	2.45	0.97	0.42	1.70	0.40	0.17	**35**
40	6.33	9.08	3.93	3.99	2.95	1.28	2.80	1.24	0.54	1.95	0.51	0.22	**40**
45	7.13	11.30	4.89	4.49	3.67	1.59	3.15	1.55	0.67	2.19	0.64	0.28	**45**
50	7.92	13.73	5.94	4.99	4.46	1.93	3.50	1.88	0.81	2.43	0.78	0.34	**50**
55	8.71	16.38	7.09	5.49	5.33	2.31	3.85	2.24	0.97	2.68	0.93	0.40	**55**
60	9.50	19.25	8.33	5.99	6.26	2.71	4.20	2.63	1.14	2.92	1.09	0.47	**60**
65	10.29	22.32	9.66	6.48	7.26	3.14	4.54	3.06	1.32	3.16	1.27	0.55	**65**
70	11.08	25.61	11.09	6.98	8.32	3.60	4.89	3.51	1.52	3.41	1.45	0.63	**70**
75				7.48	9.46	4.09	5.24	3.98	1.72	3.65	1.65	0.71	**75**
80				7.98	10.66	4.61	5.59	4.49	1.94	3.89	1.86	0.80	**80**
95				9.48	14.65	6.34	6.64	6.17	2.67	4.62	2.55	1.11	**95**
100				9.98	16.11	6.98	6.99	6.79	2.94	4.87	2.81	1.22	**100**
125				12.47	24.36	10.55	8.74	10.26	4.44	6.08	4.25	1.84	**125**
150				14.97	34.15	14.78	10.49	14.38	6.22	7.30	5.95	2.58	**150**
175							12.24	19.13	8.28	8.52	7.92	3.43	**175**
200										9.73	10.14	4.39	**200**
225										10.95	12.61	5.46	**225**
250										12.16	15.33	6.64	**250**

Note: Caution should be taken when velocities fall within the shaded levels.

V = Velocity (ft/sec)
ΔH = Head Loss (ft water/100 ft pipe)
ΔP = Pressure Loss (lb/in^2/100 ft pipe)

PROGEF Standard Polypropylene

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
		110 mm			160 mm			200 mm			225 mm		
20	0.65	0.05	0.02										**20**
25	0.81	0.08	0.04										**25**
30	0.98	0.11	0.05										**30**
35	1.14	0.15	0.07	0.54	0.02	0.01							**35**
40	1.30	0.19	0.08	0.62	0.03	0.01							**40**
45	1.46	0.24	0.10	0.69	0.04	0.02							**45**
50	1.63	0.29	0.13	0.77	0.05	0.02	0.49	0.02	0.01				**50**
75	2.44	0.62	0.27	1.16	0.10	0.04	0.74	0.03	0.01	0.58	0.02	0.01	**75**
100	3.25	1.06	0.46	1.54	0.17	0.07	0.98	0.06	0.02	0.78	0.03	0.01	**100**
125	4.07	1.60	0.69	1.93	0.26	0.11	1.23	0.09	0.04	0.97	0.05	0.02	**125**
150	4.88	2.24	0.97	2.31	0.36	0.16	1.48	0.12	0.05	1.17	0.07	0.03	**150**
200	6.51	3.81	1.65	3.08	0.62	0.27	1.97	0.21	0.09	1.56	0.12	0.05	**200**
250	8.14	5.76	2.49	3.85	0.93	0.40	2.46	0.31	0.14	1.95	0.18	0.08	**250**
300	9.76	8.08	3.50	4.62	1.31	0.57	2.95	0.44	0.19	2.34	0.25	0.11	**300**
350	11.39	10.74	4.65	5.39	1.74	0.75	3.45	0.59	0.25	2.72	0.33	0.14	**350**
400	13.02	13.76	5.96	6.16	2.23	0.97	3.94	0.75	0.33	3.11	0.42	0.18	**400**
500				7.70	3.37	1.46	4.92	1.14	0.49	3.89	0.64	0.28	**500**
600				9.24	4.73	2.05	5.91	1.59	0.69	4.67	0.90	0.39	**600**
700				10.78	6.29	2.72	6.89	2.12	0.92	5.45	1.20	0.52	**700**
800				12.33	8.06	3.49	7.88	2.71	1.17	6.23	1.53	0.66	**800**
900							8.86	3.37	1.46	7.01	1.90	0.82	**900**
1000							9.85	4.10	1.77	7.79	2.31	1.00	**1000**
1250							12.31	6.20	2.68	9.73	3.50	1.51	**1250**
1500							14.77	8.69	3.76	11.68	4.90	2.12	**1500**
1750										13.62	6.52	2.82	**1750**

Note: Caution should be taken when velocities fall within the shaded levels.

PROGEF Standard Polypropylene

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
		250 mm			315 mm			355 mm			400 mm		
100	0.63	0.02	0.01										**100**
150	0.94	0.04	0.02	0.59	0.01	0.01							**150**
200	1.26	0.07	0.03	0.79	0.02	0.01	0.62	0.01	0.01				**200**
250	1.57	0.11	0.05	0.99	0.03	0.01	0.78	0.02	0.01	0.61	0.01	0.00	**250**
300	1.89	0.15	0.06	1.19	0.05	0.02	0.94	0.03	0.01	0.74	0.02	0.01	**300**
350	2.20	0.20	0.09	1.39	0.06	0.03	1.09	0.04	0.02	0.86	0.02	0.01	**350**
400	2.52	0.25	0.11	1.59	0.08	0.04	1.25	0.05	0.02	0.98	0.03	0.01	**400**
500	3.15	0.38	0.17	1.98	0.12	0.05	1.56	0.07	0.03	1.23	0.04	0.02	**500**
750	4.72	0.81	0.35	2.97	0.26	0.11	2.34	0.15	0.06	1.84	0.08	0.04	**750**
1000	6.30	1.38	0.60	3.97	0.45	0.19	3.12	0.25	0.11	2.46	0.14	0.06	**1000**
1250	7.87	2.09	0.90	4.96	0.68	0.29	3.90	0.38	0.16	3.07	0.21	0.09	**1250**
1300	8.19	2.25	0.97	5.16	0.73	0.32	4.06	0.41	0.18	3.20	0.23	0.10	**1300**
1350	8.50	2.41	1.04	5.35	0.78	0.34	4.21	0.44	0.19	3.32	0.24	0.11	**1350**
1400	8.82	2.58	1.11	5.55	0.84	0.36	4.37	0.47	0.20	3.44	0.26	0.11	**1400**
1500	9.44	2.93	1.27	5.95	0.95	0.41	4.68	0.53	0.23	3.69	0.30	0.13	**1500**
1750	11.02	3.89	1.69	6.94	1.26	0.55	5.46	0.71	0.31	4.30	0.40	0.17	**1750**
2000	12.59	4.99	2.16	7.93	1.62	0.70	6.24	0.90	0.39	4.92	0.51	0.22	**2000**
2500				9.92	2.45	1.06	7.80	1.37	0.59	6.15	0.77	0.33	**2500**
3000				11.90	3.43	1.49	9.36	1.92	0.83	7.38	1.07	0.46	**3000**
3500				13.88	4.56	1.98	10.92	2.55	1.10	8.61	1.43	0.62	**3500**
4000							12.49	3.26	1.41	9.84	1.83	0.79	**4000**
4500										11.07	2.27	0.98	**4500**
5000										12.30	2.76	1.20	**5000**

Note: Caution should be taken when velocities fall within the shaded levels.

V = Velocity (ft/sec)
ΔH = Head Loss (ft water/100 ft pipe)
ΔP = Pressure Loss (lb/in^2/100 ft pipe)

PROGEF Standard Polypropylene

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
	450 mm			500 mm			
350	0.68	0.01	0.00				**350**
400	0.78	0.01	0.01	0.63	0.01	0.00	**400**
450	0.87	0.02	0.01	0.71	0.01	0.00	**450**
500	0.97	0.02	0.01	0.79	0.01	0.01	**500**
750	1.46	0.05	0.02	1.18	0.03	0.01	**750**
1000	1.94	0.08	0.03	1.57	0.05	0.02	**1000**
1250	2.43	0.12	0.05	1.97	0.07	0.03	**1250**
1500	2.92	0.17	0.07	2.36	0.10	0.04	**1500**
1750	3.40	0.22	0.10	2.75	0.13	0.06	**1750**
2000	3.89	0.29	0.12	3.15	0.17	0.07	**2000**
2500	4.86	0.43	0.19	3.94	0.26	0.11	**2500**
3000	5.83	0.61	0.26	4.72	0.36	0.16	**3000**
3500	6.80	0.81	0.35	5.51	0.48	0.21	**3500**
4000	7.78	1.03	0.45	6.30	0.62	0.27	**4000**
4500	8.75	1.28	0.56	7.08	0.77	0.33	**4500**
5000	9.72	1.56	0.68	7.87	0.93	0.40	**5000**
5500	10.69	1.86	0.81	8.66	1.11	0.48	**5500**
6000	11.67	2.19	0.95	9.44	1.31	0.57	**6000**
6500				10.23	1.52	0.66	**6500**
7000				11.02	1.74	0.75	**7000**

Note: Caution should be taken when velocities fall within the shaded levels.

PROGEF Natural Polypropylene (PP)

PROGEF Natural Polypropylene

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
	20 mm			25 mm			32 mm			40 mm			
0.75	0.75	0.51	0.22										**0.75**
1	1.00	0.88	0.38	0.63	0.29	0.12							**1**
2	2.01	3.17	1.37	1.27	1.03	0.45	0.77	0.31	0.13				**2**
3	3.01	6.71	2.90	1.90	2.19	0.95	1.15	0.65	0.28	0.74	0.22	0.10	**3**
4	4.02	11.43	4.95	2.53	3.72	1.61	1.54	1.10	0.48	0.99	0.38	0.16	**4**
5	5.02	17.28	7.48	3.17	5.63	2.44	1.92	1.67	0.72	1.24	0.58	0.25	**5**
6	6.03	24.22	10.48	3.80	7.89	3.42	2.30	2.34	1.01	1.49	0.81	0.35	**6**
7	7.03	32.22	13.95	4.43	10.50	4.54	2.69	3.11	1.34	1.74	1.07	0.46	**7**
8	8.03	41.26	17.86	5.07	13.44	5.82	3.07	3.98	1.72	1.98	1.37	0.59	**8**
9	9.04	51.32	22.22	5.70	16.72	7.24	3.46	4.95	2.14	2.23	1.71	0.74	**9**
10	10.04	62.38	27.00	6.33	20.32	8.80	3.84	6.01	2.60	2.48	2.08	0.90	**10**
15	15.07	132.17	57.22	9.50	43.06	18.64	5.76	12.74	5.52	3.72	4.40	1.90	**15**
20				12.67	73.35	31.75	7.68	21.71	9.40	4.96	7.50	3.25	**20**
30				19.00	155.43	67.29	11.52	46.00	19.92	7.44	15.88	6.88	**30**
40							15.36	78.38	33.93	9.92	27.06	11.72	**40**
50										12.40	40.91	17.71	**50**
60										14.88	57.34	24.82	**60**

Note: Caution should be taken when velocities fall within the shaded levels.

V = Velocity (ft/sec)
ΔH = Head Loss (ft water/100 ft pipe)
ΔP = Pressure Loss (lb/in^2/100 ft pipe)

PROGEF Natural Polypropylene

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
	50 mm			63 mm			90 mm			
5	0.79	0.19	0.08							**5**
10	1.58	0.70	0.30	1.00	0.23	0.10				**10**
15	2.38	1.48	0.64	1.50	0.48	0.21	0.62	0.06		**15**
20	3.17	2.52	1.09	2.00	0.82	0.35	0.83	0.10	0.04	**20**
25	3.96	3.80	1.65	2.49	1.24	0.54	1.03	0.15	0.06	**25**
30	4.75	5.33	2.31	2.99	1.73	0.75	1.24	0.20	0.09	**30**
35	5.54	7.09	3.07	3.49	2.31	1.00	1.45	0.27	0.12	**35**
40	6.33	9.08	3.93	3.99	2.95	1.28	1.66	0.35	0.15	**40**
45	7.13	11.30	4.89	4.49	3.67	1.59	1.86	0.43	0.19	**45**
50	7.92	13.73	5.94	4.99	4.46	1.93	2.07	0.53	0.23	**50**
55	8.71	16.38	7.09	5.49	5.33	2.31	2.28	0.63	0.27	**55**
60	9.50	19.25	8.33	5.99	6.26	2.71	2.48	0.74	0.32	**60**
65	10.29	22.32	9.66	6.48	7.26	3.14	2.69	0.85	0.37	**65**
70	11.08	25.61	11.09	6.98	8.32	3.60	2.90	0.98	0.42	**70**
75				7.48	9.46	4.09	3.10	1.11	0.48	**75**
80				7.98	10.66	4.61	3.31	1.25	0.54	**80**
95				9.48	14.65	6.34	3.93	1.72	0.75	**95**
100				9.98	16.11	6.98	4.14	1.90	0.82	**100**
110				10.97	19.23	8.32	4.55	2.26	0.98	**110**
125				12.47	24.36	10.55	5.17	2.87	1.24	**125**
150							6.21	4.02	1.74	**150**
175							7.24	5.34	2.31	**175**
200							8.28	6.84	2.96	**200**
225							9.31	8.51	3.68	**225**
250							10.35	10.34	4.48	**250**
275							11.38	12.34	5.34	**275**

Note: Caution should be taken when velocities fall within the shaded levels.

V = Velocity (ft/sec)
ΔH = Head Loss (ft water/100 ft pipe)
ΔP = Pressure Loss (lb/in^2/100 ft pipe)

PPro-Seal Natural Polypropylene (PP)

PPro-Seal Natural Polypropylene

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
	½"			¾"			1"			1½"			2"			
0.5	0.69	0.52	0.22													**0.5**
0.75	1.03	1.10	0.47													**0.75**
1	1.37	1.87	0.81	0.74	0.42	0.18										**1**
2	2.74	6.74	2.92	1.48	1.52	0.66	0.89	0.44	0.19							**2**
3	4.11	14.29	6.19	2.23	3.21	1.39	1.34	0.93	0.40							**3**
4	5.48	24.34	10.54	2.97	5.47	2.37	1.78	1.59	0.69	0.73	0.18	0.08				**4**
5	6.85	36.80	15.93	3.71	8.27	3.58	2.23	2.40	1.04	0.91	0.27	0.12				**5**
6	8.22	51.58	22.33	4.45	11.60	5.02	2.68	3.36	1.46	1.09	0.38	0.16				**6**
7	9.59	68.63	29.71	5.19	15.43	6.68	3.12	4.47	1.94	1.27	0.50	0.22	0.76	0.14	0.06	**7**
8	10.96	87.88	38.04	5.94	19.76	8.55	3.57	5.73	2.48	1.45	0.64	0.28	0.87	0.18	0.08	**8**
9	12.33	109.30	47.32	6.68	24.58	10.64	4.01	7.13	3.08	1.63	0.80	0.35	0.98	0.23	0.10	**9**
10				7.42	29.87	12.93	4.46	8.66	3.75	1.82	0.97	0.42	1.09	0.28	0.12	**10**
12.5				9.28	45.16	19.55	5.58	13.09	5.67	2.27	1.47	0.64	1.36	0.42	0.18	**12.5**
15				11.13	63.29	27.40	6.69	18.35	7.94	2.72	2.06	0.89	1.63	0.59	0.26	**15**
17.5				12.99	84.21	36.45	7.81	24.42	10.57	3.18	2.74	1.19	1.90	0.79	0.34	**17.5**
20							8.92	31.27	13.54	3.63	3.51	1.52	2.17	1.01	0.44	**20**
22.5							10.04	38.89	16.83	4.09	4.37	1.89	2.45	1.25	0.54	**22.5**
25							11.15	47.27	20.46	4.54	5.31	2.30	2.72	1.52	0.66	**25**
30										5.45	7.44	3.22	3.26	2.13	0.92	**30**
40										7.26	12.67	5.49	4.35	3.63	1.57	**40**
50										9.08	19.16	8.29	5.43	5.50	2.38	**50**
60										10.89	26.86	11.63	6.52	7.70	3.33	**60**
70										12.71	35.73	15.47	7.61	10.25	4.44	**70**
80													8.69	13.12	5.68	**80**
90													9.78	16.32	7.07	**90**
100													10.87	19.84	8.59	**100**
110													11.95	23.67	10.25	**110**

Note: Caution should be taken when velocities fall within the shaded levels.

V = Velocity (ft/sec)
ΔH = Head Loss (ft water/100 ft pipe)
ΔP = Pressure Loss (lb/in^2/100 ft pipe)

SYGEF Polyvinylidene Fluoride (PVDF), PN 16

SYGEF PVDF (PN16)

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
		16 mm			20 mm			25 mm			32 mm		
0.5	0.89	0.97	0.42										**0.5**
0.75	1.33	2.05	0.89										**0.75**
1	1.77	3.49	1.51	1.00	0.88	0.38							**1**
2	3.54	12.58	5.45	2.01	3.17	1.37	1.17	0.86	0.37				**2**
3	5.31	26.66	11.54	3.01	6.71	2.90	1.76	1.81	0.78	1.07	0.54	0.23	**3**
4	7.08	45.42	19.66	4.02	11.43	4.95	2.35	3.09	1.34	1.43	0.92	0.40	**4**
5	8.85	68.66	29.72	5.02	17.28	7.48	2.93	4.67	2.02	1.78	1.39	0.60	**5**
6	10.63	96.24	41.66	6.03	24.22	10.48	3.52	6.54	2.83	2.14	1.95	0.84	**6**
7	12.40	128.04	55.43	7.03	32.22	13.95	4.11	8.70	3.77	2.49	2.59	1.12	**7**
8				8.03	41.26	17.86	4.69	11.15	4.83	2.85	3.32	1.44	**8**
9				9.04	51.32	22.22	5.28	13.86	6.00	3.21	4.12	1.79	**9**
10				10.04	62.38	27.00	5.86	16.85	7.29	3.56	5.01	2.17	**10**
11				11.05	74.42	32.22	6.45	20.10	8.70	3.92	5.98	2.59	**11**
12							7.04	23.62	10.22	4.28	7.03	3.04	**12**
13							7.62	27.39	11.86	4.63	8.15	3.53	**13**
14							8.21	31.42	13.60	4.99	9.35	4.05	**14**
15							8.80	35.71	15.46	5.34	10.62	4.60	**15**
17.5							10.26	47.50	20.56	6.23	14.13	6.12	**17.5**
20							11.73	60.83	26.33	7.13	18.09	7.83	**20**
25										8.91	27.35	11.84	**25**
30										10.69	38.34	16.60	**30**
35										12.47	51.01	22.08	**35**
40													**40**

Note: Caution should be taken when velocities fall within the shaded levels.

SYGEF PVDF (PN16)

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
		40 mm			50 mm			63 mm			75 mm		
1	0.21	0.02	0.01										**1**
2.5	0.53	0.11	0.05										**2.5**
5	1.06	0.40	0.17	0.68	0.13	0.06							**5**
10	2.13	1.43	0.62	1.36	0.48	0.21	0.81	0.14	0.06				**10**
15	3.19	3.03	1.31	2.04	1.02	0.44	1.22	0.29	0.13	0.86	0.12	0.05	**15**
20	4.25	5.16	2.23	2.72	1.74	0.75	1.62	0.49	0.21	1.15	0.21	0.09	**20**
25	5.32	7.80	3.38	3.40	2.63	1.14	2.03	0.75	0.32	1.43	0.32	0.14	**25**
30	6.38	10.94	4.73	4.08	3.69	1.60	2.43	1.05	0.45	1.72	0.45	0.20	**30**
35	7.45	14.55	6.30	4.77	4.91	2.13	2.84	1.39	0.60	2.01	0.60	0.26	**35**
40	8.51	18.63	8.07	5.45	6.29	2.72	3.25	1.79	0.77	2.29	0.77	0.33	**40**
45	9.57	23.17	10.03	6.13	7.82	3.39	3.65	2.22	0.96	2.58	0.95	0.41	**45**
50	10.64	28.16	12.19	6.81	9.51	4.12	4.06	2.70	1.17	2.87	1.16	0.50	**50**
55	11.70	33.60	14.55	7.49	11.35	4.91	4.46	3.22	1.39	3.15	1.38	0.60	**55**
60				8.17	13.33	5.77	4.87	3.78	1.64	3.44	1.63	0.70	**60**
65				8.85	15.46	6.69	5.27	4.39	1.90	3.73	1.89	0.82	**65**
70				9.53	17.73	7.68	5.68	5.03	2.18	4.01	2.16	0.94	**70**
75				10.21	20.15	8.72	6.08	5.72	2.48	4.30	2.46	1.06	**75**
80				10.89	22.71	9.83	6.49	6.45	2.79	4.59	2.77	1.20	**80**
95							7.71	8.86	3.84	5.45	3.81	1.65	**95**
100							8.11	9.74	4.22	5.73	4.19	1.81	**100**
125							10.14	14.73	6.38	7.17	6.33	2.74	**125**
150							12.17	20.65	8.94	8.60	8.88	3.84	**150**
175										10.03	11.81	5.11	**175**
200										11.47	15.12	6.55	**200**
225													**225**

Note: Caution should be taken when velocities fall within the shaded levels.

V = Velocity (ft/sec)
ΔH = Head Loss (ft water/100 ft pipe)
ΔP = Pressure Loss (lb/in^2/100 ft pipe)

SYGEF PVDF (PN16)

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
	90 mm			110 mm			160 mm			200 mm			225 mm			
20	0.80	0.09	0.04													**20**
25	0.99	0.13	0.06													**25**
30	1.19	0.19	0.08	0.80	0.07	0.03										**30**
35	1.39	0.25	0.11	0.93	0.09	0.04										**35**
40	1.59	0.32	0.14	1.07	0.12	0.05										**40**
45	1.79	0.39	0.17	1.20	0.15	0.06										**45**
50	1.99	0.48	0.21	1.33	0.18	0.08	0.63	0.03	0.01							**50**
75	2.98	1.01	0.44	2.00	0.38	0.17	0.95	0.06	0.03	0.60	0.02	0.01				**75**
100	3.98	1.72	0.75	2.67	0.65	0.28	1.26	0.11	0.05	0.81	0.04	0.02	0.64	0.02	0.01	**100**
125	4.97	2.60	1.13	3.33	0.98	0.43	1.58	0.16	0.07	1.01	0.05	0.02	0.80	0.03	1.01	**125**
150	5.97	3.65	1.58	4.00	1.38	0.60	1.89	0.22	0.10	1.21	0.08	0.03	0.96	0.04	0.02	**150**
175	6.96	4.85	2.10	4.67	1.84	0.79	2.21	0.30	0.13	1.41	0.10	0.04	1.11	0.06	0.02	**175**
200	7.96	6.21	2.69	5.34	2.35	1.02	2.52	0.38	0.16	1.61	0.13	0.06	1.27	0.07	0.03	**200**
225	8.95	7.73	3.35	6.00	2.92	1.27	2.84	0.47	0.20	1.81	0.16	0.07	1.43	0.09	0.04	**225**
250	9.95	9.39	4.07	6.67	3.55	1.54	3.15	0.57	0.25	2.02	0.19	0.08	1.59	0.11	0.05	**250**
275	10.94	11.21	4.85	7.34	4.24	1.84	3.47	0.68	0.30	2.22	0.23	0.10	1.75	0.13	0.06	**275**
300	11.93	13.16	5.70	8.00	4.98	2.16	3.78	0.80	0.35	2.42	0.27	0.12	1.91	0.15	0.07	**300**
325				8.67	5.78	2.50	4.10	0.93	0.40	2.62	0.31	0.14	2.07	0.18	0.08	**325**
350				9.34	6.63	2.87	4.41	1.07	0.46	2.82	0.36	0.16	2.23	0.20	0.09	**350**
400				10.67	8.48	3.67	5.04	1.37	0.59	3.23	0.46	0.20	2.55	0.26	0.11	**400**
450				12.00	10.55	4.57	5.67	1.70	0.74	3.63	0.57	0.25	2.87	0.32	0.14	**450**
500							6.30	2.07	0.90	4.03	0.70	0.30	3.19	0.39	0.17	**500**
600							7.56	2.90	1.26	4.84	0.98	0.42	3.82	0.55	0.24	**600**
700							8.82	3.86	1.67	5.64	1.30	0.56	4.46	0.73	0.32	**700**
800							10.08	4.94	2.14	6.45	1.67	0.72	5.10	0.94	0.41	**800**
900							11.35	6.15	2.66	7.26	2.07	0.90	5.73	1.17	0.51	**900**
1000										8.06	2.52	1.09	6.37	1.42	0.62	**1000**
1150										9.27	3.27	1.41	7.33	1.84	0.80	**1150**
1200										9.68	3.53	1.53	7.65	1.99	0.86	**1200**
1300										10.48	4.10	1.77	8.28	2.31	1.00	**1300**
1400										11.29	4.70	2.03	8.92	2.65	1.15	**1400**
1450													9.24	2.83	1.22	**1450**
1600													10.19	3.39	1.47	**1600**
1750													11.15	4.01	1.73	**1750**
1900																**1900**

Note: Caution should be taken when velocities fall within the shaded levels.

V = Velocity (ft/sec)
ΔH = Head Loss (ft water/100 ft pipe)
ΔP = Pressure Loss (lb/in²/100 ft pipe)

SYGEF Polyvinylidene Fluoride (PVDF), PN 10

SYGEF PVDF (PN10)

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
		90 mm			110 mm			160 mm			200 mm		
20	0.74	0.07	0.03										**20**
25	0.93	0.11	0.05										**25**
30	1.11	0.16	0.07	0.74	0.06	0.03							**30**
40	1.48	0.26	0.11	0.99	0.10	0.04							**40**
50	1.85	0.40	0.17	1.24	0.15	0.07	0.58	0.02	0.01	0.37	0.01	0.00	**50**
75	2.78	0.85	0.37	1.86	0.32	0.14	0.88	0.05	0.02	0.56	0.02	0.01	**75**
100	3.70	1.44	0.62	2.47	0.54	0.23	1.17	0.09	0.04	0.75	0.03	0.01	**100**
125	4.63	2.18	0.94	3.09	0.82	0.35	1.46	0.13	0.06	0.94	0.04	0.02	**125**
150	5.55	3.06	1.32	3.71	1.15	0.50	1.75	0.19	0.08	1.12	0.06	0.03	**150**
175	6.48	4.07	1.76	4.33	1.53	0.66	2.04	0.25	0.11	1.31	0.08	0.04	**175**
200	7.40	5.21	2.26	4.95	1.96	0.85	2.34	0.32	0.14	1.50	0.11	0.05	**200**
225	8.33	6.48	2.80	5.57	2.44	1.05	2.63	0.39	0.17	1.69	0.13	0.06	**225**
250	9.25	7.88	3.41	6.19	2.96	1.28	2.92	0.48	0.21	1.87	0.16	0.07	**250**
275	10.18	9.40	4.07	6.81	3.53	1.53	3.21	0.57	0.25	2.06	0.19	0.08	**275**
300	11.10	11.04	4.78	7.42	4.15	1.80	3.51	0.67	0.29	2.25	0.23	0.10	**300**
325				8.04	4.81	2.08	3.80	0.78	0.34	2.43	0.26	0.11	**325**
400				9.90	7.07	3.06	4.67	1.14	0.49	3.00	0.39	0.17	**400**
450				11.14	8.79	3.81	5.26	1.42	0.61	3.37	0.48	0.21	**450**
500							5.84	1.72	0.75	3.74	0.58	0.25	**500**
600							7.01	2.41	1.04	4.49	0.82	0.35	**600**
700							8.18	3.21	1.39	5.24	1.09	0.47	**700**
800							9.35	4.11	1.78	5.99	1.39	0.60	**800**
1000							11.68	6.21	2.69	7.49	2.11	0.91	**1000**
1200										8.99	2.95	1.28	**1200**
1400										10.49	3.93	1.70	**1400**
1600										11.98	5.03	2.18	**1600**
1800													**1800**

Note: Caution should be taken when velocities fall within the shaded levels.

V = Velocity (ft/sec)
ΔH = Head Loss (ft water/100 ft pipe)
ΔP = Pressure Loss (lb/in²/100 ft pipe)

SYGEF PVDF (PN10)

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
		225 mm			250 mm			315 mm			355 mm		
100	0.59	0.02	0.01										**100**
150	0.89	0.04	0.02	0.72	0.02	0.01							**150**
200	1.18	0.06	0.03	0.96	0.04	0.02							**200**
250	1.48	0.09	0.04	1.20	0.05	0.02	0.75	0.02	0.01				**250**
300	1.77	0.13	0.06	1.44	0.08	0.03	0.90	0.02	0.01	0.71	0.01	0.01	**300**
350	2.07	0.17	0.07	1.68	0.10	0.04	1.06	0.03	0.01	0.83	0.02	0.01	**350**
400	2.36	0.22	0.09	1.92	0.13	0.06	1.21	0.04	0.02	0.95	0.02	0.01	**400**
500	2.95	0.33	0.14	2.39	0.20	0.09	1.51	0.06	0.03	1.19	0.04	0.02	**500**
750	4.43	0.69	0.30	3.59	0.42	0.18	2.26	0.14	0.06	1.78	0.08	0.03	**750**
1000	5.91	1.18	0.51	4.79	0.71	0.31	3.02	0.23	0.10	2.37	0.13	0.06	**1000**
1250	7.39	1.79	0.77	5.99	1.07	0.46	3.77	0.35	0.15	2.96	0.19	0.08	**1250**
1300	7.68	1.92	0.83	6.23	1.15	0.50	3.92	0.37	0.16	3.08	0.21	0.09	**1300**
1350	7.98	2.06	0.89	6.47	1.24	0.54	4.07	0.40	0.17	3.20	0.22	0.10	**1350**
1400	8.27	2.21	0.96	6.70	1.32	0.57	4.22	0.43	0.19	3.32	0.24	0.10	**1400**
1500	8.86	2.51	1.09	7.18	1.50	0.65	4.52	0.49	0.21	3.56	0.27	0.12	**1500**
1750	10.34	3.34	1.44	8.38	2.00	0.87	5.28	0.65	0.28	4.15	0.36	0.16	**1750**
2000	11.82	4.27	1.85	9.58	2.56	1.11	6.03	0.83	0.36	4.74	0.46	0.20	**2000**
2250				10.78	3.19	1.38	6.79	1.04	0.45	5.34	0.58	0.25	**2250**
2500				11.97	3.87	1.68	7.54	1.26	0.54	5.93	0.70	0.30	**2500**
2750							8.30	1.50	0.65	6.52	0.84	0.36	**2750**
3000							9.05	1.76	0.76	7.11	0.98	0.43	**3000**
3500							10.56	2.35	1.02	8.30	1.31	0.57	**3500**
4000							12.07	3.00	1.30	9.49	1.67	0.72	**4000**
4500										10.67	2.08	0.90	**4500**
5000										11.86	2.53	1.09	**5000**
5500													**5500**

Note: Caution should be taken when velocities fall within the shaded levels.

SYGEF PVDF (PN10)

Flow Rate (GPM)	V	ΔH	ΔP	V	ΔH	ΔP	Flow Rate (GPM)
		400 mm			450 mm		
400	0.75	0.01	0.01				**400**
500	0.93	0.02	0.01	0.74	0.01	0.00	**500**
750	1.40	0.04	0.02	1.11	0.02	0.01	**750**
1000	1.87	0.07	0.03	1.47	0.04	0.02	**1000**
1250	2.33	0.11	0.05	1.84	0.06	0.03	**1250**
1300	2.43	0.12	0.05	1.92	0.07	0.03	**1300**
1350	2.52	0.12	0.05	1.99	0.07	0.03	**1350**
1400	2.61	0.13	0.06	2.06	0.08	0.03	**1400**
1500	2.80	0.15	0.07	2.21	0.09	0.04	**1500**
1750	3.27	0.20	0.09	2.58	0.11	0.05	**1750**
2000	3.73	0.26	0.11	2.95	0.15	0.06	**2000**
2250	4.20	0.32	0.14	3.32	0.18	0.08	**2250**
2500	4.67	0.39	0.17	3.69	0.22	0.10	**2500**
2750	5.13	0.47	0.20	4.05	0.26	0.11	**2750**
3000	5.60	0.55	0.24	4.42	0.31	0.13	**3000**
3500	6.53	0.73	0.32	5.16	0.41	0.18	**3500**
4000	7.47	0.93	0.40	5.90	0.53	0.23	**4000**
4500	8.40	1.16	0.50	6.64	0.65	0.28	**4500**
5000	9.33	1.41	0.61	7.37	0.80	0.34	**5000**
5500	10.27	1.69	0.73	8.11	0.95	0.41	**5500**
6000	11.20	1.98	0.86	8.85	1.12	0.48	**6000**
6500				9.58	1.29	0.56	**6500**
7000				10.32	1.48	0.64	**7000**
7500				11.06	1.69	0.73	**7500**
8000							**8000**

Note: Caution should be taken when velocities fall within the shaded levels.

V = Velocity (ft/sec)
ΔH = Head Loss (ft water/100 ft pipe)
ΔP = Pressure Loss (lb/in^2/100 ft pipe)

Gravity Drain Systems

Flow Rate for Gravity Drain Systems

Drainage flow is caused by gravity due to slope of all drainage piping. Drainage piping is deliberately designed to run only partially full; a full pipe, particularly a stack, could blow out or suck out all the trap seals in the system. For a given type of pipe (friction,) the variables in drainage flow are slope and depth of liquid. When these two factors are known, the flow velocity V and flow rate Q can be calculated. The approximate flow rates and velocities can be calculated as follows:

Q - Flow Rate (gpm)
A - Section Area Pipe (ft^2)
n - Manning Friction Factor 0.009
R - Hydraulic Radius of pipe 0D(ft)/4
S - Hydraulic Gradient - Slope (in/ft)

$$Q = A \cdot \frac{1.486}{n} \cdot R^{2/3} \cdot S^{1/2} \qquad V = \frac{1.486}{n} \cdot R^{2/3} \cdot \frac{S^{1/2}}{12}$$

Example Problem

System Information
Material: 160 mm PROGEF Standard (PP-H)
Outer Diameter: 160.0 (mm)
Inside Diameter: 130.8 (mm)

Q - Flow Rate (gpm)
A - Section Area Pipe 0.1446 full = **0.0723** ½full (ft^2)
n - Manning Friction Factor **0.009**
R - Hydraulic Radius of pipe **0.1073** (ft)
S - Hydraulic Gradient - Slope **1/8** (in/ft) = 0.0104
Slope **1/4** (in/ft) = 0.0208
Slope **1/2** (in/ft) = 0.0416

$$Q = .0723 \cdot \frac{1.486}{0.009} \cdot (0.1073)^{2/3} \cdot (0.0208)^{1/2} \qquad V = \frac{1.486}{0.009} \cdot (0.1073)^{2/3} \cdot \frac{0.144}{12}$$

$$Q = 11.94 \cdot 0.226 \cdot 0.144 \qquad V = 165.1 \cdot 0.226 \cdot 0.012$$

$$Q = 0.389\ (ft^3/sec) \qquad V = 0.45\ (ft/sec)$$

$$Q = 174.4\ (gpm)$$

Approximate Discharge Rates and Velocities in Sloping Drains Flowing Half-Full

PROGEF Standard/Natural Polypropylene

	1/8 (in/ft) Slope		1/4 (in/ft) Slope		1/2 (in/ft) Slope	
Nominal Pipe Diameter (mm)	**Flow rate (gpm)**	**Velocity (fps)**	**Flow rate (gpm)**	**Velocity (fps)**	**Flow rate (gpm)**	**Velocity (fps)**
20	0.5	0.08	0.7	0.11	0.9	0.16
25	0.9	0.09	1.2	0.13	1.7	0.18
32	1.7	0.11	2.4	0.15	3.4	0.22
40	3.0	0.13	4.3	0.18	6.1	0.25
50	5.5	0.15	7.8	0.21	11.0	0.29
63	10.2	0.17	14.5	0.24	20.4	0.34
75	16.4	0.19	23.2	0.27	32.8	0.38
90	26.6	0.22	37.7	0.31	53.3	0.43
110	45.5	0.25	64.4	0.35	91.1	0.49
160	123.4	0.32	174.5	0.45	246.8	0.63
200	224.1	0.37	316.9	0.52	448.2	0.74
225	306.6	0.40	433.6	0.56	613.1	0.80
250	406.9	0.43	575.4	0.60	813.7	0.85
315	753.5	0.50	1065.7	0.70	1507.1	1.00
355	1037.1	0.54	1466.6	0.76	2074.1	1.08
400	1425.3	0.58	2015.6	0.83	2850.5	1.17
450	1949.4	0.63	2756.9	0.89	3898.9	1.26
500	2583.3	0.68	3653.4	0.96	5166.7	1.36

PPro-Seal Natural Polypropylene

	1/8 (in/ft) Slope		1/4 (in/ft) Slope		1/2 (in/ft) Slope	
Nominal Pipe Diameter (inch)	**Flow rate (gpm)**	**Velocity (fps)**	**Flow rate (gpm)**	**Velocity (fps)**	**Flow rate (gpm)**	**Velocity (fps)**
½	0.3	0.07	0.4	0.10	0.6	0.14
¾	0.7	0.09	1.0	0.12	1.4	0.17
1	1.4	0.10	2.0	0.15	2.8	0.21
1½	4.6	0.14	6.5	0.20	9.2	0.28
2	9.1	0.17	12.9	0.23	18.2	0.33

SYGEF PVDF

	PN16						PN10					
	1/8 (in/ft) Slope		1/4 (in/ft) Slope		1/2 (in/ft) Slope		1/8 (in/ft) Slope		1/4 (in/ft) Slope		1/2 (in/ft) Slope	
Nominal Pipe Diameter	**Flow rate (gpm)**	**Velocity (fps)**	**Flow rate (gpm)**	**Velocity (fps)**	**Flow rate (gpm)**	**Velocity (fps)**	**Flow rate (gpm)**	**Velocity (fps)**	**Flow rate (gpm)**	**Velocity (fps)**	**Flow rate (gpm)**	**Velocity (fps)**
16 mm	0.2	0.07	0.3	0.09	0.4	0.13						
20 mm	0.5	0.08	0.7	0.11	0.9	0.16						
25 mm	1.0	0.09	1.4	0.13	1.9	0.19						
32 mm	1.9	0.11	2.6	0.16	3.7	0.22						
40 mm	3.7	0.13	5.3	0.19	7.5	0.26						
50 mm	6.8	0.15	9.6	0.22	13.5	0.31						
63 mm	13.5	0.18	19.0	0.26	26.9	0.36						
75 mm	21.4	0.20	30.3	0.29	42.8	0.41						
90 mm	34.8	0.23	49.3	0.33	69.7	0.46	38.4	0.24	54.3	0.33	76.7	0.47
110 mm	59.3	0.26	83.9	0.37	118.7	0.53	65.6	0.27	92.8	0.38	131.2	0.54
160 mm	161.2	0.34	228.0	0.48	322.5	0.68	178.4	0.35	252.3	0.49	356.9	0.69
200 mm	292.6	0.39	413.7	0.56	585.1	0.79	322.8	0.40	456.6	0.57	645.7	0.81
225 mm	401.6	0.43	567.9	0.60	803.1	0.85	442.8	0.44	626.2	0.62	885.6	0.87
250 mm							586.0	0.47	828.7	0.66	1172.0	0.94
315 mm							1085.3	0.55	1534.9	0.77	2170.7	1.09
355 mm							1496.0	0.59	2115.7	0.84	2992.0	1.18
400 mm							2058.6	0.64	2911.3	0.91	4117.2	1.28
450 mm							2818.7	0.69	3986.2	0.98	5637.4	1.39

Surge Pressure (Water Hammer)

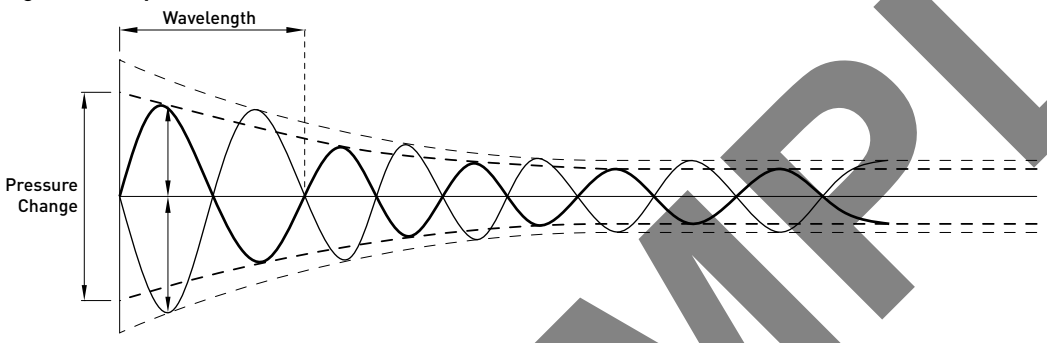
Surge pressure, or water hammer, is a term used to describe dynamic surges caused by pressure changes in a piping system. They occur whenever there is a deviation from the steady state, i.e.; when the velocity of the fluid is increased or decreased, and may be transient or oscillating. Waves of positive or negative pressure may be generated by any of the following:

- Opening or closing of a valve
- Pump startup or shutdown
- Change in pump or turbine speed
- Wave action in a feed tank
- Entrapped air

The pressure waves travel along at speeds limited by the speed of sound in the medium, causing the pipe to expand and contract. The energy carried by the wave is dissipated and the waves are progressively damped (see figure below).

The pressure excess to water hammer must be considered in addition to the hydrostatic load, and this total pressure must be sustainable by the piping system. In the case of oscillatory surge pressures, extreme caution is needed as surging at the harmonic frequency of the system could lead to catastrophic damage.

Figure 8 Dampened Pressure Wave



The maximum positive or negative addition of pressure due to surging is a function of fluid velocity, fluid density, bulk fluid density and pipe dimensions of the piping system. It can be calculated using the following steps.

Step 1

Determine the velocity of the pressure wave in pipes.

v_w = velocity of pressure wave (ft/s)
K = bulk modulus of elasticity of fluid (psi)
ρ = fluid density (slugs/ft^3)
n_i = conversion factor 1/144 (ft^2/in^2)
E = modulus of elasticity of pipe wall (psi)
d_i = pipe inner diameter (inch)
e = pipe wall thickness (inch)

$$v_w = \sqrt{\frac{K}{\rho \times n_i \left(1+\frac{K \times d_i}{e \times E}\right)}}$$

Step 2

Critical time for valve closure.

t_c = Time for Valve Closure (sec)
V_w = Velocity of Pressure Wave (ft/sec)
L = Upstream Pipe Length (ft)

$$t_c = \frac{2L}{V_w}$$

Step 3

Maximum pressure increase; assume valve closure time is less than the critical closure time and fluid velocity goes to 0.

P_i = Maximum Total Pressure (lb/in^2)
δ = Fluid Density (slugs/ft^3)
V = Fluid Velocity (ft/sec)
V_w = Velocity of Pressure Wave
n_i = Conversion Factor 1/144 (ft^2/in^2)

$$P_i = \delta \cdot V \cdot V_w n_i$$

Special Consideration

Calculate the Maximum Instantaneous System Pressure.

P_{max} = Maximum System Operating Pressure (lb/in^2)
P_i = Maximum Pressure Increase (lb/in^2)
P_s = Standard System Operating Pressure (lb/in^2)

$$P_{max} = P_i + P_s$$

Cautionary Note

Caution is recommended if P_{max} is greater than the maximum system design pressure multiplied by a safety factor of 2x.
e.g., Pipe is rated at 150 psi. If P_{max} exceeds 300 psi (150 psi × 2 safety factor), then precaution must be implemented in case of maximum pressure wave (i.e. water hammer) to prevent possible pipe failure.

Step 4

Determine the Maximum System Pressure Increase with Gradual Valve Closure

P_g = Gradual Pressure Increase with Valve Closure (lb/in²)
L = Upstream Pipe Length (ft.)
V = Fluid Velocity (ft./sec)
n_i = Conversion Factor 1/144 (ft²/in²)
t_v = Time of Valve Closure (sec)

$$P_g = \frac{2 \cdot \delta \cdot L \cdot V \cdot n_i}{t_v}$$

Example Problem

A water pipeline from a storage tank is connected to a master valve, which is hydraulically actuated with an electrical remote control. The piping system flow rate is 300 (gal/min) with a velocity of 4 (ft./sec); thus requiring a 160 mm nominal pipeline. The operating pressure of the system will be 50 (lb/in²), the valve will be 500 (ft.) from the storage tank and the valve closing time is 2.0 (sec). Determine the critical time of closure for the valve, and the internal system pressure should the valve be instantaneously or suddenly closed vs. gradually closing the valve (10 times slower).

Pipe Details

System Information

Material:	160 mm PROGEF Standard (PP-H)
Flow Rate:	300 (gal/min)
Pipeline Length:	500 (ft)
Operating Pressure:	50 (lb/in²)

Other Information

Bulk Water Density (K):	3.19×10^5 (lb/in²)
Fluid Density (δ):	1.937 (slugs/ft³)
Valve Closing Time:	2.0 (sec)
Water Velocity:	4.0 (ft/sec)

Step 1: Velocity of Pressure Wave

Determine the Velocity of the Pressure Wave

v_w = velocity of pressure wave (ft/s)
K = bulk modulus of elasticity of fluid (psi)
ρ = fluid density (slugs/ft³)
n_i = conversion factor 1/144 (ft²/in²)
E = modulus of elasticity of pipe wall (psi)
d_i = pipe inner diameter (inch)
e = pipe wall thickness (inch)

$$v_w = \sqrt{\frac{K}{\rho \times n_i \left(1+\frac{K \times d_i}{e \times E}\right)}} = 1211 \text{ (ft/sec)}$$

Step 2: Critical Valve Closure Time

Determine the Critical Closure Time

t_c = Critical Closure Time (sec)
V_w = Velocity of Pressure Wave 1211 (ft/sec)
L = Upstream Pipe Length 500 (ft)

$$t_c = \frac{2L}{V_w} = \frac{2 \times 500}{1211} = 0.83 \text{ (sec)}$$

Step 3: Maximum Pressure Increase

Determine the Maximum Pressure Increase; Assume: Valve Closure Time < Critical Closure Time t_c and Fluid Velocity goes to 0.

P_i = Maximum Pressure Increase (lb/in²)
δ = Fluid Density 1.937 (slugs/ft³)
V = Fluid Velocity 4 (ft/sec)
V_w = Velocity of Pressure Wave 1211 (ft/sec)
n_i = Conversion Factor 1/144 (ft²/in²)

$$P_i = \delta \cdot V \cdot V_w n_i = \frac{1.937 \times 4 \times 1211}{144} = 65 \text{ (lb/in}^2\text{)}$$

Consideration: Maximum Instantaneous System Pressure

Determining the Maximum Instantaneous System Pressure: Caution is recommended if P_{max} is greater than the Maximum System Operating Pressure multiplied by a 2x Service Factor.

P_{max} = Maximum Instantaneous Operating Pressure (lb/in²)
P_i = Valve Pressure (instantaneous) (lb/in²)
P_s = Standard System Operating Pressure (lb/in²)

$$P_{max} = P_i + P_s = 65 + 50 = 115 \text{ (lb/in}^2\text{)}$$

In this case, 160 mm PROGEF Standard Polypropylene pipe is rated at 150 psi. Therefore, the system design is within safety limits (300 psi max).

Step 4 - Maximum Change in Pressure with Gradual Valve Closure

Determine the Maximum Change in System Pressure with Gradual Valve Closure (2 Second Close Time).

P_g = Maximum Gradual Pressure Change (lb/in²)
t_v = Valve Closing Time 2 (sec)
L = Upstream Pipe Length 500 (ft)
V = Fluid Velocity 4 (ft/sec)
n_i = Conversion Factor 1/144 (ft²/in²)
δ = Fluid Density 1.937 (slugs/ft³)

$$P_g = \frac{2 \cdot \delta \cdot L \cdot V \cdot n_i}{t_v} = \frac{2 \cdot 1.937 \cdot 500 \cdot 4 \cdot \frac{1}{144}}{2} = 26.9 \text{ (lb/in}^2\text{)}$$

Expansion/Contraction

Allowing for Length Changes in PP and PVDF Pipelines

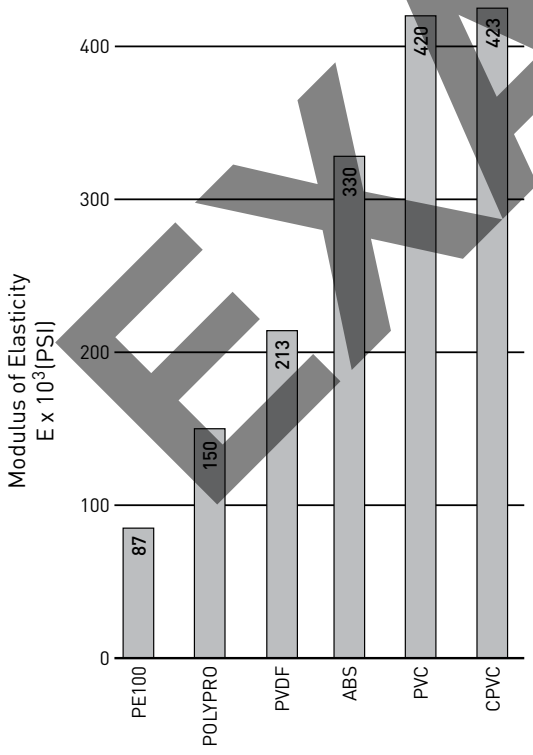
Variations in temperature cause greater length changes in thermoplastic materials than in metals. In the case of above ground, wall or duct mounted pipe work, particularly where subjected to varying working temperatures, it is necessary to make suitable provision for length changes in order to prevent additional stresses.

Calculation and Positioning of Flexible Sections

It is possible to take advantage of the very low modulus of elasticity of PP and PVDF by including special sections of pipe which compensate thermal length changes. The length of the flexible section mainly depends upon the pipe diameter and the extent of the length change to be compensated. In order to simplify planning and installation, the third influencing factor— the pipe wall temperature —is not taken into account, particularly as installation usually takes place in the temperature range between 37°F and 77°F.

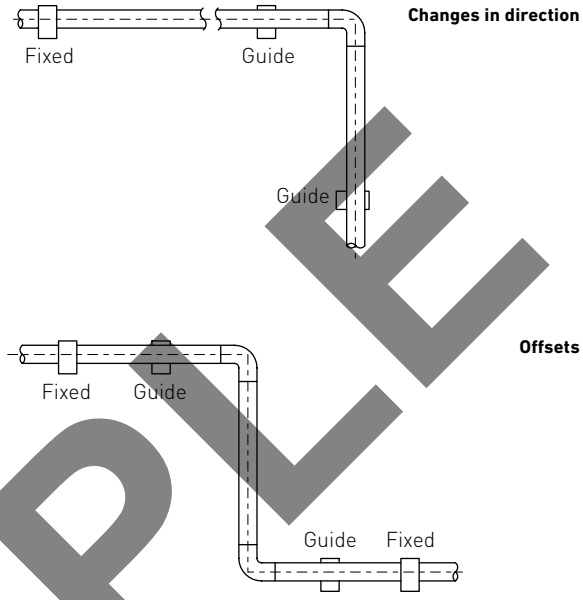
Where the pipe work changes direction or branches off, there is always a natural flexible section.

There are two primary methods of controlling or compensating for thermal expansion of plastic piping systems: taking advantage of offsets and changes of direction in the piping and expansion loops.



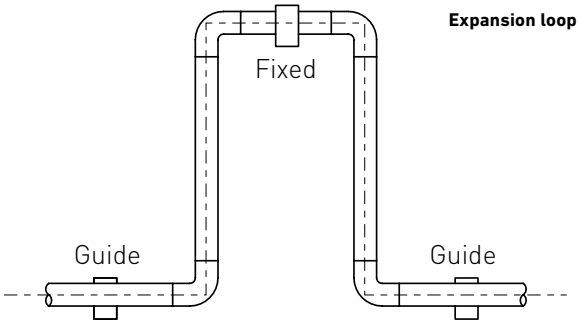
Type 1: Offsets/Changes in Direction

Most piping systems have occasional changes in directions which will allow the thermally included length changes to be taken up in offsets of the pipe beyond the bends. Where this method is employed, the pipe must be able to float except at anchor points.



Type 2: Expansion Loops

For expansion loops the flexible section is broken into two offsets close together. By utilizing the flexible members between the legs and 4 elbows the “a” length is slightly shorter than the “a” in the standalone offset.



Determining the Length Change (ΔL) (Example 1)

In order to determine the length of flexible section (a) required, the extent of the length change must be ascertained first of all, by means of the following formula where

$\Delta L = L \cdot \Delta T \cdot \alpha$

(inch) = (inch) · (°F) · (inch/inch°F)

ΔL = Length change in inches

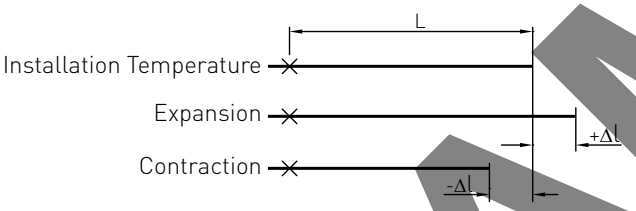
L = Length in inches of the pipe or pipe section where the length change is to be determined

ΔT = Difference between installation temperature and maximum or minimum working temperature in °F

α = Coefficient of linear thermal expansion in/in°F

Important

If the operating temperature is higher than the installation temperature, then the pipe becomes longer. If, on the other hand, the operating temperature is lower than the installation temperature, then the pipe contracts its length. The installation temperature must therefore be incorporated into the calculation, as well as the maximum and minimum operating temperatures.



Problem

The procedure is explained using a coolant pipe as an example: Length of the pipe from the fixed point to the branch where the length change is to be taken up: L = 315 inch

Installation temperature: T_v = 73°F
Temperature of the coolant: T_1= 40°F
Temperature when defrosting and cleaning: T_2= 95°F
Material: 250 mm PROGEF Standard (PPH)

Difference in Contraction Temperature

$\Delta T_1 = T_v - T_1 = 73°F - 40°F = 33°F$

Difference in Expansion Temperature

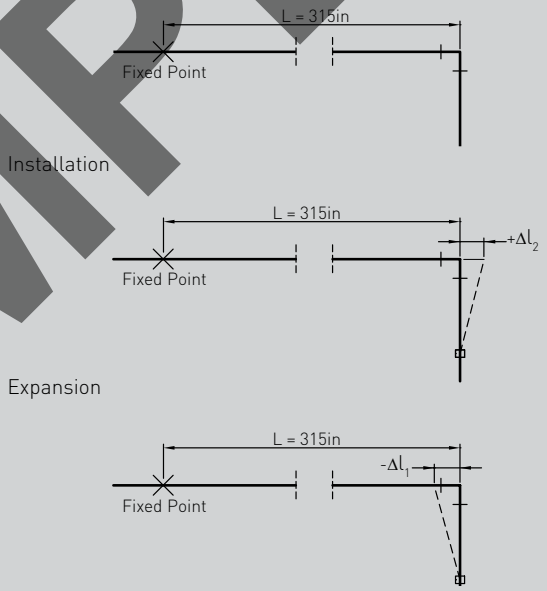
$\Delta T_2 = T_2 - T_v = 95°F - 73°F = 22°F$

Contraction during service with coolant

$-\Delta L_1 = L \times \Delta T_1 \times \alpha = 315 \text{ in} \times 33 \times (0.000089) = 0.93 \text{ in}$

Expansion during defrosting and cleaning

$+\Delta L_2 = L \times \Delta T_2 \cdot \alpha = 315 \text{ in} \times 22 \times (0.000089) = 0.62 \text{ in}$



Length Change (ΔL) in Inches

Note: Use the first PP table for temperature changes occurring in a range below 121°F and the second PP table for changes in the range above 121°F. Use both PP tables if the temperature crosses this boundary: e.g. 20 ft of pipe that changes from 131°F to 116°F = 0.2 in + 0.1 in = 0.3 in length change.

PROGEF Standard/Natural

Length of pipe section (feet) **Temperature ≤121°F**

Temperature change (°F)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
5			0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5
10		0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.1
15	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.4	1.5	1.6
20	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1
25	0.1	0.3	0.4	0.5	0.7	0.8	0.9	1.1	1.2	1.3	1.5	1.6	1.7	1.9	2.0	2.1	2.3	2.4	2.5	2.7
30	0.2	0.3	0.5	0.6	0.8	1.0	1.1	1.3	1.4	1.6	1.8	1.9	2.1	2.2	2.4	2.6	2.7	2.9	3.0	3.2
35	0.2	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.9	2.1	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.7
40	0.2	0.4	0.6	0.9	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.1	4.3
45	0.2	0.5	0.7	1.0	1.2	1.4	1.7	1.9	2.2	2.4	2.6	2.9	3.1	3.4	3.6	3.8	4.1	4.3	4.6	4.8
50	0.3	0.5	0.8	1.1	1.3	1.6	1.9	2.1	2.4	2.7	2.9	3.2	3.5	3.7	4.0	4.3	4.5	4.8	5.1	5.3
55	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	5.9
60	0.3	0.6	1.0	1.3	1.6	1.9	2.2	2.6	2.9	3.2	3.5	3.8	4.2	4.5	4.8	5.1	5.4	5.8	6.1	6.4
65	0.3	0.7	1.0	1.4	1.7	2.1	2.4	2.8	3.1	3.5	3.8	4.2	4.5	4.9	5.2	5.6	5.9	6.2	6.6	6.9
70	0.4	0.7	1.1	1.5	1.9	2.2	2.6	3.0	3.4	3.7	4.1	4.5	4.9	5.2	5.6	6.0	6.4	6.7	7.1	7.5
75	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0
80	0.4	0.9	1.3	1.7	2.1	2.6	3.0	3.4	3.8	4.3	4.7	5.1	5.6	6.0	6.4	6.8	7.3	7.7	8.1	8.5
85	0.5	0.9	1.4	1.8	2.3	2.7	3.2	3.6	4.1	4.5	5.0	5.4	5.9	6.4	6.8	7.3	7.7	8.2	8.6	9.1
90	0.5	1.0	1.4	1.9	2.4	2.9	3.4	3.8	4.3	4.8	5.3	5.8	6.2	6.7	7.2	7.7	8.2	8.7	9.1	9.6
95	0.5	1.0	1.5	2.0	2.5	3.0	3.6	4.1	4.6	5.1	5.6	6.1	6.6	7.1	7.6	8.1	8.6	9.1	9.6	10.1
100	0.5	1.1	1.6	2.1	2.7	3.2	3.7	4.3	4.8	5.3	5.9	6.4	6.9	7.5	8.0	8.5	9.1	9.6	10.1	10.7

PROGEF Standard/Natural

Length of pipe section (feet) **Temperature >121°F**

Temperature change (°F)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
5			0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6
10		0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.1	1.2
15	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.8
20	0.1	0.2	0.4	0.5	0.6	0.7	0.8	1.0	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.0	2.2	2.3	2.4
25	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	3.0
30	0.2	0.4	0.5	0.7	0.9	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.3	2.5	2.7	2.9	3.1	3.2	3.4	3.6
35	0.2	0.4	0.6	0.8	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	2.7	2.9	3.2	3.4	3.6	3.8	4.0	4.2
40	0.2	0.5	0.7	1.0	1.2	1.4	1.7	1.9	2.2	2.4	2.6	2.9	3.1	3.4	3.6	3.8	4.1	4.3	4.6	4.8
45	0.3	0.5	0.8	1.1	1.4	1.6	1.9	2.2	2.4	2.7	3.0	3.2	3.5	3.8	4.1	4.3	4.6	4.9	5.1	5.4
50	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0
55	0.3	0.7	1.0	1.3	1.7	2.0	2.3	2.6	3.0	3.3	3.6	4.0	4.3	4.6	5.0	5.3	5.6	5.9	6.3	6.6

SYGEF

Length of pipe section (feet)

Temperature change (°F)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
5			0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5
10		0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9
15	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.8	0.8	0.9	1.0	1.1	1.1	1.2	1.3	1.3	1.4
20	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
25	0.1	0.2	0.4	0.5	0.6	0.7	0.8	0.9	1.1	1.2	1.3	1.4	1.5	1.6	1.8	1.9	2.0	2.1	2.2	2.3
30	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	1.4	1.5	1.7	1.8	2.0	2.1	2.2	2.4	2.5	2.7	2.8
35	0.2	0.3	0.5	0.7	0.8	1.0	1.1	1.3	1.5	1.6	1.8	2.0	2.1	2.3	2.5	2.6	2.8	2.9	3.1	3.3
40	0.2	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.9	2.1	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.7
45	0.2	0.4	0.6	0.8	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	2.7	2.9	3.2	3.4	3.6	3.8	4.0	4.2
50	0.2	0.5	0.7	0.9	1.2	1.4	1.6	1.9	2.1	2.3	2.6	2.8	3.0	3.3	3.5	3.7	4.0	4.2	4.4	4.7
55	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.1	2.3	2.6	2.8	3.1	3.3	3.6	3.9	4.1	4.4	4.6	4.9	5.1
60	0.3	0.6	0.8	1.1	1.4	1.7	2.0	2.2	2.5	2.8	3.1	3.4	3.7	3.9	4.2	4.5	4.8	5.1	5.3	5.6
65	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.7	4.0	4.3	4.6	4.9	5.2	5.5	5.8	6.1
70	0.3	0.7	1.0	1.3	1.6	2.0	2.3	2.6	2.9	3.3	3.6	3.9	4.3	4.6	4.9	5.2	5.6	5.9	6.2	6.6
80	0.4	0.7	1.1	1.5	1.9	2.2	2.6	3.0	3.4	3.7	4.1	4.5	4.9	5.2	5.6	6.0	6.4	6.7	7.1	7.5
90	0.4	0.8	1.3	1.7	2.1	2.5	2.9	3.4	3.8	4.2	4.6	5.1	5.5	5.9	6.3	6.7	7.2	7.6	8.0	8.4
100	0.5	0.9	1.4	1.9	2.3	2.8	3.3	3.7	4.2	4.7	5.1	5.6	6.1	6.6	7.0	7.5	8.0	8.4	8.9	9.4

Determining the Length of the Flexible Section (a)

The values required to determine the length of the flexible (a) section are:

The maximum length change ΔL in comparison with the zero position during installation, (which can be either an expansion or a contraction), and the pipe diameter (d).

If values ΔL and (d) are known, The table below shows the length of flexible section (a) required.

Formula for Flexible Sections (a)

$$a = k\sqrt{\Delta L \cdot d}$$

a = Length of flexible section, inches
k = Constant (k=30 for PP and k=21.7 for PVDF)
ΔL = Change in length, inches
d = Outside diameter of pipe, inches

Flexible Sections (a) in Inches

PP-H
PP-N

PROGEF Standard/Natural Nominal Pipe Diameter (mm)

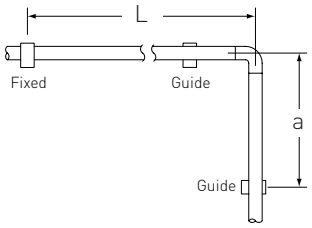
Length Change - ΔL (inch)	20	25	32	40	50	63	75	90	110	160	200	225	250	315	355	400	450	500
0.1	8	9	11	12	13	15	16	18	20	24	27	28	30	33	35	38	40	42
0.2	12	13	15	17	19	21	23	25	28	34	38	40	42	47	50	53	56	60
0.3	15	16	18	21	23	26	28	31	34	41	46	49	52	58	61	65	69	73
0.4	17	19	21	24	27	30	33	36	39	48	53	56	60	67	71	75	80	84
0.5	19	21	24	27	30	33	36	40	44	53	60	63	67	75	79	84	89	94
0.6	21	23	26	29	33	37	40	44	48	58	65	69	73	82	87	92	98	103
0.7	22	25	28	31	35	40	43	47	52	63	70	75	79	88	94	100	106	111
0.8	24	27	30	34	38	42	46	51	56	67	75	80	84	94	100	106	113	119
0.9	25	28	32	36	40	45	49	54	59	71	80	85	89	100	106	113	120	126
1.0	27	30	34	38	42	47	52	56	62	75	84	89	94	106	112	119	126	133
2.0	38	42	48	53	60	67	73	80	88	106	119	126	133	149	159	168	179	188
3.0	46	52	58	65	73	82	89	98	108	130	146	155	163	183	194	206	219	231
4.0	53	60	67	75	84	94	103	113	125	151	168	179	188	211	224	238	253	266
5.0	60	67	75	84	94	106	115	126	140	168	188	200	210	236	251	266	282	298
6.0	65	73	82	92	103	116	126	138	153	184	206	219	231	259	275	292	309	326
7.0	70	79	89	100	111	125	137	149	165	199	223	236	249	280	297	315	334	352
8.0	75	84	95	106	119	134	146	160	177	213	238	253	266	299	317	337	357	376
9.0	80	89	101	113	126	142	155	169	187	226	253	268	282	317	336	357	379	399
10.0	84	94	106	119	133	149	163	179	197	238	266	282	298	334	355	376	399	421

PP-N

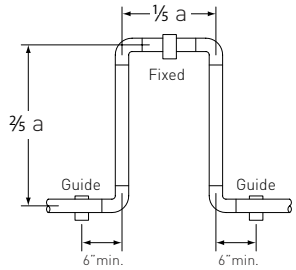
PPro-Seal Nominal Pipe Diameter (inch)

Length Change - ΔL (inch)	½	¾	1	1½	2
0.1	9	10	11	13	15
0.2	12	14	15	18	21
0.3	15	17	19	23	25
0.4	17	19	22	26	29
0.5	19	22	24	29	33
0.6	21	24	27	32	36
0.7	23	26	29	35	39
0.8	25	27	31	37	41
0.9	26	29	33	39	44
1.0	27	31	34	41	46
2.0	39	43	49	58	65
3.0	48	53	60	72	80
4.0	55	61	69	83	92
5.0	61	69	77	92	103
6.0	67	75	84	101	113
7.0	73	81	91	109	122
8.0	78	87	97	117	131
9.0	82	92	103	124	139
10.0	87	97	109	131	146

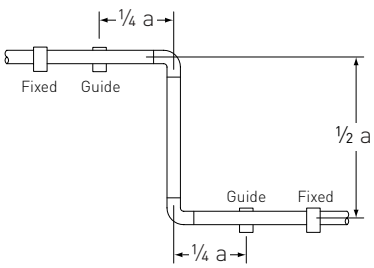
Change of direction



Expansion



Offset



Flexible Sections (a) in Inches where ΔT≤20°F

Values shown are minimum values.

PVDF

Length Change - ΔL (inch)	SYGEF Pipe Diameter (mm)																
	20	**25**	**32**	**40**	**50**	**63**	**75**	**90**	**110**	**160**	**200**	**225**	**250**	**315**	**355**	**400**	**450**
0.1	6	7	8	9	10	11	12	13	14	17	19	20	22	24	26	27	29
0.2	9	10	11	12	14	15	17	18	20	24	27	29	30	34	36	39	41
0.3	11	12	13	15	17	19	20	22	25	30	33	35	37	42	44	47	50
0.4	12	14	15	17	19	22	24	26	29	34	39	41	43	48	51	54	58
0.5	14	15	17	19	22	24	26	29	32	39	43	46	48	54	57	61	65
0.6	15	17	19	21	24	26	29	32	35	42	47	50	53	59	63	67	71
0.7	16	18	20	23	25	29	31	34	38	46	51	54	57	64	68	72	76
0.8	17	19	22	24	27	31	33	37	40	49	54	58	61	68	73	77	82
0.9	18	20	23	26	29	32	35	39	43	52	58	61	65	72	77	82	87
1.0	19	22	24	27	30	34	37	41	45	54	61	65	68	76	81	86	91
2.0	27	30	34	39	43	48	53	58	64	77	86	91	96	108	115	122	129
3.0	33	37	42	47	53	59	65	71	78	94	105	112	118	132	141	149	158
4.0	39	43	49	54	61	68	75	82	90	109	122	129	136	153	162	172	183
5.0	43	48	54	61	68	76	83	91	101	122	136	144	152	171	181	193	204
6.0	47	53	60	67	75	84	91	100	111	133	149	158	167	187	199	211	224
7.0	51	57	64	72	81	90	99	108	119	144	161	171	180	202	215	228	242
8.0	54	61	69	77	86	97	106	116	128	154	172	183	193	216	229	244	258
9.0	58	65	73	82	91	103	112	123	135	163	183	194	204	229	243	258	274
10.0	61	68	77	86	96	108	118	129	143	172	193	204	215	242	257	272	289

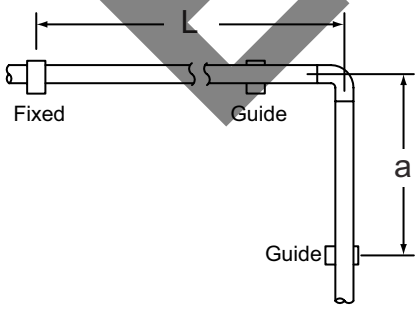
Installation Hints

The length changes in pipe sections should be clearly controlled by the arrangement of fixed brackets. It is possible to distribute the length changes in pipe sections using proper positioning of fixed brackets (see adjoining examples).

If it is not possible to include a flexible section at a change of direction or branch, or if extensive length changes must be taken up in straight sections of pipe work, expansion loops may also be installed. In this case, the length change is distributed over two flexible sections. To eliminate bilateral expansion, thrust blocks are recommended at intersections.

Pre-Stressing

In particularly difficult cases, where the length changes are large and acting in one direction only, it is also possible to pre-stress the flexible section during installation, in order to reduce the length of a. This procedure is illustrated in the following example:



Installation conditions

L = 315 inch
d = 250 mm (nominal)
Installation temperature: 73°F
Max. working temperature: 35°F
Material: PP-H

1. Length change
   +ΔL = L • ΔT • ~ = 315 • 38 • (0.000089) = 1.07 inch
2. Flexible section required to take up length change of ΔL = 1.07 inch according to the tables above:
   a = approx. 94 inch
3. If, on the other hand, the flexible section is pre-stressed to ΔL/2, the required length of flexible section is reduced to approx. 1500 mm (59 inch). The length change, starting from the zero position, then amounts to
   ±ΔL/2 = 1.07 inch/2 = 0.50 inch
   a = approx. 67 inch (per tables above)

In special cases, particularly at high working temperatures, pre-stressing of a flexible section improves the appearance of the pipeline in service, as the flexible section is less strongly deflected.

Installation

The Incorporation of Valves

Valves should be directly and properly supported. The actuating force is thus transmitted directly, and not through the pipeline. When valves are installed as fixed points, the length changes described previously will start from the valve and must be controlled.

GF has developed a better way to support valves: the Stress Less Valve Support. These support brackets allow the valve to move in line with the pipe, forward and backward, as the pipe expands and contracts. StressLess Valve Supports eliminate stress concentrations at valve locations and mitigate the risk of early leaks in the life of the piping system.

For safe mounting of plastic valves, many GF valves are equipped with metal threaded inserts for direct mounted installation.

Vibration Dampeners

There are two principal ways to control stress caused by vibration. Observe the stability of the system during initial operation and either add restraints or supports as required to reduce effects of equipment vibration, or where necessary, use restraint fittings to effectively hold pipe from lifting or moving laterally.

In special cases where the source of vibration is excessive (such as that resulting from pumps running unbalanced), an elastomeric expansion joint or other vibration absorber may be considered. This may be the case at pumps where restricting the source of vibration is not recommended.

The Installation of Pipe Work under Plaster or Embedded in Concrete

Padded Pipe Work

Where pipe work installed under plaster or embedded in concrete changes direction or branches off, the flexible section under consideration must be padded along the length "a", which is based on the calculated length change. The accompanying tees or elbows must also be included in the padding. Only flexible materials, such as glass wool, mineral wool, foam plastic or similar may be used for padding.

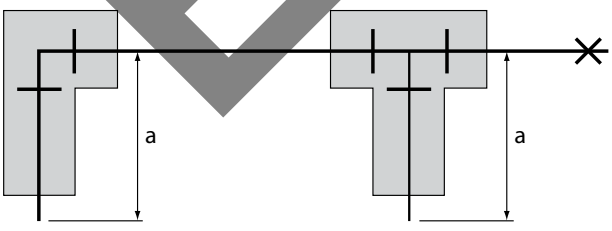


Figure 9 Support pipe in flexible sections

Pipe Bracket Support Centers and Fixation of Plastic Pipelines

General Pipe Supports and Brackets

Pipelines need to be supported at specific intervals, depending upon the material, the average pipe wall temperature, the specific gravity of the medium, and the diameter and wall thickness of the pipe. The determination of the pipe support centers has been based on the permissible amount of deflection of the pipe between two brackets. The pipe bracket centers given on the next page are calculated on the basis of a permissible deflection of max. 0.25 cm (0.01 inch) between two brackets.

Pipe Bracket Spacing in the Case of Fluids with Specific Gravity ≤ 1.0 (62.4 Lb/Ft^3)

Where fluids with a specific gravity exceeding 1g/cm^3 are to be conveyed, pipe spacing can be adjusted by dividing the support spacing by the specific gravity.

Installation of Closely Spaced Pipe Brackets

A continuous support may be more advantageous and economical than pipe brackets for small diameter horizontal pipe work, especially in a higher temperature range. Installation in a "V"-or "U"-shaped support made of metal or heat-resistant plastic material has proven satisfactory.

Pipe Bracket Requirements

When mounted, the inside diameter of the bracket must be greater than the outside diameter of the pipe, in order to allow length changes of the pipe at the specified points. The inside edges of the pipe bracket must be formed in such a way that no damage to the pipe surface is possible. GF pipe brackets meet these requirements. They are made of plastic and may be used under rugged working conditions and also in areas where the pipe work is subjected to the external influence of aggressive atmospheres or media. GF pipe brackets are suitable for PVC, CPVC, PE, PP, and PVDF pipes.

GF has developed the Stress Less Pipe Guides product line, the first such clamps especially designed to eliminate stress transfer to pipe due to thermal expansion or seismic events. They have an engineered, designed gap of 3mm between the clamp insert and pipe OD. Excessive force can never be exerted on the pipe regardless of tightening of bolts by the installer.

Arrangement of Fixed Brackets

If the pipe bracket is positioned directly beside a fitting, the length change of the pipeline is limited to one direction only (one-sided fixed point).

If it is, as in most cases, necessary to control the length change of the pipeline in both directions, the pipe bracket must be positioned between two fittings. The pipe bracket must be robust and firmly mounted in order to take up the force arising from the length change in the pipeline. Hanger type brackets are not suitable as fixed points.

General Pipe Supports and Brackets for Liquids with a Specific Gravity ≤ 1.0 (62.4 lb/ft³)

Pipe Size (mm)	Pipe Bracket Intervals L (ft.) for PROGEF Standard					
	≤65°F	85°F	105°F	125°F	140°F	176°F
20	2.3	2.2	2.1	2.1	2.0	1.8
25	2.6	2.5	2.5	2.4	2.3	2.1
32	3.1	3.0	3.0	2.9	2.8	2.5
40	3.6	3.5	3.4	3.3	3.1	2.9
50	4.1	4.0	3.9	3.8	3.6	3.3
63	4.8	4.7	4.6	4.4	4.3	3.9
75	5.1	4.9	4.8	4.6	4.4	4.1
90	5.4	5.2	5.1	4.9	4.8	4.4
160	7.4	7.2	6.9	6.6	6.2	5.6
200	8.2	7.9	7.5	7.2	6.9	6.2
225	8.7	8.4	8.0	7.7	7.4	6.6
250	9.2	8.9	8.5	8.2	7.9	7.1
315	10.3	10.0	9.7	9.4	8.9	8.0
355	11.0	10.7	10.3	10.0	9.5	8.7
400	11.6	11.3	11.0	10.7	10.2	9.4
450	12.3	12.0	11.6	11.3	10.8	10.0
500	13.0	12.6	12.3	12.0	11.5	10.7

Pipe Size (mm)	Pipe Bracket Intervals L (ft.) for PROGEF Natural					
	≤65°F	85°F	105°F	125°F	140°F	176°F
20	1.7	1.6	1.6	1.6	1.5	1.4
25	2.0	1.9	1.9	1.8	1.7	1.6
32	2.4	2.3	2.2	2.1	2.1	1.9
40	2.7	2.6	2.6	2.5	2.4	2.1
50	3.1	3.0	3.0	2.9	2.4	2.5
63	3.6	3.5	3.4	3.4	3.3	3.1
90	4.1	3.9	3.8	3.8	3.6	3.3

Pipe Size (inch)	Pipe Bracket Intervals L (ft.) for PPro-Seal					
½	3.8	3.8	3.7	3.5	3.0	2.8
¾	4.0	4.0	3.9	3.8	3.5	3.0
1	4.5	4.5	4.3	4.0	3.8	3.3
1½	5.0	5.0	4.8	4.8	4.3	3.8
2	5.5	5.5	5.3	5.0	4.5	4.0

Pipe Size (mm)	Size (inch)	Pipe Bracket Intervals L (ft.) for SYGEF PVDF						
		≤65°F	104°F	140°F	176°F	212°F	248°F	284°F
20	½	2.8	2.5	2.3	2.0	1.6	1.5	1.3
25	¾	3.1	2.8	2.5	2.2	2.0	1.6	1.5
32	1	3.6	3.3	3.0	2.6	2.3	2.0	1.6
40	1¼	3.9	3.6	3.3	3.0	2.5	2.1	1.8
50	1½	4.6	4.3	3.8	3.3	3.0	2.5	2.0
63	2	4.6	4.3	3.9	3.6	3.1	2.6	2.1
75	2½	4.9	4.6	4.3	3.9	3.4	2.8	2.3
90	3	5.2	4.9	4.6	4.3	3.6	3.1	2.8
110	4	5.9	5.6	5.1	4.8	4.1	3.6	3.1
160	6	7.1	6.7	6.1	5.6	5.1	4.4	3.8
200	8	7.9	7.4	6.9	6.2	5.6	4.9	4.3
225	9	8.4	7.9	7.2	6.9	5.9	5.2	4.6
250	10	8.7	8.2	7.5	7.2	6.2	5.6	4.9
315	12	9.8	9.4	8.5	8.2	7.1	6.2	5.4
355	14	10.7	9.6	8.7	7.8	7.0	6.3	5.7
400	16	11.6	10.4	9.4	8.5	7.6	6.8	6.2
450	18	12.8	11.5	10.4	9.3	8.4	7.6	6.8

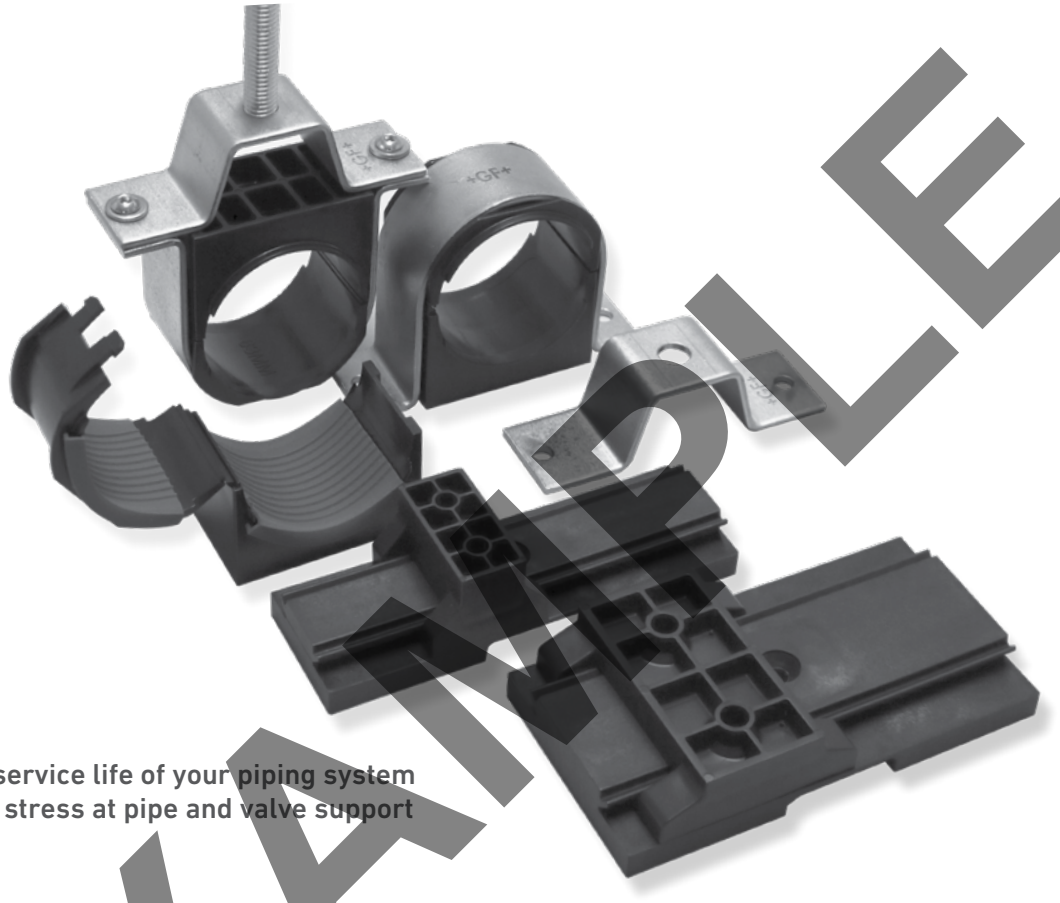
Note: Pipe spacing can be adjusted by dividing the support spacing by the specific gravity.
Example: 63 mm pipe carrying media with a specific gravity of 1.6 – 4.6 ft divided by 1.6 = approx. 2.8 ft centers.

Shear Force of Restraint Fittings (Fixation Brackets)

Pipe Size (mm)	Size (inch)	Shear Force in lbs		
		68°F	104°F	140°F
20	**½**	1798	1506	1214
25	**¾**	2158	1798	1461
32	**1**	2697	2248	1798
40	**1¼**	3147	2698	2023
50	**1½**	3821	3147	2473
63	**2**	4496	3821	2922
75	**2½**	8317	6969	5620
90	**3**	9442	7868	6294
110	**4**	11015	9217	7418

Stress Less®

Pipe and Valve Support System



Patented

Maximize the service life of your piping system by eliminating stress at pipe and valve support locations.

Stress Less® Pipe Supports

Soft touch. Inserts are low friction, molded HDPE. Piping can easily slide with absolute minimal stress and wear during each thermal expansion cycle. Piping can never touch metal.

Engineered for control. Support inserts have a designed 3mm gap around the OD of the clamped piping. This simplifies the system design; no need to account for load accelerations during seismic or water hammer events.

Strong and user friendly. The support insert fits precisely within the steel hoop, which has two functions. First, it provides the necessary strength to support the weight of the piping in normal conditions (for example, 10 times the weight of the pipe when filled with media) and even during a very strong earthquake (subjected to seismic accelerations over 5G). Second, the installer tightens down only the steel hoop and cannot overtighten the support against the pipe.

Firm grip. Optionally, we offer pipe supports with an elastomer insert for vertically installed pipe.

Stress Less® Valve Supports

GF Piping Systems introduces a new and unique product that allows valves to move in two directions as the pipe expands and contracts, all in a controlled manner and while properly supported.

Controlled movement. The support base and slide components are made of low friction PP. Valves can slide with virtually no resistance. Range of travel is ±3 inches (6 inches total).

Practical. Designed to keep centerlines of piping in double strut configuration aligned. Smaller valve support base is taller than the larger valve support.

Designed to securely and easily mount all of the following GF valves, in any material, manual and actuated.

- Type 546 ball valves
- Type 523 ball valves
- Type 543 horizontal 3-way valves
- 5-Series diaphragm valves

Mechanical Connections

Mechanical Joining of Piping Systems

Flange Connections	Flange adapters for butt fusion Coated metal flanges backing rings
Unions	Plastics-oriented connections between same plastics Transitions to other plastics Seal: O-ring
Threaded Fittings	Plastic fittings with reinforcement ring and tapered Female NPT threads.

Threaded Connections

The following different types of threads are used

Designation of the thread	According to standard	Typical use	Description
G (Buttress Threads)	ISO 228	Unions	Parallel internal or external pipe thread, where pressure-tight joints are not made on the threads
NPT = National (American Standard) Pipe Taper	ASTM F1498	Transition and threaded fittings	Taper internal or external pipe thread for plastic pipes and fittings, where pressure-tight joints are made on the threads

Flanged Connections

Creating Flange Joints

When making a flange connection, the following points have to be taken into consideration:

There is a general difference between the connection of plastic pipes and so-called adapter joints, which represent the transition from a plastic pipe to a metal pipe or a metal valve. Seals and flanges should be selected accordingly.

Flanges with sufficient thermal and mechanical stability should be used. GF flange types fulfill these requirements.

A robust and effective seal can only be achieved if sufficient compressive forces are transmitted to the flange stub end via the ductile iron backup ring. These compressive forces must be of sufficient magnitude to overcome fluctuating hydrostatic and temperature generated forces encountered during the lifetime of the joint. In assembling the stub ends, gasket and backup rings it is extremely important to ensure cleanliness and true alignment of all mating surfaces. The correct bolt tightening procedure must also be followed and allowance made for the stress relaxation characteristics of the plastic stub ends.

Alignment

1. Full parallel contact of the sealing faces is essential.
2. The backup ring must contact the stub end evenly around the circumference.
3. Misalignment can lead to excessive and damaging stresses

When to Use a Flange?

Flanges may be used when:

- The piping system may need to be dismantled
- The installation is temporary or mobile
- Transitioning between dissimilar materials that can not be bonded together

Visually inspect flanges for cracks, deformities or other obstructions on the sealing surfaces.

Gasket

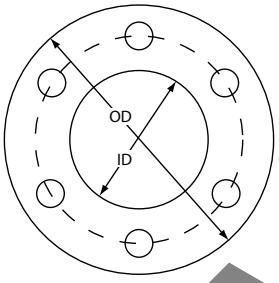
A rubber gasket must be used between the flange faces in order to ensure a good seal. GF recommends a 0.125" thick, full-face gasket with Shore A scale hardness of 70±5, and the bolt torque values (see following pages) are based on this specification. For other hardness requirements, contact GF Technical Services. Select the gasket material based on the chemical resistance requirements of your system. A full-face gasket should cover the entire flange-to-flange interface without extending into the flow path.

GF has developed a gasket with exceptional high purity performance and ease of installation: the SYGEF HP Gasket. This gasket is made of EPDM with a TFM (modified PTFE) covering in the wetted media stream. The TFM adds no coloring contamination and has extremely low leach-out characteristics. The gasket's materials and geometry also afford precise, repeatable and low torque installation.

ANSI Class 150 Flat Flange Gasket Dimensions

Size inch (mm)	O.D. inch	SYGEF I.D. inch	PROGEF I.D. inch	PPro-Seal I.D. inch
½ (20)	3.50	0.59	1.10	0.88
¾ (25)	3.86	0.79	1.34	1.10
1 (32)	4.25	1.02	1.65	1.38
1¼ (40)	4.61	1.34	2.01	—
1½ (50)	5.00	1.69	2.44	1.93
2 (63)	5.98	2.20	3.07	2.44
2½ (75)	7.01	2.60	3.62	—
3 (90)	7.48	3.07	4.33	—
4 (110)	9.02	3.94	5.24	—
6 (160)	10.98	5.94	7.05	—
8 (200)	13.50	8.15	9.30	—
8 (225)	13.50	8.15	9.42	—
10 (250)	16.00	9.84	11.35	—
12 (315)	19.00	11.81	13.31	—
14 (355)	21.00	12.87	14.80	—
16 (400)	23.50	15.39	16.93	—
18 (450)	27.00	16.77		

Full face (flat) flange gaskets are only recommended for 150 psi operating pressure systems up to 6" size. Maximum recommended operating pressure is 90 psi for flat gaskets 8" and larger. For higher operating pressure systems size 8" and larger, profile gaskets are recommended.



Fasteners

It is critical to avoid excessive compression stress on a plastic flange. Therefore, only low-friction fastener materials should be used. Low-friction materials allow torque to be applied easily and gradually, ensuring that the flange is not subjected to sudden, uneven stress during installation, which can lead to cracking.

Either the bolt or the nut, and preferably both, should be zinc-plated to ensure minimal friction. If using stainless steel bolt and nut, lubricant must be used to prevent high friction and seizing. In summary, the following fastener combinations are acceptable:

- zinc-on-zinc, with or without lube
- zinc-on-stainless-steel, with or without lube
- stainless-on-stainless, with lube only

Cadmium-plated fasteners, while becoming more difficult to obtain due to environmental concerns, are also acceptable with or without lubrication. Galvanized and carbon-steel fasteners are not recommended. Use a copper-graphite anti-seize lubricant to ensure smooth engagement and the ability to disassemble and reassemble the system easily. Bolts must be long enough that two complete threads are exposed when the nut is tightened by hand. Using a longer bolt does not compromise the integrity of the flange connection, although it wastes material and may make tightening more difficult due to interference with nearby system components.

Fastener Specifications: SYGEF PVDF, PROGEF PP, PPro-Seal PP

Flange Size inch (mm)	No. of Bolts	Bolt Size (in) and Type	Washer Size (in) and Type
½ (20)	4	½ 13-UNC	½ SAE
¾ (25)	4	½ 13-UNC	½ SAE
1 (32)	4	½ 13-UNC	½ SAE
1¼ (40)	4	½ 13-UNC	½ SAE
1½ (50)	4	½ 13-UNC	½ SAE
2 (63)	4	⅝ 11-UNC	⅝ SAE
2½ (75)	4	⅝ 11-UNC	⅝ SAE
3 (90)	4	⅝ 11-UNC	⅝ SAE
4 (110)	8	⅝ 11-UNC	⅝ SAE
6 (160)	8	¾ 10-UNC	¾ F436
8/9 (200/225)	8	¾ 10-UNC	¾ F436
10 (250)	12	1 8-UNC	1 F436
12 (315)	12	1 8-UNC	1 F436
14 (355)	12	1 8-UNC	1 F436
16 (400)	16	1 8-UNC	1 F436
18 (450)	16	1⅛ 7-UNC	1⅛ F436
20 (500)	20	1⅛ 7-UNC	1⅛ F436

Minimum spec. Use of a stronger or thicker washer is always acceptable as long as published torque limits are observed.
ASTM F436 required for larger sizes to prevent warping at high torque.

A washer must be used under each bolt head and nut. The purpose of the washer is to distribute pressure over a wider area, reducing the compression stress under the bolt head and nut. Failure to use washers voids the GF warranty.

Torque Wrench

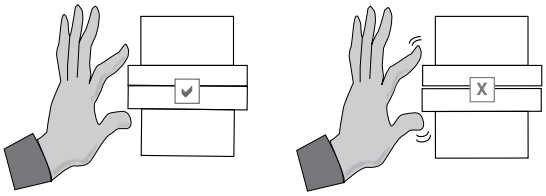
Compared to metals, plastics are relatively flexible and deform slightly under stress. Therefore, not only must bolt torque be controlled in order to avoid cracking the flange, but continuing to tighten the bolts beyond the recommended torque levels may actually make the seal worse, not better.

Because bolt torque is critical to the proper function of a plastic flange, a current, calibrated torque wrench accurate to within ±1 ft.lb. must be used when installing plastic flanges.

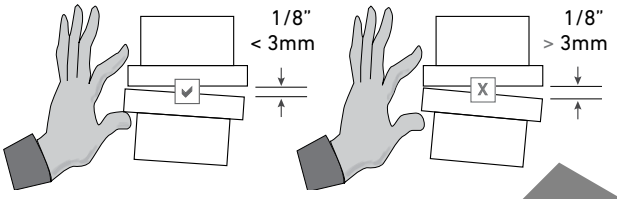
Experienced installers may be tempted to forgo the use of a torque wrench, relying instead on "feel." GF does not endorse this practice. Job-site studies have shown that experienced installers are only slightly better than new trainees at estimating bolt torque by feel. A torque wrench is always recommended.

Checking System Alignment

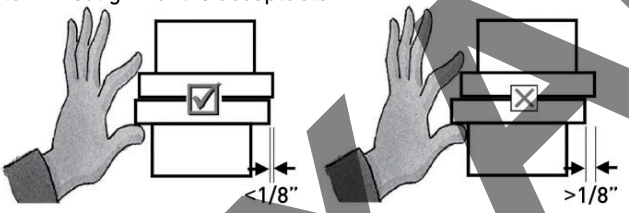
Before assembling the flange, be sure that the two parts of the system being joined are properly aligned. GF has developed a "pinch test" that allows the installer to assess system alignment quickly and easily with minimal tools. First check the gap between the flange faces by pinching the two mating components toward each other with one hand as shown below. If the faces can be made to touch, then the gap between them is acceptable.



Next check the angle between the flange faces. If the faces are completely flush when pinched together, as shown above, then the alignment is perfect, and you may continue installation. Otherwise, pinch the faces together so that one side is touching, then measure the gap between the faces on the opposite side. The gap should be no more than ⅛".



To assess high-low misalignment, pull the flange faces flush together. If the faces are concentric within ⅛", then the high-low misalignment is acceptable.

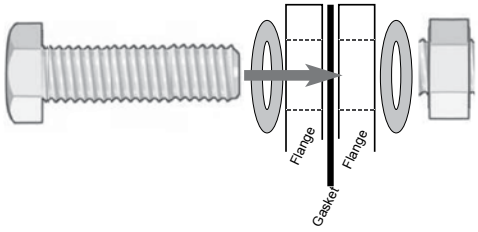


If the gap between the mating components can not be closed by pinching them with one hand, or if the angle or high-low misalignment between them is too large, then using the bolts to force the components together will result in excessive stress and possible failure during or after installation. In this case, inspect the system to find the greatest source of misalignment and refit the system with proper alignment before bolting.

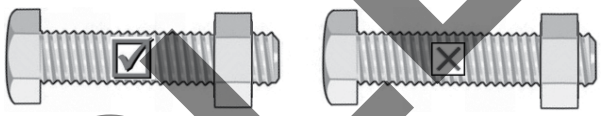
Inserting the Bolts

If using copper-graphite antiseize lubricant as recommended, apply the lubricant evenly with a brush directly to the bolt threads, and to the nut if desired. Cover the bolt from its tip to the maximum extent to which the nut will be threaded. No lubricants can be used for high purity applications, only zinc-on-zinc or zinc-on-stainless steel fastener combinations are acceptable.

Insert bolts through washers and bolts holes as shown:



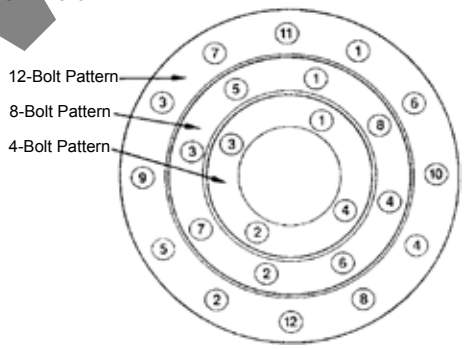
Tighten all nuts by hand. As you tighten each nut, the nuts on the other bolts will loosen slightly. Continue to handtighten all of the nuts until none remain loose. Now the flange assembly will remain in place as you prepare to fully tighten it. Again, when hand-tightened, at least two threads beyond the nut should be exposed in order to ensure permanent engagement. If less than two threads are exposed, disassemble the flange and use longer bolts.



Tightening the Bolts

Plastic flanges require gradual, even bolt tightening. Tightening one bolt to the maximum recommended torque while other bolts are only hand-tight, or tightening bolts in the wrong order, produces uneven stresses that may result in cracking or poor sealing.

To ensure even distribution of stresses in the fully-installed flange, tighten the bolts in a star pattern as described in ANSI B16.5:



The torque required on each bolt in order to achieve the best seal with minimal mechanical stress has been carefully studied in laboratory and field installations, and is given in the table on the next page.

To ensure even distribution of stresses and a uniform seal, tighten the bolts to the first torque value in the sequence, using a star pattern, then repeat the star pattern while tightening to the next torque value, and so on up to the maximum torque value.

A final tightening after 24 hours is recommended, when practical, to ensure that any bolts that have loosened due to relaxation of the polymer are fully engaged.

If a flange leaks when pressure-tested, retighten the bolts to the full recommended torque and retest. Do not exceed the recommended torque before consulting an engineer or GF representative.

Recommended Multiple Pass Bolt Torque: SYGEF, PROGEF and PPro-Seal Flanges

Flange size (inch)	DN	ANSI 150 bolt pattern	Flat gasket, lubed [ft-lb]*				Flat gasket, unlubed [ft-lb]**				SYGEF Plus Gasket [ft-lb]				Profile gasket, lubed [ft-lb]*				Profile gasket, unlubed [ft-lb]**			
			1st	2nd	3rd	4th***	1st	2nd	3rd	4th***	1st	2nd	3rd	4th***	1st	2nd	3rd	4th***	1st	2nd	3rd	4th***
½	15	4	4	7			5	9							5				4	7		
¾	20	4	5	9			6	12			5	10			4	7			5	9		
1	25	4	5	11			7	14			6	12			5	9			6	12		
1¼	32	4	7	14			9	18			7	15			5	10			7	13		
1½	40	4	7	16			7	14	21		8	19			7	13			8	17		
2	50	4	7	14	28	-	12	25	36		10	25			10	19			12	25		
2½	65	4	10	20	30	43	15	30	45	56	12	28			10	21			13	27		
3	80	4	11	22	33	47	15	30	45	61	12	24	33		12	25			10	20	33	
4	100	8	8	15	30	-	10	20	30	39	10	22	-		8	16			10	21		
6	150	8	10	20	30	45	15	30	45	59	12	24	36		12	25			10	20	33	
8	200	8	15	30	40	52	18	36	54	68	12	24	36	48	10	20	33		10	20	30	43
10	250	12	15	30	45	56	20	40	60	73	12	24	36	48	10	20	31		10	20	30	40
12	300	12	18	36	50	64	20	40	60	83	15	30	45	56	12	24	37		12	24	36	48
14	350	12	18	36	50	66	20	40	60	75					12	24	36	49	15	30	45	64
16	400	16	20	40	60	75	20	40	60	80					12	24	36	45	15	30	45	59
18	450	16	30	60	90	120	30	60	90	132					15	30	45	56	20	40	60	73
20	500	20	35	75	115	140	35	75	115	154					15	30	45	60	20	40	60	78

* Assumes the use of SS, zinc- or cadmium-plated bolt and/or nut along with copper-graphite anti seize lubricant brushed directly onto the bolt threads.

** Assumes the use of zinc- or cadmium-plated bolt, nut, or both. Never use unlubricated, uncoated bolts and nuts with plastic flanges, as high friction and seizing lead to unpredictable torque and a high incidence of cracking and poor sealing.

***Pass tightening flange bolts following recommended star pattern

Documentation

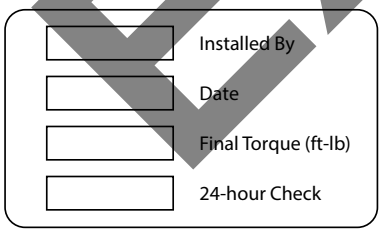
Provide a copy of these instructions to every installer on the job site prior to beginning installation. Installers who have worked primarily with metal flanges often make critical mistakes when installing plastic flanges. Even experienced plastic installers will benefit from a quick review of good installation practices before starting a new job.

Installation Tags

Best practices include tagging each flange with

- Installer's initials
- Installation date
- Final torque value (e.g., "29.2-31.5")
- Confirmation of 24-hour torque check ("y" or "n")

This information can be recorded on pre-printed stickers, as shown below, and placed on each flange immediately after installation.



Experience has shown that installation tags speed up the process of resolving system leaks and product failures, improve communication between the contractor and distributor or manufacturer, highlight training opportunities, and promote worker diligence.

Creating Union Joints

Introduction

Because unions and ball valves have similar, threaded nut connectors, these instructions have been written with both of these components in mind. GF unions and ball valves are designed to provide many years of service when installed properly.

As with any piping system component, unions and valves have particular considerations that must be kept in mind during installation in order to ensure best performance. Even experienced installers will benefit from reviewing these instructions before each installation.

Valve Support

Valves must be well-supported. An unsupported or insufficiently-supported valve body will twist when opened and closed, subjecting the union connection to torque stress that may cause cracking or distortion and subsequent leakage.

System Alignment

The major contributor to union nut failures is misalignment. Uneven compression of the o-ring will cause leaks to occur. Union nuts can be damaged by the stress of holding a misaligned system together.

Sealing Mechanism

GF union connections use an o-ring as the sealing mechanism which is highly effective under relatively low tightening force.

Dirt and Debris

An often overlooked issue is the presence of dirt and debris on the o-ring or sealing surface. This will prevent proper

o-ring sealing; if it is present on the nut or body threads, it will clog the threads and prevent proper tightening.

Installation

Understand and carefully follow these installation steps in order to ensure a seal that is sufficient to guard against leaks while avoiding excessive forces that can damage the union nut.

End Connectors

Always remove the union nut and end connectors from the ball valve for installation. Make sure that you slide the union nut onto the pipe, with the threads facing the proper direction, BEFORE installing the end connector.

O-Ring Placement

Ensure that the o-ring is securely seated in its groove. The o-ring should rest securely in place without adhesive or other aids. Never use any foreign substance or object to hold the o-ring in place.

Union Connection

There should be no gap between the mating components, so that the threaded nut serves only to compress the o-ring, thus creating the seal. However, a small gap (less than 1/8") between the mating components is acceptable.

Never use the union nuts to draw together any gaps between the mating faces of the components or to correct any system misalignment.

Hand-Tightening (all sizes)

The next step is to hand-tighten the union nut. With the o-ring in place, engage the nut with its mating threads and turn clockwise with one hand. Continue turning with moderate force until the nut no longer turns.

Be careful to use reasonable force when tightening the nut. Your grip should be firm but not aggressive. The nut should turn easily until it bottoms out and brings the mating faces into direct contact.

It is recommended that you place an indexing mark with a permanent marker on the union nut and body to identify the hand tight position.

Optional: Further Tightening (2")

Based on experience, or system requirements, the installer may choose to turn the nut an additional ⅛ turn (approximately 45°) in order to ensure a better seal before hydrostatically pressure testing the system. To do this, use a strap wrench to turn the nut ⅛ turn past the index mark applied after assembly.

Do not exceed ⅛ turn past the index mark.

Do not use any metallic tools. (Tool marks on the union nut will void manufacturer's warranty.)

At this point, the system should be hydrostatically pressure tested before turning the union nut any farther.

Tightening Guide for Union and Ball Valve Nuts

Nominal Size (inch)	Initial	Additional Pre-Test	Additional Post-Test
½	Hand-Tight	None	⅛ Turn (max)
¾	Hand-Tight	None	⅛ Turn (max)
1	Hand-Tight	None	⅛ Turn (max)
1½	Hand-Tight	None	⅛ Turn (max)
2	Hand-Tight	⅛ Turn (max)	⅛ Turn (max)

Post-Test Tightening (Sizes ⅜" to 1½" only)

It is highly unlikely that any union nut connection when tightened as instructed above will leak under normal operating conditions.

In the unlikely event that a leak occurs, the union nut at the leaking joint may be tightened an additional ⅛ turn, as described above. The system should then be re-tested. If the joint still leaks after post-test tightening, do not continue to tighten the nut at the leaking joint. Disassemble the leaking joint, re-check system alignment, and check for obstructions in the sealing area. If the cause of a leak can not be determined, or if you suspect that the union or valve is defective, contact your GF representative for further instructions.

Quality Check After Assembly

To check if the union connections are installed in a stress-free manner, GF recommends that a random check of alignment be done by removing the nut on selected union connection one at a time. A properly installed system will not have any movement of the piping as the nut is loosened. If any springing action is noticed, steps should be taken to remove the stress prior to re-installing the union nut.

Documentation

Keep Instructions Available

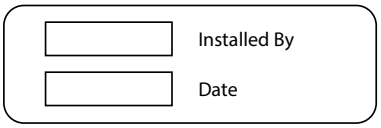
Provide a copy of these instructions to every installer on the job site prior to beginning installation.

Installation Tags

Best practices include tagging each union with:

- Installer's initials
- Installation date

This information can be recorded on pre-printed stickers, as shown below, and placed on each union nut immediately after installation.



Experience has shown that installation tags speed up the process of resolving system leaks and product failures, improve communication between the contractor and distributor or manufacturer, highlight training opportunities, and promote worker diligence.

Creating Threaded Joints

Introduction

NPT threaded connections are not recommended for high pressure systems or those larger than two inches. They also should be avoided in systems where leaks would be dangerous or costly.

When properly installed, threaded connections offer the benefit of an easy and inexpensive transition to metal systems. They can also be used for joining plastic where the installation is expected to be modified or moved later.

Design Considerations

Due to the difference in stiffness between plastic and metal, a metal male-to-plastic female joint must be installed with care and should be avoided if possible. Only molded or machined adapters may be threaded. Threading reduces the rated pressure of the pipe.

Preparation: Thread Sealant

A thread sealant (or "pipe dope") approved for use with plastic or PTFE tape must be used to seal threads.

Use a thin, even coat of sealant.

PTFE tape must be installed in a clockwise direction, starting at the bottom of the thread and overlapping each pass. GF recommends no more than 3 wraps.

Making the Connection

Start the threaded connection carefully by hand to avoid cross threading or damaging threads. Turn until hand tight. Mark the location with a marker. With a strap wrench on the plastic part, turn an additional half turn. If leakage occurs during pressure testing, consult the chart for next steps.

Threaded Connection Guide

Connection Type	Next Step
Plastic to Plastic	Tighten up to ½ turn
Plastic Male to Metal Female	Tighten up to ½ turn
Metal Male to Plastic Female	Consult Factory

Alignment

Threaded connections are susceptible to fracture or leaking due to misalignment. Pipe should be installed without bending.

Fusion Joining

This section provides an overview of various fusion joining methods. GF strongly recommends that installers are trained by GF personnel before operating GF fusion machines or fusion joining GF products.

Socket Fusion

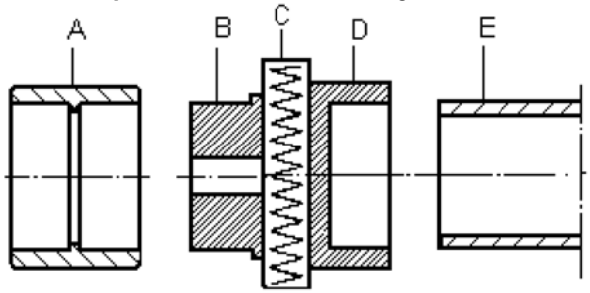
Socket fusion joining can be used to join socket fusion fittings available in sizes 16–110 mm (⅜"–4"). The socket fusion method of joining uses a heated non-stick "female" bushing (D)to melt the outside of the pipe end (E) and a heated non-stick "male" bushing (B) to heat the inside of the corresponding size of fitting (A). After several seconds, when the outside of the pipe and the inside of the fitting are melted, the bushings are removed and the pipe is pushed into the fitting. Due to the large area of pipe to fitting contact (3–5 times the cross sectional area of the pipe), the resulting joint is actually several times stronger than the pipe itself. The pipe and fittings for this system are also manufactured to have an interference fit; because of this interference, it is not possible to slide a fitting over the pipe without the use of heat to melt the surface to be joined. This feature prevents the possibility of inadvertently leaving a joint unfused, and more importantly, causes displacement of some material during fusion thereby guaranteeing a high strength, reliable, reproducible joint.

Advantages

- Fast fusion times
- Low installation cost
- Easiest fusion method
- Corrosion resistant

Details of the requirements for machines and equipment used for fusion jointing thermoplastics are contained in DVS 2208 Part 1.

The Principle of Socket Fusion Joining



General Requirements

The basic rule is that only similar materials can be fusion joined. For best results, only components which have a similar density and a compatible melt flow index range should be fusion joined.

Tools Required

Apart from the tools normally used in plastic piping construction, such as pipe cutters or a saw with a cutting guide, the socket fusion jointing method requires certain special tools.

Important: The tools described here may be used for GF socket fusion fittings made of PVDF, PP and PE.

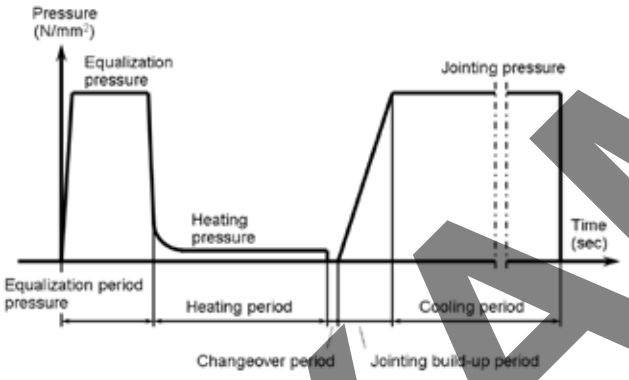
Pipe Peeling and Chamfering Tool

This is used to calibrate the pipe end. This reduces the force exerted to push the pipe into the heating bush, while preventing damage to the surface coating of the heating bush. At the same time, the pipe end is chamfered and the insertion depth marked.

Note: Further information on the fusion joining equipment hire service and training courses are available from GF.

Pressure/Time Diagram

Fusion joining requires different pressures to be applied during equalization and joining on the one hand and during the heat soak period on the other.



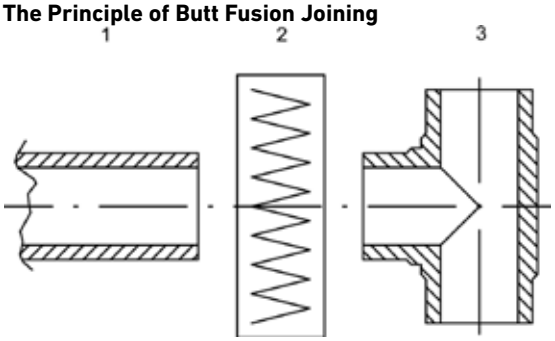
Contact (Conventional) Butt Fusion

Butt fusion pipe and fittings both have the same inside and outside diameters. To make a butt fusion joint, the pipe and fitting are clamped so that the ends to be joined are facing each other. The ends are then "faced" flat and parallel. A flat heating plate is used to simultaneously heat both faces to be joined. When each end is molten, the heating plate is removed and the pipe and fitting are brought together, joining the molten materials by fusion.

Advantages

- Repeatable weld parameters
- Controlled facing and joining pressure
- Automated fusion records
- Ease of operation due to cnc controller
- Eliminates operator dependant decisions

The Principle of Butt Fusion Joining

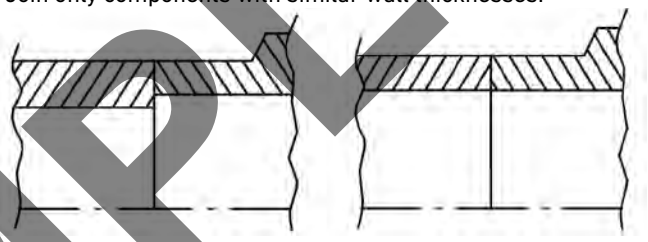


1 Pipe **2 Heating element** **3 Fitting**

General Requirements

The basic rule is that only similar materials can be fusion joined, i.e.: PE with PE. For best results, only components which have a melt flow index in an acceptable range should be fusion joined. The components to be joined must have the same wall thicknesses in the fusion area.

Join only components with similar wall thicknesses.



Incorrect **Correct**

Tools Required

Butt fusion joining requires a special joining machine in addition to the tools normally used for plastic piping construction (pipe cutters, saw with cutting guide). The fusion joining machine must meet the following minimum requirements:

The clamping equipment must hold the various parts securely without damaging the surfaces. Possible ovality can be largely compensated by centered clamping of the components to be joined. It must also be possible to hold all parts firmly in alignment.

The machine must also be capable of face planing the fusion surfaces of pipes and fittings.

The fusion joining machine must be sufficiently solid to be able to absorb the pressures arising during the fusion procedure without detrimentally deforming the joint.

The heating surfaces of the heating element must be flat and parallel. The machine should be set up and operated according to the manufacturer's instructions.

The fusion procedure detailed below, including the preparation, is based on DVS 2207-1 Welding of thermoplastics - Heated tool welding of pipes, pipeline, components and sheets made from PE.

General Conditions

Protect the area of the fusion joint from adverse weather conditions, such as rain, snow and wind. At temperatures

below 41°F (5°C) or above 113°F (45°C), measures must be taken to ensure that the temperature in the working area is in the range required for satisfactory joining and does not hinder the necessary manual tasks.

IR Plus® Infrared Butt Fusion Joining

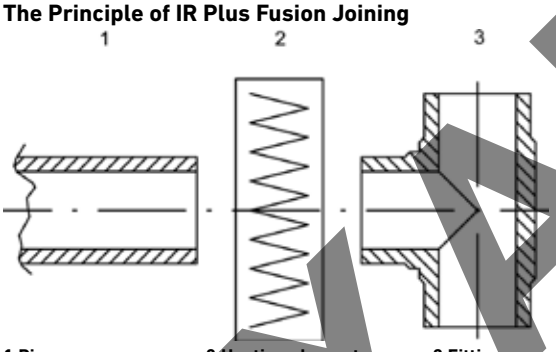
IR Plus Infrared Butt Fusion Joining is an ideal method to join IR fusion fittings to achieve the maximum joint consistency.

Using the computer process-controlled fusion machinery, high-strength butt fusion joints can be made with many advantages over the conventional, pressure type butt fusion methods. A non-contact IR heating plate is used, along with a predetermined overlap to join the pipe (or fitting) ends together eliminating the potential for operator error. Reliable, reproducible, high-strength joints with smaller internal and external beads can be achieved.

Advantages

- Non-contact heating
- Smaller internal and external beads repeatability
- Low stress joint
- Ease of operation due to automated fusion machinery
- Automatic fusion joining record (if desired) using optional printer or PC download
- Faster fusion and cooling time than conventional butt fusion

The Principle of IR Plus Fusion Joining



1 Pipe **2 Heating element** **3 Fitting**

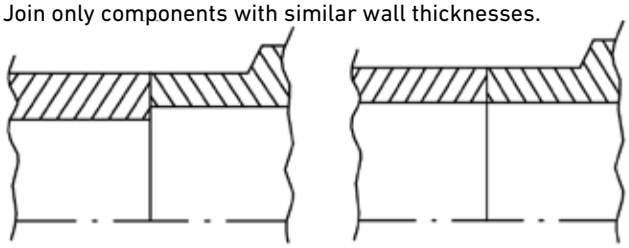
The resulting fusion joints are homogeneous and display the following characteristics:

- Non-contact heating of the joining components eliminates the risk of contamination and inhomogeneities;
- Smaller joining beads due to adjustment of joining pressure path prior to the fusion process itself, i.e. elimination of the equalization process
- Adjustment of the joining pressure path also ensures excellent reproducibility of the fusion joints
- Low-stress fusion joints due to very uniform heating by means of IR radiator

General Requirements

The basic rule is that only similar materials can be fusion joined. For the best results only components which have a melt flow index in the range from MFR 190/5 0.3 to 1.7 g/10 min should be fusion joined. The components to be joined must have the same wall thicknesses in the fusion area.

Join only components with similar wall thicknesses.



Incorrect **Correct**

IR fusion joining must only be performed by personnel trained in the use of this method. Training is provided worldwide by qualified GF IR Plus welding instructors.

Tools Required

Infrared fusion joining requires a special joining machine in addition to the tools normally used for plastic pipe work construction (pipe cutters, etc.).

General Conditions

Protect the area of the fusion joint from adverse weather conditions, such as rain, snow or wind. The permitted temperature range for IR Plus fusion joining between 41°F (5°C) and 104°F (40°C). Outside this range, suitable action must be taken to ensure that these conditions are maintained. It must also be ensured that the components being joined are in this temperature range.

Properties and Characteristics of IR Fusion Joints

Non-Contact Heating

The components being joined are heated uniformly and without contact to the ideal fusion temperature by infrared radiation.

A defined gap between the heating element and the end faces minimizes the risk of contamination of the joining surface. Contamination of the heating element by plastic particles is thus also eliminated.

Reduced Bead Formation

The fusion bead produced during joining is considerably reduced, compared with conventional butt fusion welding, without any loss of quality. Bead forming equalization is eliminated by non-contact softening of the end faces. The minimal, defined bead is only formed during the joining process. The fusion area thus has improved flow dynamics, low clearance volume, and greater throughput area.

Reproducible Joining Processes

The joining path controls the joining pressure and thus the fusion process. The high reproducibility of the joints is assured by the clearly defined and controlled process sequence.

Clear, Simple Operator Guidance

Clear, unambiguous operator guidance via the liquid crystal display leads the user interactively through the fusion process in logical operating steps.

Welding Report/Traceability

The welding parameters for the relevant welding operations can be read out directly via various interfaces on the machine. It is possible to print these out on paper, on labels, or to employ electronic data output.

This automatically provides an accurate record with all essential fusion parameters for each individual fusion joint, as required.

BCF® Plus (Bead and Crevice Free) Fusion Joining

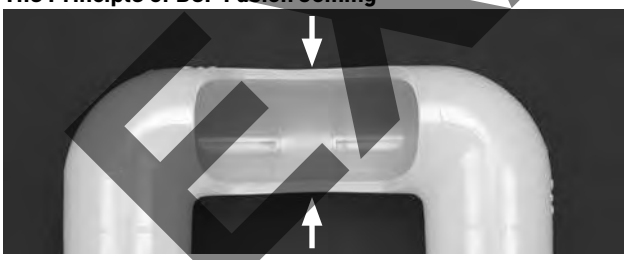
GF's BCF (Bead and Crevice Free) joining system produces bead and crevice free joints for SYGEF PVDF and PROGEF Natural Polypropylene piping. It is used where there is extreme concern about the presence of small beads or crevices in the piping system. Such applications can be found in the Pharmaceutical (BPE Required Installations, fully drainable system requirements) and Food and Beverage Industries.

The BCF joining machine automatically clamps and aligns the pipe and fitting, and produces the seamless joint by a proprietary heat fusion method. The machine's electronic logic circuits provide temperature monitoring and heat sensing to automatically produce the proper weld for the particular pipe size. The BCF system is offered in 20 mm through 110 mm pipe diameters, with 90° elbows, tees, unions, diaphragm valves, zero static diaphragm valves, reducers, and flange adapters.

Advantages

- Completely smooth inner surface
- Low stress joint
- Ease of operation due to automated fusion machinery
- Automatic fusion joining record (if desired) using optional printer or PC download

The Principle of BCF Fusion Joining



Tools required

BCF joining requires the GF BCF Plus joining machine in addition to the tools normally used for plastic pipework construction (pipe cutters, etc.).

Properties and characteristics of BCF Plus fusion joints

Welding free from beads and crevices

The result of the jointing process is a surface similar to the actual pipeline components, free from beads or crevices. There are therefore no dead spaces, the surface roughness lies in the range Ra 9.8µin (0.25µm).

Reproducible jointing processes

The high reproducibility of the joints is assured by the clearly defined and controlled process sequence.

Clear, simple operator guidance

Clear, unambiguous operator guidance via the liquid crystal display leads the user interactively through the fusion process in logical operating steps.

Welding report/traceability

The welding parameters for the relevant welding operations can be read out directly via various interfaces on the machine. It is possible to print these out on paper, on labels, or to employ electronic data output.

This automatically provides an accurate record with all essential fusion parameters for each individual fusion joint.

Electrofusion Joining

Electrofusion joining is an excellent joining solution that provides numerous advantages. The process of joining pipe to a fitting socket uses wires to transfer the heat energy to the plastic material. The heat energy is sufficient to melt the plastic surrounding the wires. This generates a zone called the "melt zone." This "melt zone" encapsulates the wires, which are at its origin along the center line.

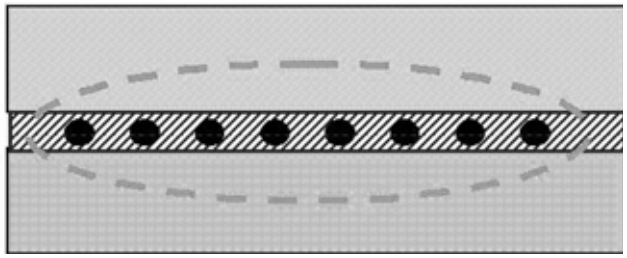
These features makes this one of the safest and easiest fusion technologies on the market.

Advantages

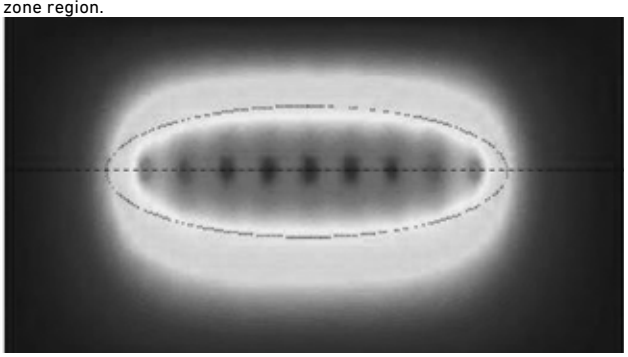
- Fast fusion times
- Fuse multiple joints in one heat cycle
- Easiest fusion method
- Corrosion resistant

The fusion area of the pipes and socket fittings are heated to fusion temperature and joined by means of an interference fit, without using additional materials. A homogeneous joint between socket and spigot is accomplished. Electrofusion must only be carried out with GF fusion joining machines that tightly control the fusion parameters.

The Principle of Electrofusion Joining



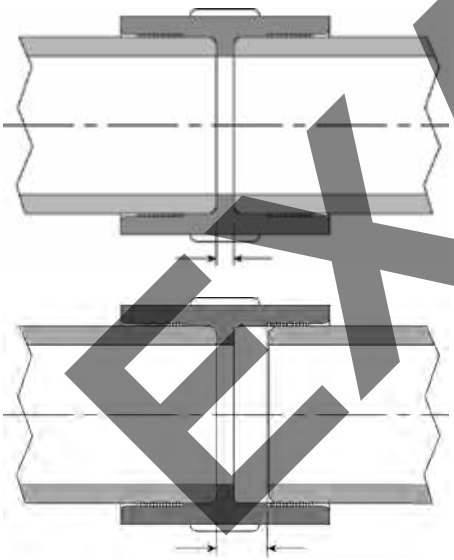
The computer simulation below shows the heat distribution and the "melt" zone region.



General Requirements

The basic rule is that only similar materials can be fusion joined, i.e. PP with PP. The components must be joined with the fitting inserted to the full socket depth for the joint to be considered acceptable. Should this not be the case, failure to meet the depth requirement could result in joint failure, overheating and intrusion of the heating coil.

Electrofusion should only be performed by GF trained and certified personnel.



Pressure Testing

Introduction

A lot of international and national standards and guidelines are available for leak and pressure tests. Therefore often it is not easy to find the applicable test procedure or for example the test pressure.

The purpose of a pressure test is to:

- Ensure the resistance to pressure of the pipeline and
- Show the leak tightness against the test media.

Usually the pressure test is done as a water pressure test and only in exceptional cases (with consideration to special safety precautions) as a gas pressure test with air or nitrogen.

The following comparison should point out the difference between water and air as a test medium:

- Water is an incompressible medium, which means setting, for example, a 3.2 ft (1m) PVDF pipe 6" (160mm) under a pressure of 45 psi (3 bar) results in an energy of ca. 1 Joule.
- In contrast, air is a compressible medium; the same pipe has with 45 psi (3 bar) pressure an energy of already 5000 Joule.
- If there were a failure during the pressure test, the water-filled pipe would fly 1" high, the air-filled pipe 360ft! And this with a test pressure of only 45psi (3 bar).

Fractural Behavior of Thermoplastics

In case of failures thermoplastic materials show different behaviors. PE has a ductile behavior, meaning that brittle fracture cannot occur. On the other hand, materials like PVDF are less ductile, and can potentially fail in a brittle mode.

Nevertheless, the following safety precautions must be taken into consideration during the internal pressure test. As mentioned before the pressure test is the first dynamic loading placed on the piping to uncover any existing processing faults (e.g. insufficient welding).

Internal pressure test with water or a similar incompressible test fluid

General

The internal pressure test is done when installation work has been completed and necessitates an operational pipeline or operational test sections. The test pressure load should furnish experimental proof of operational safety. The test pressure is not based on the working pressure, but rather on the internal pressure load capacity, derived from the pipe wall thickness.

Test pressures are therefore determined in relation to SDR and the pipe wall temperature. The piping system should only be pressure tested with water.

Pre-test

A pre-test serves to prepare the piping system for an actual test (main test). In the course of pre-testing, a tension-expansion equilibrium in relation to an increase in volume will develop in the piping system (the piping system will expand). A material-related drop in pressure (see table below for typical values of various piping materials) will occur which will require repeated pumping to restore the test pressure and also frequently a re-tightening of the flange connection screws. Note that this is normal and does not necessarily indicate leaks in the system.

Material	Pressure Drop
PVC	7.2 psi/h (0.5 bar/h)
CPVC	7.2 psi/h (0.5 bar/h)
ABS	8.7 psi/h (0.6 bar/h)
PP	11.6 psi/h (0.8 bar/h)
PE	17.4 psi/h (1.2 bar/h)
PVDF	11.6 psi/h (0.8 bar/h)

Main test

In the context of the main test, a much smaller drop in pressure can be expected at constant pipe wall temperatures so that it is not necessary to pump again. The checks can focus primarily on leak detection at the flange joints and any position changes of the pipe.

Observe if using compensators

If the pipeline to be tested contains compensators, this has an influence on the expected axial forces of the pipeline. Because the test pressure is higher than the working pressure, the axial forces on the fixed points become higher. This has to be taken into account when designing the fixed points.

Observe if using valves

When using a valve at the end of a pipeline (end or final valve), the valve and the pipe end should be closed by a blind flange or cap. This prevents inadvertent opening of the valve or any pollution of the inside of the valve.

Filling the pipeline

Before starting with the internal pressure test, the following points must be checked:

- Was installation done according to the available plans?
- All pressure relief devices mounted in the flow direction?
- All end valves shut?
- Valves in front of other devices are shut to protect against pressure.
- Visual inspection of all joints, pumps, measurement devices and tanks.
- Has the waiting period after the last fusion/cementing been observed?

Now the pipeline can be filled from the lowest point. Special attention should be given to the air vent. If possible, vents should be provided at all the high points of the pipeline and these should be open when filling the system. Flushing velocity should be at least 3ft/sec.

Adequate time should be allowed between filling and testing the pipeline, so that the air contained in the piping system can escape via the vents: approximately 6-12 hours, depending on the nominal diameter.

Checks during testing

The following measurement values must be recorded consistently during testing:

- Internal pressure at the absolute low point of the pipeline
- Medium and ambient temperature
- Water volume input
- Water volume output
- Pressure drop rates

Pressure Test Procedure for all GF Thermoplastic Piping Systems

The following is a general test procedure for GF plastic piping. It applies to most applications. Certain applications may require additional consideration. For further questions regarding your application, please contact a GF representative.

1. All piping systems should be pressure tested prior to being put into operational service.
2. All pressure tests should be conducted in accordance with the appropriate building, plumbing, mechanical, and safety codes for the area where the piping is being installed.
3. When testing plastic piping systems, all tests should be conducted hydrostatically and should not exceed the pressure rating of the lowest rated component in the piping system (often a valve). Test the system at 150% of the designed operational pressure. For example, if the system is designed to operate at 80 psi, then the test will be done at 120 psi.
4. When hydrostatic pressure is introduced to the system, it should be done gradually through a low point in the piping system with care taken to eliminate any entrapped air by bleeding at high points within the system. This should be done in four stages, waiting ten minutes at each stage (adding ¼ the total desired pressure at each stage).
5. Allow one hour for system to stabilize after reaching desired pressure. After the hour, in case of pressure drop, increase pressure back to desired amount and hold for 30 minutes. If pressure drops by more than 6%, check system for leaks. (Note that some pressure loss is normal the first time a piping system is pressurized, due to expansion of the material as described earlier.)

If ambient temperature changes by more than 10°F during the test, a retest may be necessary.

Testing with gases is not recommended.

If it is not possible to do an internal pressure test with water (e.g. pipeline must be kept dry), a leak test can be carried out

with slight overpressure. For safety reasons the test pressure must then be limited to maximum 5 psi.

For the leak test all the joints can be coated with a soap solution for visual leak detection, but only use fluids or soaps that are compatible with the material they are being applied to.

Attention: Commercial leak detection sprays can cause stress cracks in plastics. If using these sprays, remove any residues after testing.

Modifications and repairs

The following safety measures are to be observed when modifying or repairing piping systems:

- wear protective clothing
- drain the respective pipeline section completely
- rinse the pipe section
- protect against dripping
- clean and dry the joints

An important factor for the competent repair of piping systems is to have the work carried out by trained professionals.

Modifications and repair work may not weaken the piping system mechanically.

To ensure the operational safety of the piping system following a modification or a repair, an internal pressure test should be done.

Commissioning

When putting a pipeline into operation for the first time, besides the internal pressure test, temperature effects are also generally examined. Thermal stress, i.e. expansion, was not simulated during testing.

We recommend an initial inspection at the earliest 3 days, at the latest 7 days, after commissioning and recording the results.

The inspection checks should include:

- critical points in the system (visual inspection)
- flange joints, unions, valves (leak-proof)
- safety and leak detection equipment (condition, function)

Continuous inspection of the piping system should be done by operating personnel during their usual rounds according to the operating instructions.

Sterilization and Sanitization Methods

Autoclave Sterilization

PVDF piping components exhibit no changes upon repeated exposure to typical temperatures experienced in autoclave cycles; however, autoclaving is not recommended for PVDF valves due to dissimilar materials for construction of diaphragm and valve bonnets.

In-Line Steam

PVDF piping, fittings and valves exhibit thermal stability up to 284°F (140°C). Therefore, in-line steam sterilization, typically executed at temperatures of up to 273°F (134°C), can be performed without adverse affects, provided that the pipe is properly supported. PVDF offers better insulation than metal and has a significantly lower surface temperature. Due to the high temperatures, PP cannot be sanitized with steam.

Hot Water Sanitization

PVDF is rated up to maximum operating temperatures of 284°F (140°C), it can be hot water sanitized which requires no additives or removal processes. This method of sanitization is typically used to maintain USP and WFI systems for the pharmaceutical industry. PVDF systems that are operated for long periods of time at temperatures above 140°F (60°C) will need to be properly supported at all horizontal and vertical lengths of the piping system. PP is rated up to maximum operating temperatures of 176°F (80°C) and also needs to be properly supported during hot water sanitization. For both materials, recommended water temperature at point of introduction cannot exceed the maximum operating temperature of the material; for PP the maximum injection temperature would be 170°F (77°C). The temperature should be maintained during a 3-4 hour cycle and be a minimum of 110°F (43°C) to 120°F (49°C) at point of discharge.

Ozone Sanitization

PVDF can be sanitized using continuous ozone concentration levels of up to 0.2 ppm without adverse effects. Ozone is commonly removed using UV light at a wavelength of 1.0×10^{-5} in (254 nm). The light sources can be safely installed in PVDF piping systems provided a 90° deflection is introduced by either a fully lined diaphragm valve or a 90° stainless steel elbow. Ozone does not require the purchase of additional cleaning agents; does not require rinsing of the system afterwards; and does not add unwanted substances in the water. Best practice installations in the industry are showing that PP can be successfully sanitized by using ozone in concentrations of <0.5ppm and sanitization times of less than 3 hours (including flushing) at ambient temperature.

Chemical Sanitization

PVDF and PP can also be sterilized at system startup using a 10% concentration hydrogen peroxide solution circulated for 12 hours, or 1% concentration Minncare (by Minntech) solution for 1-2 hours.

In all cases, valves should be in the open position during sterilization and sanitization. Solution should be flowing through all branches of the system (ideally at a rate of 5 fps) and end-of-line- valves should be opened to allow sanitizing solution to fully circulate through the entire piping system. After chemical flushing is achieved, DI water shall be flushed through the system until all traces of chemical solution is removed (should also be checked using test strips). Flushing shall continue until chemical levels are checked at outlets to levels of 0.1ppm or lower.

GF Piping Systems

+GF+

Pressure Piping Systems Catalog

PROGEF® Standard Polypropylene
PROGEF® Natural Polypropylene
PPro-Seal™ Natural Polypropylene
SYGEF® Standard Polyvinylidene Fluoride
SYGEF® Plus Polyvinylidene Fluoride
AquaTap® Recirculating Faucet
Accessories
Fusion Machines

Table of contents

Section 1

PROGEF® Standard PP Piping System

PROGEF Standard – System Specification

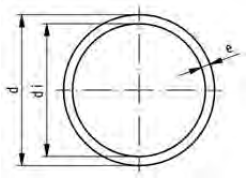
Material	Beta PP-H 100 (Beta Polypropylene Homopolymer) d 16 - d 225	State-of-the-art PP (Polypropylene) d 250 - d 500
Color	RAL 7032 pebble grey	RAL 7032 pebble grey
Density	~0.90 g/cm³ (ISO 1183 / ASTM D 792)	~0.90 g/cm³ (ISO 1183 / ASTM D 792)
Surface tension	31 mJ/m²	24 mJ/m²
Linear expansion coefficient	0.16-0.18 mm/mK (DIN 53752)	0.16-0.18 mm/mK (DIN 53752)
E-modulus	1300 N/mm² (ISO 527 / ASTM D 790)	900 N/mm² (ISO 527 / ASTM D 790)
Thermal conductivity	0.23 W/mK (EN 12664)	0.23 W/mK (EN 12664)
Surface resistivity	> 10^{16} Ω (IEC 60093)	> 10^{16} Ω (IEC 60093)
Dimension	d 16 – d 500 in accordance to EN ISO 15494	
Pressure Rating	Pipes/Fittings/Diaphragm and ball valves: d 16 – d 225 SDR11, PN10 (150 PSI), c = 2.0 d 50 – d 225 SDR17.6, PN6 (90 PSI), c = 2.0 Butterfly valves: d63–d315, PN10 (150 PSI)	Pipes/Fittings: d 250 – d 500 SDR11, PN10 (150 PSI), c = 2.0 d 250 – d 500 SDR17.6, PN6 (90PSI), c = 2.0
Temperature Rating	From 0 °C to 80 °C (32 °F – 176 °F)	
Production	Fittings: injection molded or segment welded Pipes: extruded Valves: injection molded	
Marking	All components are embossed with a permanent identification during the production process to ensure full traceability: Lot No Material Dimension Pressure Rating	
Testing and Inspection (EN ISO 15494)	Visual inspection Surface finish Dimension tolerance Pressure testing Full product range passed the Initial Type Test (ITT)	
Material- and Product Approvals / Conformance[1]	FDA CFR 21 177.1520 NSF 61 NSF/ANSI 372 (G) USP 25 class VI (physiological non-toxic) DIBt (Z-40.23-4, Z-40.23-264, Z – 40.23-265) DNV (K-2630, K – 2636) Loyd's Register (01/ 20030(E1))	
Welding Technology	Socket fusion (DVS 2207 - 11): d 16 - d 110 IR Plus, infrared fusion (DVS 2207 - 6): d 20 - d 225 Butt fusion (DVS 2207-11): d 20 - d 500	
Documentation[2]	EN 10204 2.2 / EN 10204 3.1	
Packing	Pipes and fittings bulk bagged; quantities vary	
Labeling	Brand Name Product Description Code Number Material Dimension CE-labeling [3] Approvals	
Main Applications	Highly resistant to impact, abrasion and many chemicals make it ideal for slurries transportation in the semiconductor industry. Suitable for cost-effective distribution of DI-water and RO-water, as well as for industrial applications in chemical production, chemical distribution, plating, power stations, and cooling.	

[1] For thermoplastic material only
[2] On request
[3] From 2008 on

Table of contents

Pipe

A



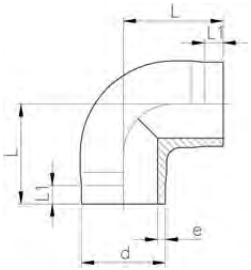
Pipe, PN 10, Standard PP

Sizes 20-63 have multiple lengths of pipe per bag (20mm-6, 25mm-6, 32mm-8, 40mm-5, 50mm-3, 63mm-2) and are sold per bag. Sizes 75-225 pipe lengths are bagged individually. Sizes 250 and above are capped and individually bagged per pipe length.

d (mm)	Part No.	weight (kg/m)	lbs/meter	e (mm)	closest inch (inch)
16	* 167 480 710	0.080	0.176	1.8	⅜
20	* 167 480 711	0.107	0.236	1.9	½
25	* 167 480 712	0.164	0.362	2.3	¾
32	* 167 480 713	0.261	0.575	2.9	1
40	* 167 480 714	0.412	0.908	3.7	1 ¼
50	* 167 480 715	0.638	1.407	4.6	1 ½
63	* 167 480 716	1.010	2.227	5.8	2
75	* 167 480 717	1.410	3.108	6.8	2 ½
90	* 167 480 718	2.030	4.475	8.2	3
110	* 167 480 719	3.010	6.636	10.0	4
160	* 167 480 722	6.380	14.065	14.6	6
200	* 167 481 724	9.950	21.936	18.2	8
225	* 167 481 725	12.600	27.778	20.5	9
250	* 167 481 726	15.500	34.171	22.7	10
315	* 167 481 728	24.600	54.233	28.6	12
355	* 167 481 730	31.200	68.784	32.2	14
400	* 167 481 731	39.600	87.302	36.3	16
450	* 167 480 731	50.200	110.671	40.9	18
500	* 167 480 732	63.300	139.551	45.4	20

IR Plus®/Butt Fusion Fittings

A



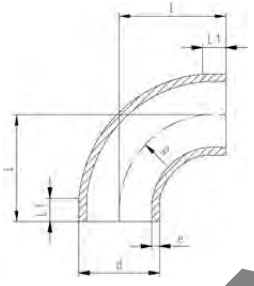
90° Elbow Short Radius, PN 10, Standard PP

Model:

- Material: PP-H
- Conventional butt-welding according to DVS 2207
- IR = Infrared-(IR Plus®) compatible. Choose fusion parameters: PP-H

d (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	e (mm)
20	IR	**727 108 506**	0.008	38	25	1.9
25	IR	**727 108 507**	0.012	42	26	2.3
32	IR	**727 108 508**	0.022	46	27	2.9
40	IR	**^ 727 108 509**	0.045	51	22	3.7
50	IR	**727 108 510**	0.080	58	23	4.6
63	IR	**727 108 511**	0.138	66	21	5.8

A



90° Elbow Sweep Radius, PN 10, Standard PP

Model:

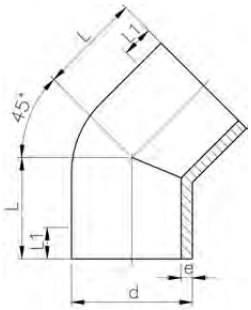
- Material: PP-H
- Conventional butt-welding according to DVS 2207
- IR = Infrared-(IR Plus®) compatible. Choose fusion parameters: PP-H

* Material:PP-R

	d (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	R (mm)	e (mm)
	75	IR	**727 018 612**	0.232	100	20	90	6.8
	90	IR	**727 018 613**	0.337	100	20	90	8.2
	110	IR	**727 018 614**	0.701	141	25	130	10.0
	160	IR	**727 018 617**	1.699	160	33	151	14.6
	200	IR	**727 018 619**	3.264	200	33	190	18.2
	225	IR	*** 727 018 620**	4.535	220	33	210	20.5
	250		*** 727 018 521**	6.351	256	48	232	22.7
	315		*** 727 018 523**	12.959	321	48	297	28.6
*	355		**727 018 524**	16.400	345	70	330	32.2
*	400		**727 018 525**	22.220	365	70	350	36.3
*	450		**727 018 526**	32.560	425	70	400	40.9
*	500		**727 018 527**	44.840	470	90	445	45.4

A

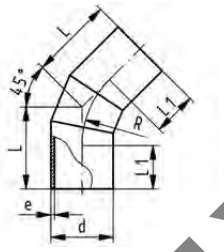
45° Elbow, PN 10, Standard PP



d (mm)	FM	Part No.	L (mm)	L1 (mm)	e (mm)
20	IR	**727 158 506**	32	24.0	1.9
25	IR	**727 158 507**	34	25.0	2.3
32	IR	**727 158 508**	36	25.0	2.9
40	IR	**^ 727 158 509**	39	25.0	3.7
50	IR	**727 158 510**	42	26.0	4.6
63	IR	**727 158 511**	47	29.0	5.8
75	IR	**^ 727 158 512**	49	29.0	6.8
90	IR	**727 158 513**	57	34.0	8.2
110	IR	**727 158 514**	70	43.0	10.0
160	IR	**^ 727 158 517**	100	60.0	14.6
200	IR	**727 158 519**	124	75.0	18.2
225	IR	*** 727 158 520**	140	85.0	20.5
250		*** 727 158 521**	225	133.0	22.7
315		*** 727 158 523**	255	154.0	28.6

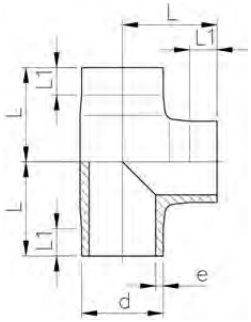
A

45° Elbow, PN 10, Standard PP



d (mm)	Part No.	L (mm)	L1 (mm)	e (mm)	R (mm)
355	*** 727 158 524**	520	300	32.2	532.5
400	*** 727 158 525**	548	300	36.3	600.0
450	*** 727 158 526**	580	300	40.9	675.0
500	*** 727 158 527**	665	350	45.4	750.0

A

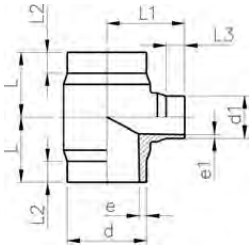


Tee, PN 10, Standard PP

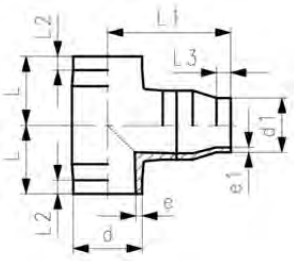
d (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	e (mm)
20	IR	**727 208 506**	0.011	38	24	1.9
25	IR	**727 208 507**	0.018	42	26	2.3
32	IR	**727 208 508**	0.032	46	26	2.9
40	IR	**^ 727 208 509**	0.062	51	23	3.7
50	IR	**727 208 510**	0.105	58	22	4.6
63	IR	**727 208 511**	0.186	66	20	5.8
75	IR	**^ 727 208 512**	0.293	75	20	6.8
90	IR	**727 208 513**	0.521	90	20	8.2
110	IR	**727 208 514**	0.928	110	20	10.0
160	IR	**^ 727 208 517**	2.844	160	28	14.6
200	IR	**727 208 519**	5.579	200	35	18.2
225	IR	*** 727 208 520**	7.812	220	35	20.5
250	--	**727 208 521**	10.400	227	68	22.7
315	--	**727 208 523**	20.330	283	86	28.6
355	--	*** 727 208 524**	31.100	345	105	32.2
400	--	*** 727 208 525**	40.900	365	105	36.3
450	--	*** 727 208 526**	60.300	425	135	40.9
500	--	*** 727 208 527**	81.900	470	155	45.4

A

Molded Reducing Tee, PN 10, Standard PP

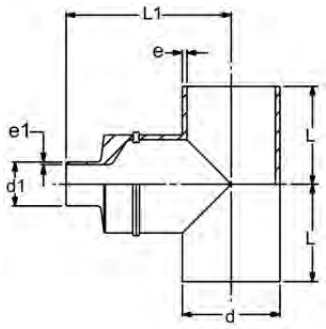


1



d (mm)	d1 (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	e (mm)	e1 (mm)
63	32	IR	^ 727 208 351	0.161	65	70	25	25	5.8	2.9
63	40	IR	^ 727 208 350	0.165	65	70	25	25	5.8	3.7
63	50	IR	^ 727 208 352	0.170	65	70	25	25	5.8	4.6
75	32	IR	^ 727 208 353	0.238	70	75	25	25	6.8	2.9
75	50	IR	^ 727 208 354	0.249	70	75	25	25	6.8	4.6
75	63	IR	^ 727 208 355	0.258	70	75	25	25	6.8	5.8
90	50	IR	^ 727 208 357	0.420	80	85	25	25	8.2	4.6
90	63	IR	^ 727 208 358	0.428	80	85	25	25	8.2	5.8
90	75	IR	^ 727 208 359	0.430	80	85	25	25	8.2	6.8
110	32	IR	^ 727 208 360	0.652	90	95	30	25	10.0	2.9
110	50	IR	^ 727 208 361	0.659	90	95	30	25	10.0	4.6
110	63	IR	^ 727 208 362	0.665	90	95	30	25	10.0	5.8
110	75	IR	^ 727 208 363	0.681	90	95	30	25	10.0	6.8
110	90	IR	^ 727 208 364	0.701	90	95	30	25	10.0	8.2
160	63	IR	^ 727 208 371	2.130	142	135	50	30	14.6	5.8
160	75	IR	^ 727 208 372	2.143	142	135	50	30	14.6	6.8
160	90	IR	^ 727 208 373	2.148	142	135	50	30	14.6	8.2
160	110	IR	^ 727 208 374	2.186	142	135	50	30	14.6	10.0
200	160	IR	727 208 385	6.632	200	295	35	40	18.2	14.6
225	90	IR	^ 727 208 388	4.576	155	165	40	30	20.5	8.2
225	110	IR	^ 727 208 389	4.624	155	165	40	30	20.5	10.0
225	160	IR	^ 727 208 391	4.685	155	165	40	30	20.5	14.6
250	160		727 208 093	12.500	227	387	68	53	22.7	14.6

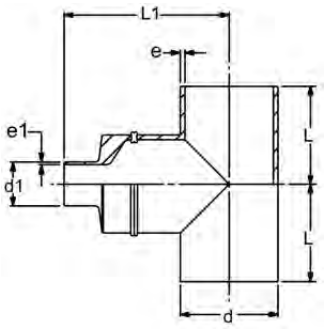
B



Fabricated Reducing Tee (25-110mm), PN 10, Standard PP

d (mm)	d1 (mm)	FM	Part No.	e (mm)	e1 (mm)	L (mm)	L1 (mm)
25	20	IR	* 727 992 450	2.30	1.90	42	87
32	20	IR	* 727 992 451	3.00	1.90	46	91
32	25	IR	* 727 992 452	3.00	2.30	46	91
40	20	IR	* 727 992 453	3.70	1.90	51	98
40	25	IR	* 727 992 454	3.70	2.30	51	99
40	32	IR	* 727 992 455	3.70	3.00	51	99
50	20	IR	* 727 992 456	4.60	1.90	58	105
50	25	IR	* 727 992 457	4.60	2.30	58	106
50	32	IR	* 727 992 458	4.60	3.00	58	106
50	40	IR	* 727 992 459	4.60	3.70	58	108
63	20	IR	* 727 992 460	5.80	1.90	66	113
63	25	IR	* 727 992 461	5.80	2.30	66	113
63	32	IR	* 727 992 462	5.80	3.00	66	113
63	40	IR	* 727 992 463	5.80	3.70	66	115
63	50	IR	* 727 992 464	5.80	4.60	66	115
75	20	IR	* 727 992 465	6.90	1.90	75	128
75	25	IR	* 727 992 466	6.90	2.30	75	129
75	32	IR	* 727 992 467	6.90	3.00	75	130
75	40	IR	* 727 992 468	6.90	3.70	75	131
75	50	IR	* 727 992 469	6.90	4.60	75	132
75	63	IR	* 727 992 470	6.90	5.80	75	135
90	20	IR	* 727 992 471	8.20	1.90	90	148
90	25	IR	* 727 992 472	8.20	2.30	90	149
90	32	IR	* 727 992 473	8.20	3.00	90	150
90	40	IR	* 727 992 474	8.20	3.70	90	151
90	50	IR	* 727 992 475	8.20	4.60	90	152
90	63	IR	* 727 992 476	8.20	5.80	90	155
90	75	IR	* 727 992 477	8.20	6.90	90	149
110	20	IR	* 727 992 478	10.00	1.90	110	178
110	25	IR	* 727 992 479	10.00	2.30	110	179
110	32	IR	* 727 992 480	10.00	3.00	110	180
110	40	IR	* 727 992 481	10.00	3.70	110	181
110	50	IR	* 727 992 482	10.00	4.60	110	182
110	63	IR	* 727 992 483	10.00	5.80	110	185
110	75	IR	* 727 992 484	10.00	6.90	110	179
110	90	IR	* 727 992 485	10.00	8.20	110	179

B

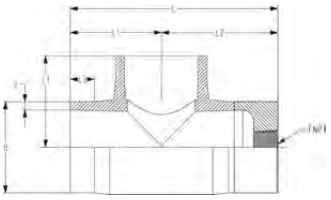


Fabricated Reducing Tee (160-500mm), PN 10, Standard PP

The L1 dimensions on sizes 250 mm and above are a maximum value; this dimension can be up to 44 mm less. Various fittings from 250mm and up with extreme reductions cannot be performed on all machines. If unsure please contact GF representative.

d (mm)	d1 (mm)	Part No.	e (mm)	e1 (mm)	L (mm)	L1 (mm)
160	63	* 727 992 486	14.60	5.80	160	250
160	75	* 727 992 487	14.60	6.90	160	244
160	90	* 727 992 488	14.60	8.20	160	244
160	110	* 727 992 489	14.60	10.00	160	243
200	63	* 727 992 490	18.20	5.80	200	310
200	75	* 727 992 491	18.20	6.90	200	304
200	90	* 727 992 492	18.20	8.20	200	304
200	110	* 727 992 493	18.20	10.00	200	303
200	160	* 727 992 494	18.20	14.60	200	311
225	63	* 727 992 495	20.50	5.80	220	340
225	75	* 727 992 496	20.50	6.90	220	334
225	90	* 727 992 497	20.50	8.20	220	334
225	110	* 727 992 498	20.50	10.00	220	333
225	160	* 727 992 499	20.50	14.60	220	341
225	200	* 727 992 500	20.50	18.20	220	339
250	63	* 727 992 501	22.80	5.80	276	389
250	75	* 727 992 502	22.80	6.90	276	385
250	90	* 727 992 503	22.80	8.20	276	386
250	110	* 727 992 504	22.80	10.00	276	388
250	160	* 727 992 505	22.80	14.60	276	388
250	200	* 727 992 506	22.80	18.20	276	388
250	225	* 727 992 507	22.80	20.50	276	388
315	63	* 727 992 508	28.70	5.80	353	501
315	75	* 727 992 509	28.70	6.90	353	497
315	90	* 727 992 510	28.70	8.20	353	498
315	110	* 727 992 511	28.70	10.00	353	495
315	160	* 727 992 512	28.70	14.60	353	497
315	200	* 727 992 513	28.70	18.20	353	498
315	225	* 727 992 514	28.70	20.50	353	500
315	250	* 727 992 515	28.70	22.80	353	504
355	225	* 727 992 516	32.20	20.50	345	489
355	250	* 727 992 517	32.20	22.70	345	489
355	315	* 727 992 518	32.20	28.60	345	509
400	225	* 727 992 519	36.30	20.50	360	524
400	250	* 727 992 520	36.30	22.70	360	524
400	315	* 727 992 521	36.30	28.60	360	524
400	355	* 727 992 522	36.30	32.20	360	524
450	225	* 727 992 523	40.90	20.50	419	593
450	250	* 727 992 524	40.90	22.70	419	593
450	315	* 727 992 525	40.90	28.60	419	593
450	355	* 727 992 526	40.90	32.20	419	593
450	400	* 727 992 527	40.90	36.30	419	593
500	225	* 727 992 528	45.40	20.50	465	627
500	250	* 727 992 529	45.40	22.70	465	627
500	315	* 727 992 530	45.40	28.60	465	627
500	355	* 727 992 531	45.40	32.20	465	627
500	400	* 727 992 532	45.40	36.30	465	627
500	450	* 727 992 533	45.40	40.90	465	627

B

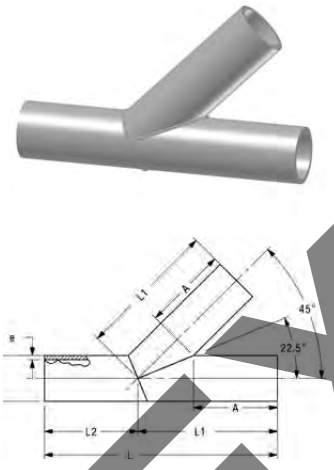


Analytical Threaded Sensor, PN 10, Standard PP

IR Plus/Butt Fusion

d (mm)	FNPT (inch)	FM	Part No.	e (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
50	¼	IR	* 727 991 840	4.6	135	58	77	22
50	½	IR	* 727 991 841	4.6	135	58	77	22
50	¾	IR	* 727 991 842	4.6	135	58	77	22
50	1	IR	* 727 991 843	4.6	135	58	77	22
63	¼	IR	* 727 991 844	5.8	148	66	82	20
63	½	IR	* 727 991 845	5.8	148	66	82	20
63	¾	IR	* 727 991 846	5.8	148	66	82	20
63	1	IR	* 727 991 847	5.8	148	66	82	20
75	¼	IR	* 727 991 848	6.8	171	75	96	20
75	½	IR	* 727 991 849	6.8	171	75	96	20
75	¾	IR	* 727 991 850	6.8	171	75	96	20
75	1	IR	* 727 991 851	6.8	171	75	96	20
90	¼	IR	* 727 991 852	8.2	208	90	118	20
90	½	IR	* 727 991 853	8.2	208	90	118	20
90	¾	IR	* 727 991 854	8.2	208	90	118	20
90	1	IR	* 727 991 855	8.2	208	90	118	20
110	¼	IR	* 727 991 856	10.0	244	110	134	20
110	½	IR	* 727 991 857	10.0	244	110	134	20
110	¾	IR	* 727 991 858	10.0	244	110	134	20
110	1	IR	* 727 991 859	10.0	244	110	134	20

B

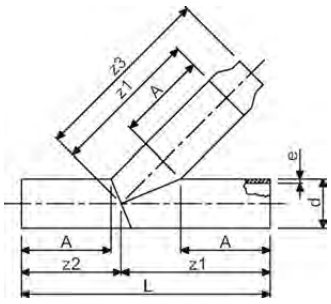


45° Wye, Standard PP, PN 10

Size (mm)	Part No.	e (mm)	L (mm)	L1 (mm)	L2 (mm)	A (mm)
25	* 157 345 350	2.3	225	125	100	95
50	* 157 345 050	4.6	371	210	161	150
63	* 157 345 063	5.8	389	226	163	150
75	* 157 345 075	6.9	406	241	165	150
90	* 157 345 090	8.2	527	309	218	200
110	* 157 345 110	10.0	555	333	222	200
160	* 157 345 160	14.6	626	393	233	200
200	* 157 345 200	18.2	783	491	292	250
225	* 157 345 225	20.5	818	522	296	250
250	* 157 345 250	22.8	954	602	352	300
315	* 157 345 315	28.7	1146	730	416	350

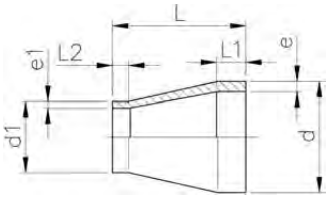
B

45° Reducing Wye, Standard PP, PN 10



	d - d1 (mm)	Part No.	e1 (mm)	e2 (mm)	z1 (inch)	z3 (inch)	z2 (inch)	A (inch)
*	63 - 50	* **157 445 100**	5.8	4.6	8.90	11.06	6.42	5.91
*	75 - 50	* **157 445 105**	6.9	4.6	9.47	11.63	6.52	5.91
*	75 - 63	* **157 445 106**	6.9	5.8	9.47	11.63	6.52	5.91
*	90 - 63	* **157 445 112**	8.2	5.8	12.15	14.71	8.61	7.87
*	90 - 75	* **157 445 113**	8.2	6.9	12.15	14.71	8.61	7.87
*	110 - 75	* **157 445 120**	10.0	6.9	13.10	16.25	8.77	7.87
*	110 - 90	* **157 445 121**	10.0	8.2	13.07	16.44	8.77	7.87
*	160 - 90	**157 445 122**	14.6	8.2	15.48	23.27	9.18	7.87
*	160 - 110	* **157 445 148**	14.6	10.0	15.48	19.80	9.18	7.87
*	200 - 160	* **157 445 160**	18.2	14.6	19.35	24.65	11.47	9.84
*	225 - 110	* **157 445 169**	20.5	10.0	20.54	26.44	11.68	9.84
*	225 - 160	* **157 445 170**	20.5	14.6	20.54	26.44	11.68	9.84
*	225 - 200	* **157 445 171**	20.5	18.2	20.54	26.44	11.68	9.84
*	250 - 160	* **157 445 181**	22.8	14.6	23.69	30.98	13.85	11.81
*	250 - 225	* **157 445 183**	22.8	20.5	23.69	30.47	13.85	11.81
*	315 - 225	* **157 445 208**	28.7	20.5	28.75	33.48	16.35	13.78
*	315 - 250	* **157 445 209**	28.7	22.8	28.75	32.27	16.35	13.78

A

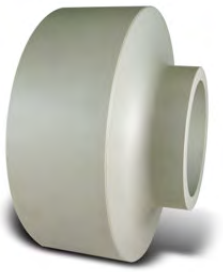


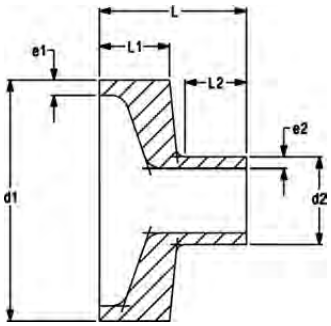
Reducer, PN 10, Standard PP

d (mm)	d1 (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	L2 (mm)	e (mm)	e1 (mm)
25	20	IR	**727 908 537**	0.007	50	20	20	2.3	1.9
32	20	IR	**727 908 542**	0.010	50	20	20	2.9	1.9
32	25	IR	**727 908 541**	0.010	50	20	20	2.9	2.3
40	20	IR	**^ 727 908 548**	0.016	58	20	23	3.7	1.9
40	25	IR	**^ 727 908 547**	0.016	55	20	20	3.7	2.3
40	32	IR	**^ 727 908 546**	0.018	55	20	20	3.7	2.9
50	25	IR	**727 908 554**	0.024	60	20	20	4.6	2.3
50	32	IR	**727 908 553**	0.027	60	20	20	4.6	2.9
50	40	IR	**^ 727 908 552**	0.030	60	20	20	4.6	3.7
63	32	IR	**727 908 560**	0.043	65	20	20	5.8	2.9
63	40	IR	**^ 727 908 559**	0.047	65	20	20	5.8	3.7
63	50	IR	**727 908 558**	0.051	65	20	20	5.8	4.6
75	40	IR	**727 908 566**	0.062	68	20	20	6.8	3.7
75	50	IR	**727 908 565**	0.071	65	20	20	6.8	4.6
75	63	IR	**727 908 564**	0.075	65	20	20	6.8	5.8
90	63	IR	**727 908 571**	0.115	75	22	19	8.2	5.8
90	75	IR	**727 908 570**	0.130	75	22	19	8.2	6.8
110	63	IR	**727 908 572**	0.201	90	28	28	10.6	6.2
110	75	IR	**727 908 577**	0.215	90	28	18	10.0	6.8
110	90	IR	**727 908 576**	0.225	90	28	30	10.0	8.2
160	110	IR	**727 908 590**	0.586	120	39	27	14.6	10.0
200	160	IR	**727 908 592**	1.149	145	50	40	18.2	14.6
225	110	IR	**727 908 595**	1.485	160	55	35	20.5	10.0
225	160	IR	**727 908 596**	1.590	160	55	40	20.5	14.6
225	180	IR	**727 908 162**	1.770	163	60	58	20.5	16.4
225	200	IR	**727 908 597**	1.723	160	55	50	20.5	18.2
250	160		**727 908 165**	2.140	170	63	53	22.7	14.6
250	225		**727 908 168**	2.750	180	65	65	22.7	20.5
315	225		**727 908 176**	5.110	237	84	60	28.6	20.5
315	250		**727 908 177**	5.105	231	86	63	28.6	22.7
355	250		**^ 727 908 963**	5.490	245	90	60	32.3	22.7
355	315		**^ 727 908 961**	3.700	245	90	80	32.2	28.6
400	315		**^ 727 908 966**	5.300	260	95	80	36.3	28.6
400	355		**^ 727 908 965**	4.800	260	95	90	36.3	32.2
450	315		*** 727 908 948**	8.000	230	60	80	40.9	28.6
450	355		*** 727 908 950**	7.400	230	60	90	40.9	32.2
450	400		*** 727 908 951**	6.000	230	60	95	40.9	36.3
500	315		*** 727 908 953**	12.000	230	60	80	45.4	28.6
500	355		*** 727 908 954**	10.800	230	60	90	45.4	32.2
500	400		*** 727 908 956**	10.000	230	60	95	45.4	36.3
500	450		*** 727 908 964**	8.300	230	60	60	45.4	40.9

B

Concentric Flush Style Reducer (40-110mm), PN 10, Standard PP

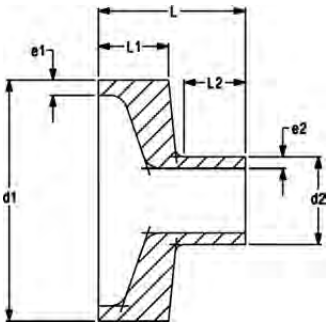




IR Plus/Butt Fusion

d1 (mm)	d2 (mm)	FM	Part No.	e1 (mm)	e2 (mm)	L (mm)	L1 (mm)	L2 (mm)
40	20	IR	* 727 909 604	3.7	1.9	52	24	25
40	25	IR	* 727 909 605	3.7	2.3	53	23	26
40	32	IR	* 727 909 606	3.7	3.0	53	22	26
50	20	IR	* 727 909 607	4.6	1.9	52	24	25
50	25	IR	* 727 909 608	4.6	2.3	53	23	26
50	32	IR	* 727 909 609	4.6	3.0	53	22	26
50	40	IR	* 727 909 610	4.6	3.7	55	21	28
63	20	IR	* 727 909 611	5.8	1.9	52	24	25
63	25	IR	* 727 909 612	5.8	2.3	52	23	26
63	32	IR	* 727 909 613	5.8	3.0	52	22	26
63	40	IR	* 727 909 614	5.8	3.7	54	20	28
63	50	IR	* 727 909 615	5.8	4.6	54	19	28
75	20	IR	* 727 909 616	6.9	1.9	58	27	25
75	25	IR	* 727 909 617	6.9	2.3	59	27	26
75	32	IR	* 727 909 618	6.9	3.0	60	27	26
75	40	IR	* 727 909 619	6.9	3.7	61	27	28
75	50	IR	* 727 909 620	6.9	4.6	62	27	28
75	63	IR	* 727 909 621	6.9	5.8	65	28	28
90	20	IR	* 727 909 622	8.2	1.9	63	32	25
90	25	IR	* 727 909 623	8.2	2.3	64	32	26
90	32	IR	* 727 909 624	8.2	3.0	65	32	26
90	40	IR	* 727 909 625	8.2	3.7	66	32	28
90	50	IR	* 727 909 626	8.2	4.6	67	32	28
90	63	IR	* 727 909 627	8.2	5.8	70	33	28
90	75	IR	* 727 909 628	8.2	6.9	64	31	23
110	20	IR	* 727 909 629	10.0	1.9	73	42	25
110	25	IR	* 727 909 630	10.0	2.3	74	42	26
110	32	IR	* 727 909 631	10.0	3.0	75	42	26
110	40	IR	* 727 909 632	10.0	3.7	76	42	28
110	50	IR	* 727 909 633	10.0	4.6	77	42	28
110	63	IR	* 727 909 634	10.0	5.8	80	43	28
110	75	IR	* 727 909 635	10.0	6.9	74	41	23
110	90	IR	* 727 909 636	10.0	8.2	74	39	23

B

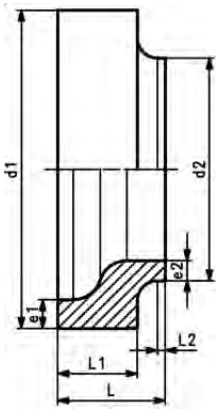


Concentric Flush Style Reducer (160-315mm), PN 10, Standard PP

IR Plus/Butt Fusion
Welds on some fittings with extreme reductions cannot be performed on all machines. If unsure please contact GF representative.

d1 (mm)	d2 (mm)	Part No.	e1 (mm)	e2 (mm)	L (mm)	L1 (mm)	L2 (mm)
160	63	* 727 909 656	15	6	95	58	28
160	75	* 727 909 657	15	7	89	56	23
160	90	* 727 909 658	15	8	89	54	23
160	110	* 727 909 659	15	10	88	50	23
200	75	* 727 909 663	18	7	109	76	23
200	90	* 727 909 664	18	8	109	74	23
200	110	* 727 909 665	18	10	108	70	23
200	160	* 727 909 668	18	15	116	61	33
225	63	* 727 909 669	21	6	125	88	28
225	75	* 727 909 670	21	7	119	86	23
225	90	* 727 909 671	21	8	119	84	23
225	110	* 727 909 672	21	10	118	80	23
225	160	* 727 909 675	21	15	126	71	33
225	200	* 727 909 676	21	18	124	64	33
250	63	* 727 909 677	23	6	119	85	28
250	75	* 727 909 678	23	7	115	80	23
250	90	* 727 909 679	23	8	116	80	23
250	110	* 727 909 680	23	10	118	80	28
250	160	* 727 909 683	23	15	118	70	38
250	200	* 727 909 684	23	18	118	67	38
250	225	* 727 909 685	23	21	118	64	38
315	63	* 727 909 696	29	6	154	100	28
315	75	* 727 909 697	29	7	150	100	23
315	90	* 727 909 698	29	8	151	100	23
315	110	* 727 909 699	29	10	148	100	23
315	160	* 727 909 702	29	15	148	100	23
315	200	* 727 909 703	29	18	151	100	33
315	225	* 727 909 704	29	21	153	99	33
315	250	* 727 909 705	29	23	157	86	48

A



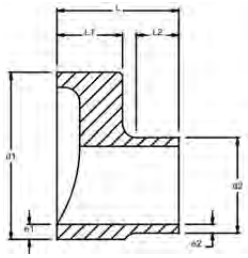
Concentric Flush Style Reducer (355-500mm), PN 10, Standard PP

Model:

- Material: PP-H
- Flush style design
- Conventional butt-welding according to DVS 2207
- Clamping on the welding machine must always be done on the larger diameter (d1)
- The butt fusion machine must be suitable to weld both d1 and d2 dimensions

d1 (mm)	d2 (mm)	Part No.	weight (kg)	L (mm)	L1 (mm)	L2 (mm)	e1 (mm)	e2 (mm)
355	225	* 727 909 809	4.983	130	95	10	32.2	20.5
355	250	* 727 909 810	3.574	115	80	10	32.2	22.7
355	315	* 727 909 812	3.952	115	80	15	32.2	28.6
400	225	* 727 909 816	7.587	145	110	10	36.3	20.5
400	250	* 727 909 817	6.955	140	105	10	36.3	22.7
400	315	* 727 909 819	6.149	135	100	10	36.3	28.6
400	355	* 727 909 820	5.811	135	100	13	36.3	32.2
450	225	* 727 909 822	11.398	165	125	10	40.9	20.5
450	250	* 727 909 823	10.561	160	120	10	40.9	22.7
450	315	* 727 909 825	8.660	150	110	15	40.9	28.6
450	355	* 727 909 826	8.246	150	110	15	40.9	32.2
450	400	* 727 909 827	7.973	150	110	15	40.9	36.3
500	225	* 727 909 829	15.293	180	130	10	45.4	20.5
500	250	* 727 909 830	15.037	180	130	10	45.4	22.7
500	315	* 727 909 832	10.404	165	115	10	45.4	28.6
500	355	* 727 909 833	10.785	165	115	10	45.4	32.2
500	400	* 727 909 834	11.863	165	115	10	45.4	36.3
500	450	* 727 909 835	12.042	165	115	25	45.4	40.9

B



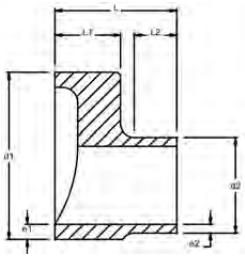
Eccentric Flush Style Reducer (40-110mm), PN 10, Standard PP

IR Plus/Butt Fusion

d1 (mm)	d2 (mm)	FM	Part No.	e1 (mm)	e2 (mm)	L (mm)	L1 (mm)	L2 (mm)
40	20	IR	* 157 909 604	3.7	1.9	52	24	25
40	25	IR	* 157 909 605	3.7	2.3	53	23	26
40	32	IR	* 157 909 606	3.7	3.0	53	22	26
50	20	IR	* 157 909 607	4.6	1.9	52	24	25
50	25	IR	* 157 909 608	4.6	2.3	53	23	26
50	32	IR	* 157 909 609	4.6	3.0	53	22	26
50	40	IR	* 157 909 610	4.6	3.7	55	21	28
63	20	IR	* 157 909 611	5.8	1.9	52	24	25
63	25	IR	* 157 909 612	5.8	2.3	52	23	26
63	32	IR	* 157 909 613	5.8	3.0	52	22	26
63	40	IR	* 157 909 614	5.8	3.7	54	20	28
63	50	IR	* 157 909 615	5.8	4.6	54	19	28
75	20	IR	* 157 909 616	6.9	1.9	58	27	25
75	25	IR	* 157 909 617	6.9	2.3	59	27	26
75	32	IR	* 157 909 618	6.9	3.0	60	27	26
75	40	IR	* 157 909 619	6.9	3.7	61	27	28
75	50	IR	* 157 909 620	6.9	4.6	62	27	28
75	63	IR	* 157 909 621	6.9	5.8	65	28	28
90	20	IR	* 157 909 622	8.2	1.9	63	32	25
90	25	IR	* 157 909 623	8.2	2.3	64	32	26
90	32	IR	* 157 909 624	8.2	3.0	65	32	26
90	40	IR	* 157 909 625	8.2	3.7	66	32	28
90	50	IR	* 157 909 626	8.2	4.6	67	32	28
90	63	IR	* 157 909 627	8.2	5.8	70	33	28
90	75	IR	* 157 909 628	8.2	6.9	64	31	23
110	20	IR	* 157 909 629	10.0	1.9	73	42	25
110	25	IR	* 157 909 630	10.0	2.3	74	42	26
110	32	IR	* 157 909 631	10.0	3.0	75	42	26
110	40	IR	* 157 909 632	10.0	3.7	76	42	28
110	50	IR	* 157 909 633	10.0	4.6	77	42	28
110	63	IR	* 157 909 634	10.0	5.8	80	43	28
110	75	IR	* 157 909 635	10.0	6.9	74	41	23
110	90	IR	* 157 909 636	10.0	8.2	74	39	23

B

Eccentric Flush Style Reducer (160-315mm), PN 10, Standard PP

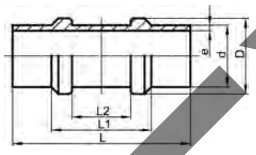


IR Plus/Butt Fusion

d1 (mm)	d2 (mm)	FM	Part No.	e1 (mm)	e2 (mm)	L (mm)	L1 (mm)	L2 (mm)
160	63	IR	* 157 909 656	14.6	5.8	95	58	28
160	75	IR	* 157 909 657	14.6	6.9	89	56	23
160	90	IR	* 157 909 659	14.6	8.2	89	54	23
160	110	IR	* 157 909 662	14.6	10.0	88	50	23
200	63	IR	* 157 909 663	18.2	5.8	115	78	28
200	75	IR	* 157 909 664	18.2	6.9	109	76	23
200	90	IR	* 157 909 706	18.2	8.2	109	74	23
200	110	IR	* 157 909 665	18.2	10.0	108	70	23
200	160	IR	* 157 909 666	18.2	14.6	116	61	33
225	63	IR	* 157 909 667	20.5	5.8	125	88	28
225	75	IR	* 157 909 668	20.5	6.9	119	86	23
225	90	IR	* 157 909 669	20.5	8.2	119	84	23
225	110	IR	* 157 909 670	20.5	10.0	118	80	23
225	160	IR	* 157 909 671	20.5	14.6	126	71	33
225	200	IR	* 157 909 672	20.5	18.2	124	64	33
250	63	IR	* 157 909 677	22.8	5.8	119	85	28
250	75	IR	* 157 909 678	22.8	6.9	115	80	23
250	90	IR	* 157 909 679	22.8	8.2	116	80	23
250	110	IR	* 157 909 680	22.8	10.0	118	80	28
250	160	IR	* 157 909 683	22.8	14.6	118	70	38
250	200	IR	* 157 909 684	22.8	18.2	118	67	38
250	225	IR	* 157 909 685	22.8	20.5	118	64	38
315	63	IR	* 157 909 696	28.7	5.8	154	100	28
315	75	IR	* 157 909 697	28.7	6.9	150	100	23
315	90	IR	* 157 909 698	28.7	8.2	151	100	23
315	110	IR	* 157 909 699	28.7	10.0	148	100	23
315	160	IR	* 157 909 702	28.7	14.6	148	100	23
315	200	IR	* 157 909 703	28.7	18.2	151	100	33
315	225	IR	* 157 909 704	28.7	20.5	153	99	33
315	250	IR	* 157 909 705	28.7	22.8	157	86	48

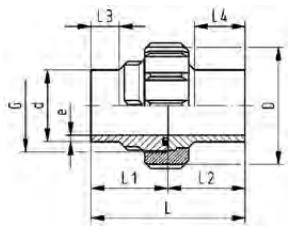
A

Restraint Fitting, PN 10, Standard PP



d (mm)	Part No.	D (mm)	e (mm)	L (mm)	L1 (mm)	L2 (mm)
20	* 727 918 656	28	1.9	100	53	32
25	* 727 918 657	33	2.3	100	53	32
32	* 727 918 658	40	2.9	100	53	32
50	* 727 918 660	58	4.6	100	53	32
63	* 727 918 661	71	5.8	105	53	32
90	* 727 918 663	105	8.2	125	70	40
110	* 727 918 664	127	10.0	125	70	40

A



Union, PN 10, Standard PP

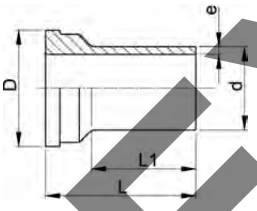
Model:

- Material: PP-H
- With butt fusion ends
- Conventional butt fusion and IR Plus® compatible
- Gasket: O-ring EPDM
- **For the dimensions d75-110 please see instructions for the installation**

d (mm)	FM	EPDM Part No.	FKM Part No.
20	IR	**727 518 506**	**727 528 506**
25	IR	**727 518 507**	**727 528 507**
32	IR	**727 518 508**	**727 528 508**
40	IR	**^ 727 518 509**	**^ 727 528 509**
50	IR	**727 518 510**	**727 528 510**
63	IR	**727 518 511**	**727 528 511**
75	IR	*** 727 518 512**	*** 727 528 512**
90	IR	*** 727 518 513**	*** 727 528 513**
110	IR	*** 727 518 514**	*** 727 528 514**

d (mm)	D (mm)	G (R/Rp BS Thread) (inch)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	e (mm)
20	48	1	107	54.0	53.0	13	26	1.9
25	58	1 1/4	113	57.0	56.0	12	26	2.3
32	65	1 1/2	119	60.0	59.0	14	26	2.9
40	79	2	126	63.0	63.0	16	26	3.7
50	91	2 1/4	131	65.5	65.5	19	26	4.6
63	111	2 3/4	137	69.0	68.0	20	26	5.8
75	135	S107,5x3,6	131	66.0	65.5	22	24	6.8
90	135	S107,5x3,6	131	65.5	65.5	22	24	8.2
110	158	S127,5x3,6	131	65.5	65.5	22	25	10.0

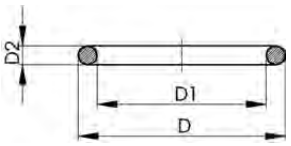
A



Union End, PN 10, Standard PP

d (mm)	FM	Part No.	D (mm)	L (mm)	L1 (mm)	e (mm)
20	IR	**727 508 506**	30	54	38	1.9
25	IR	**727 508 507**	39	57	42	2.3
32	IR	**727 508 508**	45	60	41	2.9
40	IR	**727 508 509**	57	63	42	3.7
50	IR	**727 508 510**	63	66	44	4.6
63	IR	**727 508 511**	78	69	45	5.8
75	IR	*** 727 508 512**	101	66	34	6.8
90	IR	**727 508 513**	101	66	45	8.2
110	IR	**727 508 514**	121	66	40	10.0

B



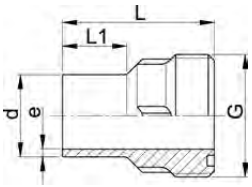
O-Ring for PROGEF, SYGEF Standard IR/BCF and Socket Fusion Unions

Model:

- For unions and adaptor unions
- Hardness approx. 65° Shore
- EPDM minimum temperature -40°F
- FKM minimum temperature -15°F
- * for unions PVC-U, PVC-C and ABS: 21 51 01, 21 51 11, 21 53 03, 21 53 08, 21 55 04, 21 55 13, 21 55 18, 23 51 01 and 29 51 01 only

	d (mm)	DN (mm)	EPDM Part No.	weight (kg)	FKM Part No.	weight (kg)	D (mm)	D1 (mm)	D2 (mm)	closest inch (inch)
	20	15	**^ 748 410 006**	0.002	**^ 749 410 006**	0.002	27	20	3.53	½
	25	20	**^ 748 410 007**	0.002	**^ 749 410 007**	0.002	35	28	3.53	¾
	32	25	**748 410 008**	0.003	**749 410 008**	0.002	40	33	3.53	1
	40	32	**748 410 009**	0.003	**749 410 009**	0.007	51	41	5.34	1 ¼
	50	40	**748 410 010**	0.004	**749 410 010**	0.060	58	47	5.34	1 ½
	63	50	**748 410 011**	0.005	**749 410 011**	0.003	70	60	5.34	2
	75	65	*** 748 410 014**	0.007	*** 749 410 014**	0.012	93	82	5.34	2 ½
	90	80	*** 748 410 015**	0.008	*** 749 410 015**	0.015	112	101	5.34	3
	110	100	*** 748 410 016**	0.016	*** 749 410 016**	0.031	134	120	6.99	4

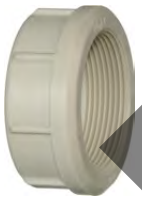
A



Union Bushing, PN 10, Standard PP, Socket Fusion

d (mm)	FM	Part No.	weight (lb)	G (R/Rp BS Thread) (inch)	L (mm)	L1 (mm)	e (mm)
20	IR	*** 727 848 506**	0.026	1	54	26	1.9
25	IR	*** 727 848 507**	0.044	1 1/4	57	26	2.3
32	IR	*** 727 848 508**	0.064	1 1/2	60	25	2.6
40	IR	*** 727 848 509**	0.104	2	63	25	3.7
50	IR	*** 727 848 510**	0.137	21/4	66	25	4.6
63	IR	*** 727 848 511**	0.236	23/4	69	25	5.8
75	IR	*** 727 848 512**	0.379	S107.5x3.6	66	24	6.8
90	IR	*** 727 848 513**	0.401	S107.5x3.6	66	24	8.2
110	IR	*** 727 848 514**	0.569	S127.5x3.6	66	25	10.0

B

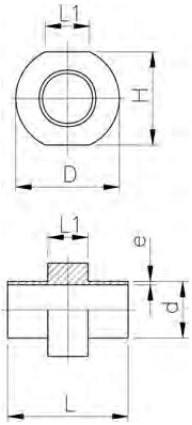


Union Nut, PN 10, Standard PP

Socket Fusion d (mm)	Butt Fusion d (mm)	G (R/Rp BS Thread) (inch)	Part No.	D (mm)	L (mm)
16	16	3/4	**727 890 405**	35	21
20	20	1	**727 890 406**	48	24
25	25	1 1/4	**727 890 407**	58	26
32	32	1 1/2	**727 890 408**	65	28
40	40	2	**727 890 409**	77	27
50	50	2 1/4	**727 890 410**	84	30
63	63	2 3/4	**727 890 411**	111	39
75	75 - 90	S107,5x3,6	*** 727 890 422**	135	40
90	110	S127,5x3,6	*** 727 890 423**	158	43
110	-	S152,5x3,6	*** 727 890 424**	188	48

B

Instrument Installation Fitting, PN 10, Standard PP

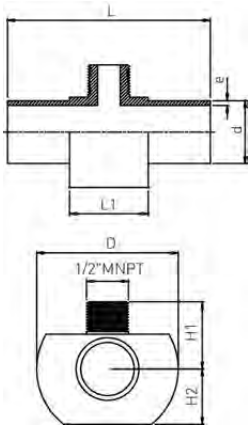


Add "T" to end of part number and fee to list price for each factory milled thread (max. diameter is 3/4"). See published price list for fee.

d (mm)	FM	Part No.	e (mm)	L (mm)	D (mm)	H (mm)	L1 (mm)
20	IR	* 727 918 606	1.9	140	71	58	40
25	IR	* 727 918 607	2.3	140	75	63	40
32	IR	* 727 918 608	3.0	140	81	70	40
40	IR	* 727 918 609	3.7	140	88	78	40
50	IR	* 727 918 610	4.6	140	97	88	40
63	IR	* 727 918 611	5.8	140	109	101	40
75	IR	* 727 918 612	6.9	140	120	113	40
90	IR	* 727 918 613	8.2	140	134	128	40
110	IR	* 727 918 614	10.0	140	153	148	40
160	IR	* 727 918 567	14.6	140	191	187	40
200	IR	* 727 918 569	18.2	140	223	220	40
225	IR	* 727 918 570	20.5	140	243	240	40

B

1/2" MNPT Low Profile Adapter, PN 10, Standard PP



IR Plus/Butt Fusion

d (mm)	FM	Part No.	e (mm)	L (mm)	D (mm)	H1 (mm)	H2 (mm)	L1 (mm)
20	IR	* 727 918 626	1.90	140	71	28	29	40
25	IR	* 727 918 627	2.30	140	75	31	32	40
32	IR	* 727 918 628	3.00	140	81	34	35	40
40	IR	* 727 918 629	3.70	140	88	38	39	40
50	IR	* 727 918 630	4.60	140	97	43	44	40
63	IR	* 727 918 631	5.80	140	109	50	51	40
75	IR	* 727 918 632	6.90	140	120	56	57	40
90	IR	* 727 918 633	8.20	140	134	63	64	40
110	IR	* 727 918 634	10.00	140	153	73	74	40

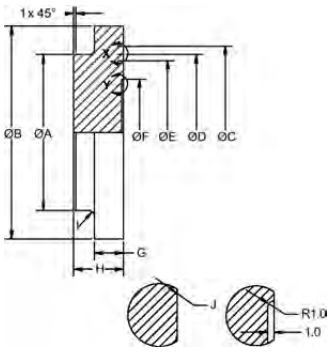
B

3/4" (3A) Sanitary Adapter, PN 10, Standard PP

IR Plus/Butt Fusion
3/4" size sanitary adapter port, i.e. 0.985" flange OD

d (mm)	FM	Part No.	e (mm)	L (mm)	D (mm)	H1 (mm)	H2 (mm)	L1 (mm)
20	IR	* 727 918 646	1.9	140	71	28	29	40
25	IR	* 727 918 647	2.3	140	75	31	32	40
32	IR	* 727 918 648	3.0	140	81	34	35	40
40	IR	* 727 918 649	3.7	140	88	38	39	40
50	IR	* 727 918 650	4.6	140	97	43	44	40
63	IR	* 727 918 651	5.8	140	109	50	51	40
75	IR	* 727 918 652	6.9	140	120	56	57	40
90	IR	* 727 918 653	8.2	140	134	63	64	40
110	IR	* 727 918 654	10.0	140	153	73	74	40

A

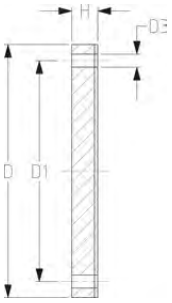


Blind Flange, PN 10, Standard PP

d (mm)	ANSI (inch)	Part No.	weight (lb)
20	½	**727 991 362**	0.040
25	¾	**727 991 363**	0.062
32	1	**727 991 364**	0.093
40	1 ¼	**^ 727 991 365**	0.132
50	1 ½	**727 991 366**	0.172
63	2	**727 991 367**	0.309
90	3	**727 991 369**	0.672
110	4	**727 991 370**	0.970
160	6	*** 727 991 372**	2.205
200/225	⅛	*** 727 991 373**	5.115

d (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	Rad I (mm)	Rad J (mm)
20	26	44	28	22		16	7	14	1.0	0.4
25	32	54	36	29		20	9	16	1.5	0.4
32	40	63	43	36		26	10	17	1.5	0.4
40	49	73	54	47		33	11	19	2.0	0.4
50	60	79	64	56		41	12	20	2.0	0.4
63	75	99	83	75	69	51	14	24	2.5	0.4
90	105	133	115	106	97	74	17	27	3.0	0.4
110	125	158	138	128	118	90	18	28	3.0	0.5
160	175	200	191	181	171	131	25	38	4.0	1.0
200/225	232	268	250	240	230	164	32	48	4.0	1.0

B

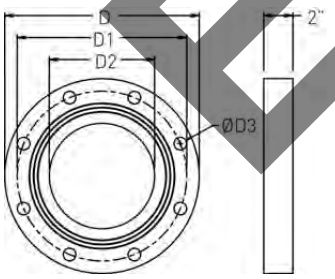


Blind Flange with PP Sheet, PN 10, Standard PP

- PP sheet is inside the blind flange as the wetted surface

d (mm)	Part No.	D (mm)	D1 (mm)	H (mm)	D3 (mm)	# holes
250	*** 157 991 250**	419.10	361.95	44.50	25.40	12
315	*** 157 991 315**	494.00	431.80	50.80	25.40	12
355	*** 157 991 355**	546.00	476.30	54.00	29.00	12
400	*** 157 991 405**	610.00	539.80	57.20	29.00	16
450	*** 157 991 450**	648.00	577.90	63.50	32.00	16
500	*** 157 991 500**	711.00	635.00	69.90	32.00	20

B



Full-Face Flange Spacer, PN 10, Standard PP

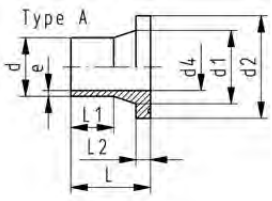
ANSI (inch)	Part No.	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	# holes
4	*** 727 991 340**	229	190	90	19	8
6	*** 727 991 341**	285	241	131	22	8
8	*** 727 991 342**	340	296	164	22	8
9	*** 727 991 343**	340	296	184	22	8
10	*** 727 991 344**	406	362	204	25	12
12	*** 727 991 345**	483	432	258	25	12

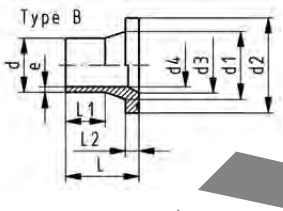
A

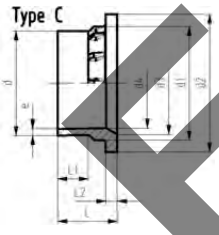
Type A

Type B

Type C







PROGEF Standard flange adaptor S5/SDR11
Combined jointing face: flat and serrated

Model:

- Material: PP-H
- Conventional butt-welding according to DVS 2207
- IR compatible. Choose fusion parameters: PP-H
- Suitable for flange connections to **ANSI/ASME B 16.5**
- Up to d315, suitable for butterfly valve type 567/578 and 038/039.
- Gasket: Profile flange gasket EPDM No. 48 44 07, FKM No. 49 44 07

	d (mm)	DN (mm)	FM	Part No.	weight (kg)
	20	15	IR	**727 798 706**	0.015
	25	20	IR	*** 727 798 757**	0.022
	32	25	IR	*** 727 798 758**	0.039
	40	32	IR	**^ 727 798 759**	0.056
	50	40	IR	*** 727 798 760**	0.087
	63	50	IR	**727 798 711**	0.144
	75	65	IR	**727 798 712**	0.243
	90	80	IR	*** 727 798 763**	0.310
	110	100	IR	**727 798 714**	0.441
	160	150	IR	**727 798 317**	0.927
	200	200	IR	**727 798 319**	1.652
	225	200	IR	*** 727 798 320**	1.665
	250	250		*** 727 798 321**	2.630
	315	300		*** 727 798 323**	3.247

	d (mm)	DN (mm)	L1 (mm)	L2 (mm)	L (mm)	d1 (mm)	d4 (mm)	d2 (mm)	e (mm)	d3 (mm)	Type
	20	15	29	7	50	26	16	45	1.9		A
	25	20	27	9	52	33	20	54	2.3		A
	32	25	28	10	54	40	26	63	3.0		A
	40	32	25	11	55	50	32	73	3.7		A
	50	40	32	12	62	61	40	82	4.6		A
	63	50	38	14	68	75	49	102	5.8		A
	75	65	43	16	80	89	58	122	6.8	66	B
	90	80	42	17	80	105	70	133	8.2	78	B
	110	100	41	18	80	125	87	158	10.0	100	B
	160	150	40	25	92	175	127	212	14.6	151	C
	200	200	35	32	100	232	174	268	18.2	203	C
	225	200	35	32	100	235	196	268	20.5	210	C
	250	250	45	35	120	285	203	320	22.7	252	C
	315	300	50	50	150	335	256	370	28.6	300	C

A

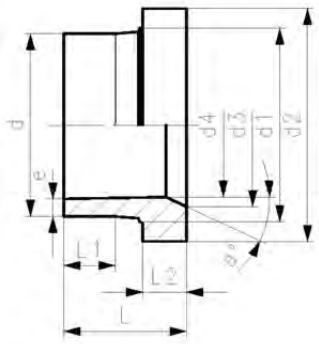
Flange Adaptor (355-500mm), PN 10, Standard PP, Joining Face Flat and Serrated

Model:

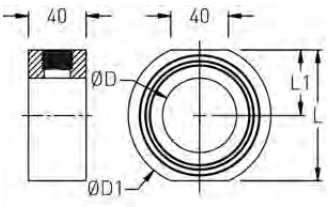
- Suitable for butterfly valve type 567/578 and 038/039

d (mm)	DN (mm)	Part No.	weight (kg)	d1 (mm)	d2 (mm)	d3 (mm)	a°	d4 (mm)	L (mm)	L1 (mm)	L2 (mm)	Type	e (mm)
355	350	* **727 798 924**	7.300	373	430	350	25	284	187	70	65	B	33.9
400	400	* **727 798 925**	10.200	427	482	400	25	320	196	70	70	B	38.2
450	500	* **727 798 926**	17.900	467	533	450	23	360	272	105	107	B	43.0
500	500	* **727 798 927**	20.100	530	585	498	25	400	261	105	90	B	47.8

Type B



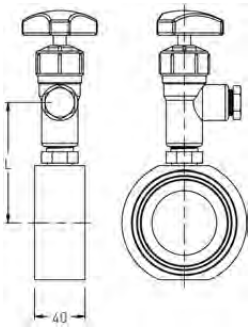
B



Wafer (Pre-Drilled) with 1/2" FNPT, PN 10, Standard PP

d (mm)	Part No.	L (mm)	L1 (mm)	D (mm)	D1 (mm)
50	* 727 992 260	71	35	40	82
63	* 727 992 261	94	47	51	102
75	* 727 992 262	115	57	61	121
90	* 727 992 263	127	63	73	133
110	* 727 992 264	153	76	90	158
160	* 727 992 265	208	104	130	212
200	* 727 992 266	265	132	163	268
225	* 727 992 267	265	132	184	268
250	* 727 992 268	317	158	204	320
315	* 727 992 269	368	184	257	370

B

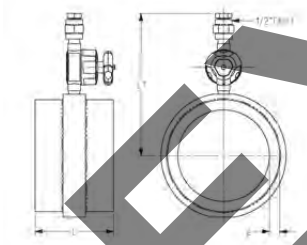


Wafer Vent, PN 10, Standard PP

Vent valve is 1/2" Type 522 Angle Needle Valve, with MPT plug

d (mm)	Part No.	L (mm)
50	* 727 991 960	84
63	* 727 991 961	95
75	* 727 991 962	106
90	* 727 991 963	112
110	* 727 991 964	125
160	* 727 991 965	153
200	* 727 991 966	181
225	* 727 991 967	181
250	* 727 991 968	207
315	* 727 991 969	232

B



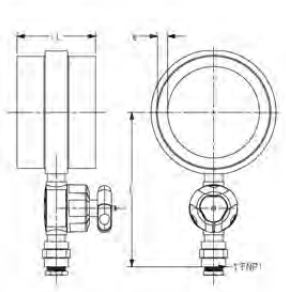
Vent Port Assembly, PN 10, Standard PP

IR Plus/Butt Fusion
Vent is 1/2" PP-H Type 515 Diaphragm Valve with MPT plug

d (mm)	Part No.	e (mm)	L (mm)	L1 (mm)
50	* 157 992 600	4.6	301	183
63	* 157 992 601	5.8	301	189
75	* 157 992 602	6.9	301	194
90	* 157 992 603	8.2	301	201
110	* 157 992 604	10.0	301	210
160	* 157 992 605	14.6	301	235
200	* 157 992 606	18.2	301	254
225	* 157 992 607	20.5	301	266
250	* 157 992 608	22.8	301	278
315	* 157 992 609	28.7	301	308

B

Drain Port Assembly, PN 10, Standard PP

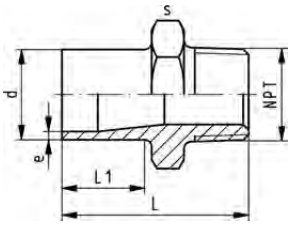


IR Plus/Butt Fusion
Drain is 1" PP-H Type 515 Diaphragm Valve with MPT plug

d (mm)	Part No.	e (mm)	L (mm)	L1 (mm)
50	* 157 992 610	4.6	301	215
63	* 157 992 611	5.8	301	221
75	* 157 992 612	6.9	301	227
90	* 157 992 613	8.2	301	233
110	* 157 992 614	10.0	301	242
160	* 157 992 615	14.6	301	268
200	* 157 992 616	18.2	301	287
225	* 157 992 617	20.5	301	294
250	* 157 992 618	22.8	301	310
315	* 157 992 619	28.7	301	340

A

Male Adapter, PN 10, Standard PP



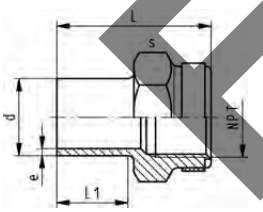
Model:

- Material: PP-H
- With butt fusion spigot SDR11 and NPT tapered male thread
- Do not use thread sealing pastes that are harmful to PP
- Install with low mechanical stress and avoid large cyclic temperature changes

d (mm)	NPT (inch)	FM	Part No.	L (mm)	L1 (mm)	s (mm)	e (mm)
20	½	IR	727 914 656	51	23	32	1.9
25	¾	IR	727 914 657	52	23	36	2.3
32	1	IR	727 914 658	55	23	46	2.9
40	1 ¼	IR	^ 727 914 659	58	24	55	3.7
50	1 ½	IR	727 914 660	60	23	65	4.6
63	2	IR	727 914 661	67	26	80	5.8

A

Female Adapter, PN 10, Standard PP

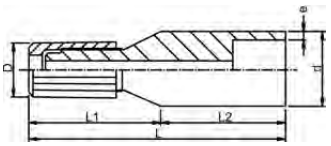


Model:

- Material: PP-H
- With butt fusion spigot **SDR11** and NPT tapered female thread, reinforced
- Reinforcing ring stainless (A2)
- Connection to plastic or metal threads
- Do not use thread sealing pastes that are harmful to PP
- Install with low mechanical stress and avoid large cyclic temperature changes

d (mm)	NPT (inch)	FM	Part No.	weight (lb)	L (mm)	L1 (mm)	s (mm)	e (mm)
20	½	IR	727 914 356	0.037	49	23	32	1.9
25	¾	IR	727 914 357	0.049	51	23	36	2.3
32	1	IR	727 914 358	0.086	54	23	46	2.9
40	1 ¼	IR	^ 727 914 359	0.126	56	23	55	3.7
50	1 ½	IR	727 914 360	0.187	60	23	65	4.6
63	2	IR	727 914 361	0.269	62	23	80	5.8

A

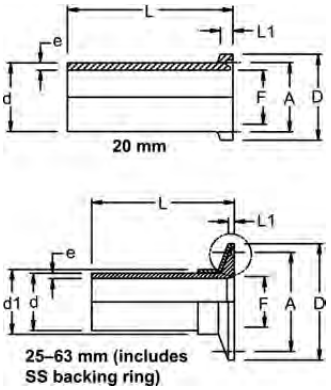


Flare Tube Adapter, PN 10, Standard PP

IR Plus/Butt Fusion
Nut is PVDF material

d (mm)	Tube Size (inch)	FM	Part No.	e (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)
20	¼	IR	* 727 991 430	1.9	19	74	43	31
20	⅜	IR	* 727 991 431	1.9	22	77	46	31
20	½	IR	* 727 991 432	1.9	25	79	48	31
20	¾	IR	* 727 991 433	1.9	34	83	52	31
25	¼	IR	* 727 991 435	2.3	19	74	43	31
25	⅜	IR	* 727 991 436	2.3	22	77	46	31
25	½	IR	* 727 991 437	2.3	25	79	48	31
25	¾	IR	* 727 991 438	2.3	34	83	52	31
25	1	IR	* 727 991 439	2.3	37	84	58	31
32	½	IR	* 727 991 442	3.0	25	79	48	31
32	¾	IR	* 727 991 443	3.0	34	83	52	31
32	1	IR	* 727 991 444	3.0	37	89	58	31

B

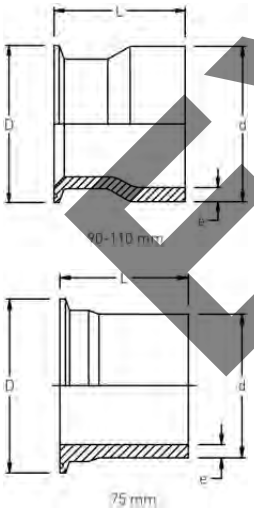


Sanitary Adapter, PN 10, Standard PP

IR Plus/Butt Fusion

d (mm)	Tube (3A) (inch)	FM	Part No.	e (mm)	D (mm)	d1 (mm)	A (mm)	F (mm)	L (mm)	L1 (mm)
20	¾	IR	* 157 300 016	1.9	25				49	
25	1	IR	* 157 598 707	2.3	50	28	44	22	50	3
32	1 ½	IR	* 157 598 708	3.0	50	35	44	35	52	3
40	1 ½	IR	* 157 598 709	3.7	50	43	44	35	54	3
50	2	IR	* 157 598 710	4.6	64	53	57	48	61	3
63	2 ½	IR	* 157 598 711	5.8	77	66	71	60	67	3

B

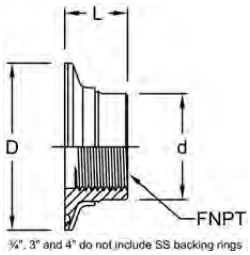


Large Sanitary Adapter, PN 6, Standard PP

Does not use a stationary backing ring
IR Plus/Butt Fusion

d (mm)	Tube (3A) (inch)	FM	Part No.	e (mm)	D (mm)	L (mm)
75	3	IR	* 727 598 370	6.9	91	67
90	3	IR	* 727 598 371	8.2	91	76
110	4	IR	* 727 598 372	10.0	119	76

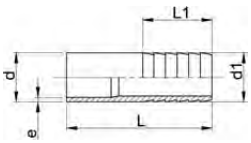
B



Sanitary Instrument Adapter, PN 10, Standard PP

Tube (3A) (inch)	FNPT (inch)	Part No.	D (mm)	d (mm)	L (mm)
¾	¼	* 727 992 400	25	20	13
1	¼	* 727 992 401	51	40	19
1	⅜	* 727 992 402	51	40	19
1 ½	¼	* 727 992 403	51	40	19
1 ½	½	* 727 992 404	51	40	19
1 ½	¾	* 727 992 405	51	40	19

A



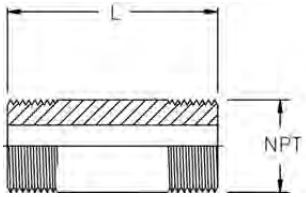
Hose Connector, PN 10, Standard PP

Model:

- Material: PP-H
- With butt fusion spigot SDR11 and parallel hose connection

d (mm)	d1 (mm)	FM	Part No.	e (mm)	L (mm)	L1 (mm)
20	20	IR	* 727 968 606	1.9	64	27
25	25	IR	* 727 968 607	2.3	75	36
32	32	IR	* 727 968 608	2.9	82	36
40	40	IR	* 727 968 609	3.7	84	42
50	50	IR	* 727 968 610	4.6	90	48
63	60	IR	* 727 968 611	5.8	100	50

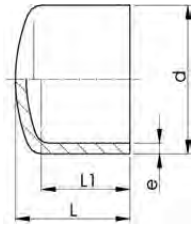
B



Nipple, PN 10, Standard PP

Male NPT (inch)	L (inch)	Part No.
½	2	* 727 992 350
½	3	* 727 992 351
½	4	* 727 992 352
¾	2	* 727 992 353
¾	3	* 727 992 354
¾	4	* 727 992 355
1	2	* 727 992 356
1	3	* 727 992 357
1	4	* 727 992 358
1 ¼	3	* 727 992 359
1 ¼	4	* 727 992 360
1 ½	3	* 727 992 361
1 ½	4	* 727 992 362
2	3	* 727 992 363
2	4	* 727 992 364

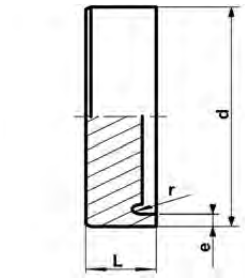
A



End Cap (20-225mm), PN 10, Standard PP

d (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	e (mm)
20	IR	**727 968 106**	0.005	49	42	1.9
25	IR	**727 968 107**	0.007	52	42	2.3
32	IR	**727 968 108**	0.016	57	47	2.9
40	IR	**727 968 109**	0.023	64	51	3.7
50	IR	**727 968 110**	0.048	72	59	4.6
63	IR	**727 968 111**	0.087	86	67	5.8
75	IR	**727 968 112**	0.138	94	73	6.8
90	IR	**727 968 113**	0.222	112	83	8.2
110	IR	**727 968 114**	0.375	124	90	10.0
160	IR	**727 968 117**	1.040	162	109	14.6
200	IR	**727 968 119**	1.860	179	117	18.2
225	IR	**727 968 120**	2.625	203	127	20.5

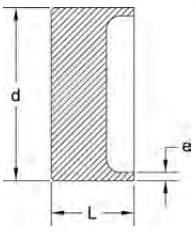
A



End Cap (250-500mm), PN 10, Standard PP

d (mm)	Part No.	L (mm)	e (mm)
250	* **727 968 846**	60	22.7
315	* **727 968 848**	70	28.6
355	* **727 968 849**	80	32.2
400	* **727 968 850**	85	36.3
450	* **727 968 851**	95	40.9
500	* **727 968 852**	105	74.5

B



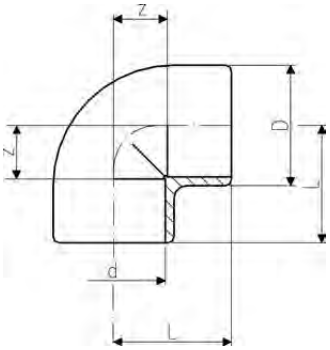
Flush Style End Cap for tapping, PN 10, Standard PP

Add "T" to end of part number and fee to list price for each factory milled thread (max. diameter is 3/4"). See published price list for fee.

d (mm)	FM	Part No.	e (mm)	L (mm)
20	IR	* **727 992 680**	1.9	30
25	IR	* **727 992 681**	2.3	30
32	IR	* **727 992 682**	3.0	30
40	IR	* **727 992 683**	3.7	30
50	IR	* **727 992 684**	4.6	36
63	IR	* **727 992 685**	5.8	37
75	IR	* **727 992 686**	6.9	39
90	IR	* **727 992 687**	8.2	40
110	IR	* **727 992 688**	10.0	43
160	IR	* **727 992 690**	14.6	57
200	IR	* **727 992 691**	18.2	69
225	IR	* **727 992 692**	20.5	77

Socket Fusion Fittings

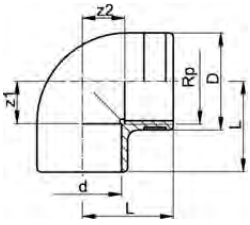
A



90° Elbow, PN 10, Standard PP, Socket Fusion

d (mm)	Part No.	D (mm)	L (mm)	z (mm)
16	**727 100 105**	26	25	12
20	**727 100 106**	31	28	14
25	**727 100 107**	36	32	16
32	**727 100 108**	44	38	20
40	**^ 727 100 109**	54	44	24
50	**727 100 110**	66	51	28
63	**727 100 111**	82	62	35
75	**727 100 112**	93	76	45
90	**727 100 113**	110	88	53
110	**727 100 114**	134	106	65

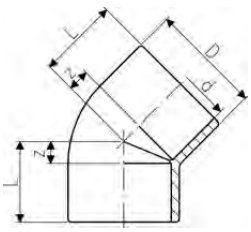
A



90° Elbow BSP Thread, PN 10, Standard PP, Socket Fusion

d (mm)	Rp (inch)	FBSP (inch)	Part No.	weight (lb)	D (mm)	L (mm)	z1 (mm)	z2 (mm)
20	½	½	*** 727 100 206**	0.049	30	28	14	14
25	¾	¾	*** 727 100 207**	0.077	35	32	16	16
32	1	1	*** 727 100 208**	0.126	44	38	20	20
40	1 ¼	1 ¼	*** 727 100 209**	0.192	54	44	24	24

A

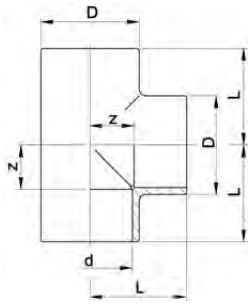


45° Elbow, PN 10, Standard PP, Socket Fusion

d (mm)	Part No.	D (mm)	L (mm)	z (mm)
16	**727 150 105**	23	20	7
20	**727 150 106**	31	21	7
25	**727 150 107**	36	24	8
32	**727 150 108**	44	28	10
40	**^ 727 150 109**	53	33	13
50	**727 150 110**	64	36	13
63	**727 150 111**	82	43	16
75	**727 150 112**	93	51	20
90	**727 150 113**	114	58	23
110	**727 150 114**	134	68	27

A

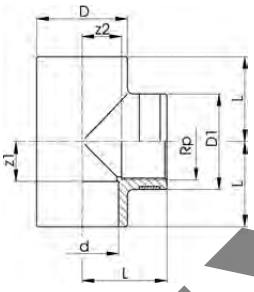
Tee, PN 10, Standard PP, Socket Fusion



d (mm)	Part No.	weight (kg)	D (mm)	L (mm)	z (mm)
16	**727 200 105**	0.020	26	25	12
20	**727 200 106**	0.027	31	28	14
25	**727 200 107**	0.039	36	32	16
32	**727 200 108**	0.057	44	38	20
40	**^ 727 200 109**	0.095	54	44	24
50	**727 200 110**	0.161	66	51	28
63	**727 200 111**	0.286	82	62	35
75	**727 200 112**	0.390	93	76	45
90	**727 200 113**	0.727	114	88	53
110	**727 200 114**	1.062	134	106	65

A

Tee BSP Threaded Branch, PN 10, Standard PP, Socket Fusion

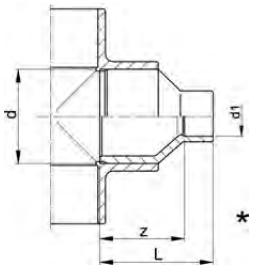


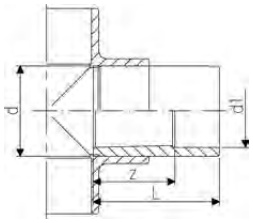
Model:

- Line is fusion socket metric
- Branch is BSP parallel female thread Rp, reinforced
- Reinforcing ring stainless (A2)
- Connection to plastic or metal threads
- Do not use thread sealing pastes that are harmful to PP
- Install with low mechanical stress and avoid large cyclic temperature changes

d (mm)	Rp (inch)	FBSP (inch)	Part No.	D (mm)	D1 (mm)	L (mm)	z1 (mm)	z2 (mm)
20	½	½	*** 727 200 206**	31	30	28	14	14
25	¾	¾	*** 727 200 207**	36	35	32	16	16
32	1	1	*** 727 200 208**	44	45	38	20	20
40	1 ¼	1 ¼	*** 727 200 209**	54	55	44	24	24

A



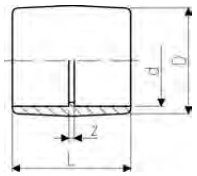


Reducer Bushing, PN 10, Standard PP, Socket Fusion

Note:
* Fusion spigot and socket

d (mm)	d1 (mm)	Part No.	L (mm)	z (mm)
20	16	**727 910 334**	35	22
25	16	**727 910 338**	38	25
25	20	**727 910 337**	37	23
32	20	**727 910 342**	43	29
32	25	**727 910 341**	43	27
40	20	**^ 727 910 348**	48	34
40	25	**^ 727 910 347**	48	32
40	32	**^ 727 910 346**	48	30
50	20	**727 910 355**	54	40
50	25	**727 910 354**	54	38
50	32	**727 910 353**	54	36
50	40	**^ 727 910 352**	54	34
63	25	**727 910 361**	64	46
63	32	**727 910 360**	64	46
63	40	**^ 727 910 359**	64	44
63	50	**727 910 358**	64	41
75	63	**727 910 364**	62	35
90	63	**727 910 371**	88	61
90	75	**727 910 370**	70	39
110	90	**727 910 376**	81	46

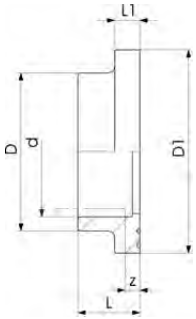
A



Coupling, PN 10, Standard PP, Socket Fusion

d (mm)	Part No.	D (mm)	L (mm)	z (mm)
16	**727 910 105**	26	33	7
20	**727 910 106**	31	35	7
25	**727 910 107**	36	39	7
32	**727 910 108**	44	43	7
40	**^ 727 910 109**	54	48	8
50	**727 910 110**	66	54	8
63	**727 910 111**	82	62	8
75	**727 910 112**	93	70	8
90	**727 910 113**	112	81	11
110	**727 910 114**	134	96	14

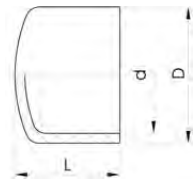
A



Flange Adaptor, ANSI Serrated, PN 10, Standard PP, Socket Fusion

d (mm)	Part No.	weight (lb)	D (mm)	D1 (mm)	L (mm)	L1 (mm)	z (mm)
20	**727 790 206**	0.024	27	45	19	7	5
25	**727 790 257**	0.040	33	54	21	7	5
32	**727 790 258**	0.057	41	63	23	7	5
40	**^ 727 790 259**	0.090	50	73	25	8	5
50	**727 790 260**	0.121	61	82	28	8	5
63	**727 790 211**	0.198	76	102	32	14	5
75	**727 790 212**	0.342	90	122	36	16	5
90	**727 790 263**	0.417	108	133	36	16	5
110	**727 790 214**	0.631	131	158	48	18	7

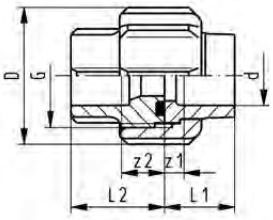
A



End Cap, PN 10, Standard PP, Socket Fusion

d (mm)	Part No.	D (mm)	L (mm)
16	**727 960 105**	25	20
20	**727 960 106**	30	27
25	**727 960 107**	36	30
32	**727 960 108**	44	34
40	**^ 727 960 109**	53	38
50	**727 960 110**	65	44
63	**727 960 111**	80	51
75	**727 960 112**	91	65
90	**727 960 113**	111	77
110	**727 960 114**	137	93

A



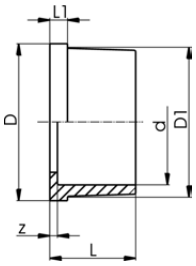
Union, PN 10, Standard PP, Socket Fusion

Model:

- Fusion socket metric
- Rated PN10 up to d110
- Joining face: with O-ring groove
- **For the dimensions d75-110 please see instructions for the installation**

d (mm)	EPDM Part No.	FKM Part No.	D (mm)	G (R/Rp BS Thread) (inch)	L1 (mm)	L2 (mm)	z1 (mm)	z2 (mm)
16	**727 510 155**	*** 727 520 155**	35	3/4	18	24	3	9
20	**727 510 156**	*** 727 520 156**	48	1	19	26	3	10
25	**727 510 157**	*** 727 520 157**	58	1 1/4	21	28	3	10
32	**727 510 158**	*** 727 520 158**	65	1 1/2	23	30	3	10
40	**^ 727 510 159**	*** 727 520 159**	79	2	25	34	3	12
50	**727 510 160**	*** 727 520 160**	91	2 1/4	28	39	3	14
63	**727 510 161**	*** 727 520 161**	111	2 3/4	32	47	3	18
75	**^ 727 510 172**	*** 727 520 172**	135	S107,5x3,6	36	51	3	18
90	**^ 727 510 173**	*** 727 520 173**	158	S127,5x3,6	42	55	5	18
110	**^ 727 510 174**	*** 727 520 174**	188	S152,5x3,6	49	54	5	10

B



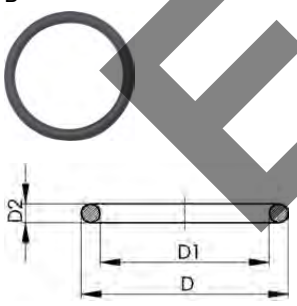
Union End, PN 10, Standard PP, Socket Fusion

Model:

- Fusion socket metric

d (mm)	Part No.	D (mm)	D1 (mm)	L (mm)	L1 (mm)	z (mm)
16	**727 500 105**	24	22	18	4	3
20	**727 500 106**	30	28	19	5	3
25	**727 500 107**	39	36	21	5	3
32	**727 500 108**	45	42	23	6	3
40	**727 500 109**	57	53	25	6	3
50	**727 500 110**	63	59	28	7	3
63	**727 500 111**	79	74	32	8	3
75	*** 727 500 112**	101	91	36	10	3
90	*** 727 500 113**	121	108	42	11	5
110	*** 727 500 114**	146	131	49	12	6

B



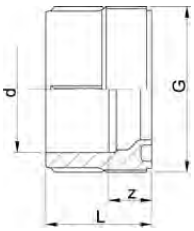
O-Ring for PROGEF, SYGEF Standard IR/BCF and Socket Fusion Unions

Model:

- For unions and adaptor unions
- Hardness approx. 65° Shore
- EPDM minimum temperature -40°F
- FKM minimum temperature -15°F
- * for unions PVC-U, PVC-C and ABS: 21 51 01, 21 51 11, 21 53 03, 21 53 08, 21 55 04, 21 55 13, 21 55 18, 23 51 01 and 29 51 01 only

	d (mm)	DN (mm)	EPDM Part No.	weight (kg)	FKM Part No.	weight (kg)	D (mm)	D1 (mm)	D2 (mm)	closest inch (inch)
	16	10	**748 410 005**	0.004	**749 410 005**	0.002	21	16	2.62	⅜
	20	15	**^ 748 410 006**	0.002	**^ 749 410 006**	0.002	27	20	3.53	½
	25	20	**^ 748 410 007**	0.002	**^ 749 410 007**	0.002	35	28	3.53	¾
	32	25	**748 410 008**	0.003	**749 410 008**	0.002	40	33	3.53	1
	40	32	**748 410 009**	0.003	**749 410 009**	0.007	51	41	5.34	1 ¼
	50	40	**748 410 010**	0.004	**749 410 010**	0.060	58	47	5.34	1 ½
	63	50	**748 410 011**	0.005	**749 410 011**	0.003	70	60	5.34	2

A



Union Bushing, PN 10, Standard PP, Socket Fusion

Model:

- Fusion socket metric
- **For the dimensions d75-110 please see instructions for the installation**

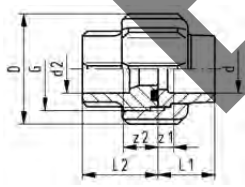
d (mm)	Part No.	G (R/Rp BS Thread) (inch)	L (mm)	z (mm)
16	**727 840 155**	3/4	24	11
20	**727 840 156**	1	26	12
25	**727 840 157**	1 1/4	28	12
32	**727 840 158**	1 1/2	30	12
40	**^ 727 840 159**	2	34	14
50	**727 840 160**	2 1/4	39	16
63	**727 840 161**	2 3/4	47	20
75	*** 727 840 172**	S107,5x3,6	51	18
90	*** 727 840 173**	S127,5x3,6	55	18
110	*** 727 840 174**	S152,5x3,6	54	22

B

Union Nut, PN 10, Standard PP

Socket Fusion d (mm)	Butt Fusion d (mm)	G (R/Rp BS Thread) (inch)	Part No.	D (mm)	L (mm)
16	16	3/4	**727 890 405**	35	21
20	20	1	**727 890 406**	48	24
25	25	1 1/4	**727 890 407**	58	26
32	32	1 1/2	**727 890 408**	65	28
40	40	2	**727 890 409**	77	27
50	50	2 1/4	**727 890 410**	84	30
63	63	2 3/4	**727 890 411**	111	39
75	75 - 90	S107,5x3,6	*** 727 890 422**	135	40
90	110	S127,5x3,6	*** 727 890 423**	158	43
110	-	S152,5x3,6	*** 727 890 424**	188	48

A



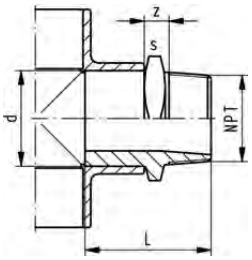
Metric x ASTM Adapter Union, PN 10, Standard PP, Socket Fusion

Model:

- Fusion socket metric
- Joining face: with O-ring groove

d (mm)	d2 (inch)	Part No.	D (mm)	G (R/Rp BS Thread) (inch)	L1 (mm)	L2 (mm)	z1 (mm)	z2 (mm)
20	½	*** 727 513 006**	48	1	19	26	5	12
25	¾	*** 727 513 007**	58	1 1/4	21	28	5	12
32	1	*** 727 513 008**	65	1 1/2	23	30	5	12
40	1 ¼	*** 727 513 009**	79	2	25	34	5	14
50	1 ½	*** 727 513 010**	91	2 1/4	28	39	5	16
63	2	*** 727 513 011**	111	2 3/4	32	47	5	20

A



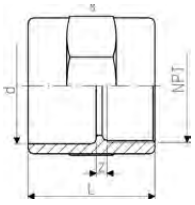
Male Threaded Adapter, PN 10, Standard PP, Socket Fusion (spigot end)

Model:

- With fusion spigot metric and NPT tapered male thread
- Connection to plastic thread only
- Do not use thread sealing pastes that are harmful to PP
- Install with low mechanical stress and avoid large cyclic temperature changes

d (mm)	NPT (inch)	Part No.	s (mm)	L (mm)	z (mm)
16	⅜	**727 914 555**	27	37	13
20	½	**727 914 556**	32	42	13
25	¾	**727 914 557**	36	46	13
32	1	**727 914 558**	46	52	12
40	1 ¼	**^ 727 914 559**	55	56	14
50	1 ½	**727 914 560**	65	60	15
63	2	**727 914 561**	80	69	16

A



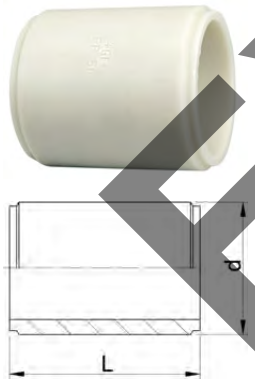
Female Threaded Adapter, PN 10, Standard PP, Socket Fusion

Model:

- With fusion socket metric and NPT tapered female thread, reinforced
- Reinforcing ring stainless (A2)
- Connection to plastic or metal threads
- Do not use thread sealing pastes that are harmful to PP
- Install with low mechanical stress and avoid large cyclic temperature changes

d (mm)	NPT (inch)	Part No.	L (mm)	s (mm)	z (mm)
20	½	**727 914 266**	40	32	7
25	¾	**727 914 267**	42	36	7
32	1	**727 914 268**	48	46	7
40	1 ¼	**^ 727 914 269**	53	55	7
50	1 ½	**727 914 270**	54	65	9
63	2	**727 914 271**	62	80	9

A



Barrel Nipple, PN 10, Standard PP, Socket Fusion

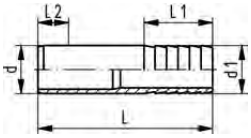
Model:

- Material: PP-H
- With socket fusion spigots on both ends
- For the shortest possible distance between fittings

* In these two sizes, sitffeners Code No. 727900006 (20 x 1.9) and 727900007 (25 x 2.3), or pipe SDR 7.4 must be used with socket fusion joints.

	d (mm)	Part No.	weight (kg)	L (mm)
	16	**727 910 905**	0.005	36
*	20	*** 727 910 906**	0.005	37
*	25	*** 727 910 907**	0.006	41
	32	*** 727 910 908**	0.010	45
	40	*** 727 910 909**	0.017	50
	50	*** 727 910 910**	0.029	55
	63	*** 727 910 911**	0.058	64
	75	*** 727 910 912**	0.095	76
	90	*** 727 910 913**	0.163	90
	110	*** 727 910 914**	0.305	108

A



Hose Connector, PN 10, Standard PP, Socket Fusion

Model:

- With socket fusion spigot (metric) and parallel hose connection

d (mm)	d1 (mm)	Part No.	L (mm)	L1 (mm)	L2 (mm)
20	20	* 727 960 406	78	27	14
25	25	* 727 960 407	91	36	16
32	32	* 727 960 408	100	36	18
40	40	* 727 960 409	104	42	20
50	50	* 727 960 410	90	48	23
63	60	* 727 960 411	100	50	27

Electrofusion Fittings

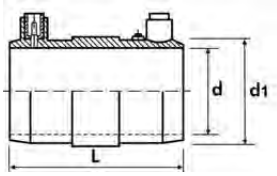
A

Flex Restraint, Standard PP

- Use MSA 330/340

Size Range (inch)	Part No.	Pack Qty	H (inch)	W (inch)	L (inch)
6 - 36	* 157 991 600	5	2.910	2.560	4.920

A

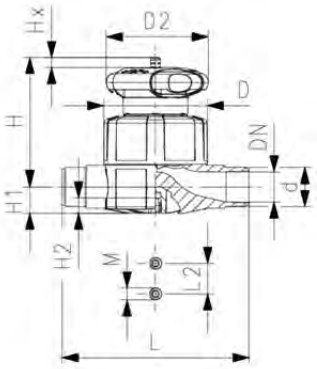


Electrofusion Coupling, Standard PP

- 4mm pin connectors
- Pipe to pipe fusion only
- Use MSA 330/340

	Part No.	weight (kg)	d (mm)	L (mm)	d1 (mm)
*	200 090 200	0.042	20	69	30
*	200 090 201	0.051	25	77	35
*	200 090 202	0.073	32	79	44
*	^ 200 090 203	0.096	40	91	53
*	200 090 204	0.131	50	102	64
*	200 090 205	0.227	63	117	80
*	200 090 206	0.333	75	128	95
*	200 090 207	0.486	90	144	112
*	200 090 208	0.813	110	159	136
*	200 090 209	1.089	125	170	153
*	200 090 211	1.651	160	185	194
*	200 090 213	3.588	200	210	243
*	* 200 090 214	4.200	225	212	273
*	* 200 090 215	6.600	250	260	315
*	* 200 090 217	10.950	315		
*	* 200 090 218	14.250	355		
*	* 200 090 219	18.200	400		
*	* 200 090 220	28.000	450		
*	* 200 090 221	18.500	500		

A



Type 515 Diaphragm Valve PROGEF Standard PP
Socket fusion spigot metric

Model:

- Material: PP-H
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- EPDM version is PN 10 pressure rated. PTFE/EPDM version is PN 6 pressure rated.

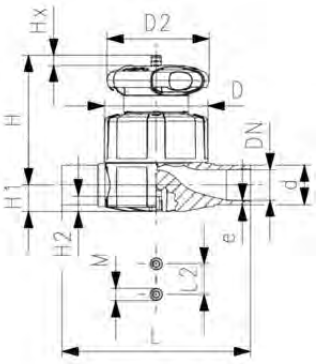
Option:

- Self adjusting multifunctional module with integrated limit switches

d (mm)	EPDM Part No.	PTFE/EPDM Part No.	FKM Part No.	weight (lb)
20	**167 515 012**	**167 515 032**	**167 515 062**	0.657
25	**167 515 013**	**167 515 033**	**167 515 063**	0.646
32	**167 515 014**	**167 515 034**	**167 515 064**	2.094
40	**^ 167 515 015**	**^ 167 515 035**	**^ 167 515 065**	2.443
50	**167 515 016**	**167 515 036**	**167 515 066**	4.535
63	**167 515 017**	**167 515 037**	**167 515 067**	5.741

d (mm)	D (mm)	D2 (mm)	L (mm)	L2 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	Lift = Hx (mm)	e (mm)	closest inch (inch)
20	65	65	124	25	73	14	12	M6	7	1.9	½
25	80	65	144	25	81	18	12	M6	10	2.3	¾
32	88	87	154	25	107	22	12	M6	13	2.9	1
40	101	87	174	45	115	26	15	M8	15	3.7	1 ¼
50	117	135	194	45	148	32	15	M8	19	4.6	1 ½
63	144	135	223	45	166	39	15	M8	25	5.8	2

A



Type 515 Diaphragm Valve PROGEF Standard PP
Butt fusion spigots SDR11 metric

Model:

- Material: PP-H
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- EPDM version is PN 10 pressure rated. PTFE/EPDM version is PN 6 pressure rated.

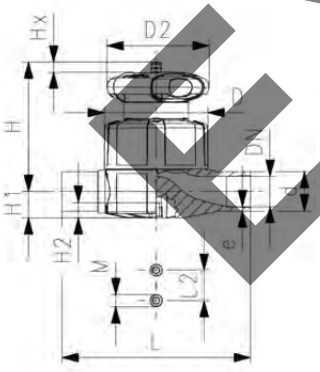
Option:

- Self adjusting multifunctional module with integrated limit switches

d (mm)	EPDM Part No.	PTFE/EPDM Part No.	FKM Part No.	weight (lb)
20	167 515 112	167 515 132	167 515 162	0.655
25	167 515 113	167 515 133	167 515 163	0.840
32	167 515 114	167 515 134	167 515 164	2.090
40	167 515 115	167 515 135	167 515 165	2.434
50	167 515 116	167 515 136	167 515 166	4.524
63	167 515 117	167 515 137	167 515 167	5.734

d (mm)	D (mm)	D2 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L2 (mm)	M	e (mm)	Lift = Hx (mm)	closest inch (inch)
20	65	65	73	14	12	124	25	M6	1.9	7	½
25	80	65	81	18	12	144	25	M6	2.3	10	¾
32	88	87	107	22	12	155	25	M6	2.9	13	1
40	101	87	115	26	15	176	45	M8	3.7	15	1 ¼
50	117	135	148	32	15	193	45	M8	4.6	19	1 ½
63	144	135	166	39	15	223	45	M8	5.8	25	2

A

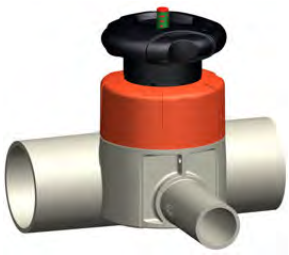


Type 515 Diaphragm Valve PROGEF Plus PP Silicone Free
Butt fusion spigots SDR11 metric

d (mm)	EPDM Part No.	PTFE/EPDM Part No.
20	167 515 122	167 515 172
25	167 515 123	167 515 173
32	167 515 124	167 515 174
40	^ 167 515 125	^ 167 515 175
50	167 515 126	167 515 176
63	167 515 127	167 515 177

d (mm)	D (mm)	D2 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L2 (mm)	M	e (mm)	Lift = Hx (mm)	closest inch (inch)
20	65	65	73	14	12	124	25	M6	1.9	7	½
25	80	65	81	18	12	144	25	M6	2.3	10	¾
32	88	87	107	22	12	155	25	M6	2.9	13	1
40	101	87	115	26	15	176	45	M8	3.7	15	1 ¼
50	117	135	148	32	15	193	45	M8	4.6	19	1 ½
63	144	135	166	39	15	223	45	M8	5.8	25	2

A



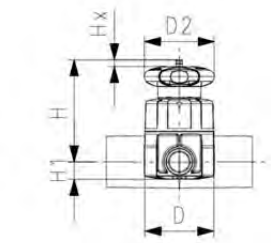
Type 519 Zero Static Diaphragm Valve
PROGEF Standard PP
Butt fusion spigots metric

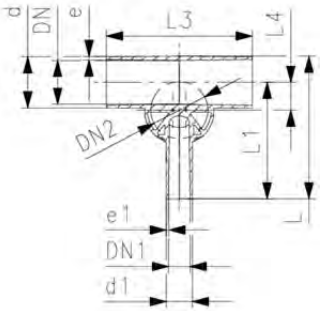
Model:

- Material: PP-H
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- Smallest possible dead space

Option:

- Self adjusting multifunctional module with integrated limit switches





d (mm)	d1 (mm)	DN (mm)	PN (bar)	Cv-value (l/min)	EPDM Part No.	PTFE/EPDM Part No.
20	20	15	10	57	^ 167 519 101	^ 167 519 301
25	20	20	10	89	^ 167 519 103	^ 167 519 303
25	25	20	10	118	^ 167 519 104	^ 167 519 304
32	20	25	10	80	^ 167 519 107	^ 167 519 307
32	25	25	10	105	^ 167 519 108	^ 167 519 308
32	32	25	10	231	^ 167 519 109	^ 167 519 309
40	20	32	10	85	^ 167 519 112	^ 167 519 312
40	40	32	10	187	^ 167 519 115	^ 167 519 315
50	20	40	10	86	^ 167 519 118	^ 167 519 318
50	25	40	10	160	^ 167 519 119	^ 167 519 319
50	32	40	10	206	^ 167 519 120	^ 167 519 320
63	20	50	10	84	^ 167 519 125	^ 167 519 325
63	25	50	10	150	^ 167 519 126	^ 167 519 326
63	32	50	10	184	^ 167 519 127	^ 167 519 327

d (mm)	D (mm)	D2 (mm)	H (mm)	L (mm)	L1 (mm)	L3 (mm)	L4 (mm)	e (mm)	e1 (mm)	Lift = Hx (mm)	Valve Size d (mm)	DN1 (mm)	DN2 (mm)
20	65	65	75	117	96	162	12	1.9	1.9	7	20	15	15
25	80	65	80	133	108	162	16	2.3	1.9	10	25	15	20
25	80	65	80	133	108	162	16	2.3	2.3	10	25	20	20
32	80	65	84	142	120	162	19	2.9	1.9	10	25	15	20
32	80	65	84	142	120	162	19	2.9	2.3	10	25	20	20
32	88	87	107	145	120	160	19	2.9	2.9	13	32	25	25
40	88	87	115	149	128	180	23	3.7	1.9	13	32	15	25
40	88	87	115	174	153	180	23	3.7	3.7	13	32	32	25
50	80	65	97	160	134	180	27	4.6	1.9	10	25	15	20
50	88	87	120	160	134	180	28	4.6	2.3	13	32	20	25
50	88	87	120	160	134	180	28	4.6	2.9	13	32	25	25
63	80	65	104	177	144	180	33	5.8	1.9	10	25	15	20
63	88	87	127	177	144	180	35	5.8	2.3	13	32	20	25
63	88	87	127	177	144	180	35	5.8	2.9	13	32	25	25

A

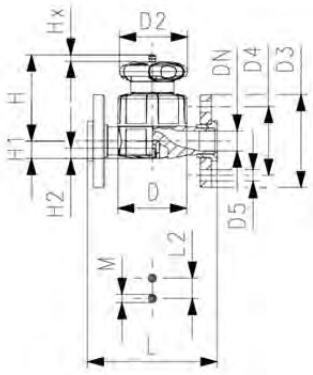
Type 517 Diaphragm Valve PROGEF Standard PP ANSI Flanged

Model:

- Material: PP-H
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- Joining faces flat/serrated
- EPDM version is PN 10 pressure rated. PTFE/EPDM version is PN 6 pressure rated.
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759

Option:

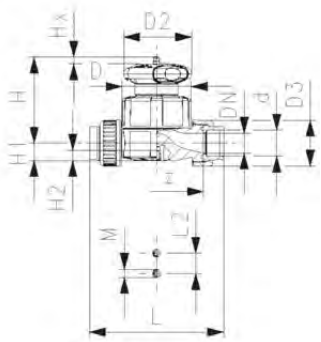
- Individual configuration of the valve (see diagram)
- Self adjusting multifunctional module with integrated limit switches



Size (inch)	EPDM Part No.	PTFE/EPDM Part No.	weight (lb)
½	^ 167 517 712	^ 167 517 732	1.080
¾	^ 167 517 713	^ 167 517 733	1.411
1	^ 167 517 714	^ 167 517 734	2.901
1 ¼	^ 167 517 715	^ 167 517 735	3.660
1 ½	^ 167 517 716	^ 167 517 736	5.800
2	^ 167 517 717	^ 167 517 737	7.875

Size (inch)	D (mm)	D2 (mm)	D3 (mm)	D4 (mm)	D5 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L2 (mm)	M	Lift = Hx (mm)
½	65	65	95	60	16	73	14	12	130	25	M6	7
¾	80	65	105	70	16	81	18	12	150	25	M6	10
1	88	87	115	79	16	107	22	12	160	25	M6	13
1 ¼	101	87	140	89	16	115	26	15	180	45	M8	15
1 ½	117	135	150	98	16	148	32	15	200	45	M8	19
2	144	135	165	121	19	166	39	15	230	45	M8	25

A



Type 514 Diaphragm Valve PROGEF Standard PP
Fusion sockets metric

Model:

- Material: PP-H
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- For easy installation and removal
- Short overall length

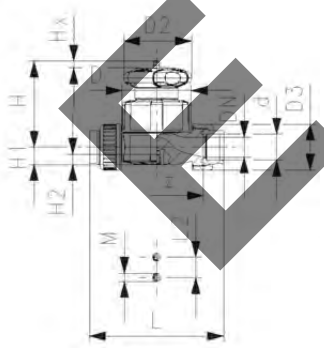
Option:

- Self adjusting multifunctional module with integrated limit switches

d (mm)	EPDM Part No.	PTFE/EPDM Part No.	FKM Part No.	weight (lb)
20	**167 514 012**	**167 514 032**	**167 514 062**	0.589
25	**167 514 013**	**167 514 033**	**167 514 063**	0.862
32	**167 514 014**	**167 514 034**	**167 514 064**	2.538
40	**167 514 015**	**167 514 035**	**167 514 065**	2.815
50	**167 514 016**	**167 514 036**	**167 514 066**	3.056
63	**167 514 017**	**167 514 037**	**167 514 067**	6.680

d (mm)	D (mm)	D2 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L2 (mm)	M	z (mm)	Lift = Hx (mm)	closest inch (inch)
20	65	65	48	73	14	12	128	25	M6	100	7	½
25	80	65	58	81	18	12	150	25	M6	118	10	¾
32	88	87	65	107	22	12	162	25	M6	126	13	1
40	101	87	79	115	26	15	184	45	M8	144	15	1 ¼
50	117	135	91	148	32	15	210	45	M8	164	19	1 ½
63	144	135	111	166	39	15	248	45	M8	194	25	2

A

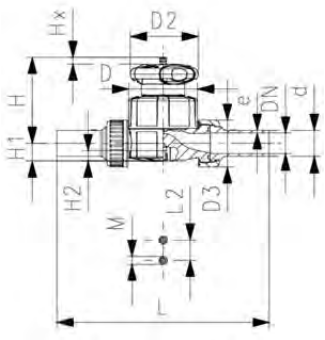


Type 514 Diaphragm Valve PROGEF Plus PP Silicone Free
Fusion sockets metric

d (mm)	EPDM Part No.	PTFE/EPDM Part No.
20	**167 514 022**	**167 514 072**
25	**167 514 023**	**167 514 073**
32	**167 514 024**	**167 514 074**
40	**167 514 025**	**167 514 075**
50	**167 514 026**	**167 514 076**
63	**167 514 027**	**167 514 077**

d (mm)	D (mm)	D2 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L2 (mm)	M	z (mm)	Lift = Hx (mm)	closest inch (inch)
20	65	65	43	73	14	12	128	25	M6	100	7	½
25	80	65	51	81	18	12	150	25	M6	118	10	¾
32	88	87	58	107	22	12	162	25	M6	126	13	1
40	101	87	72	115	26	15	184	45	M8	144	15	1 ¼
50	117	135	83	148	32	15	210	45	M8	164	19	1 ½
63	144	135	100	166	39	15	248	45	M8	194	25	2

A



Type 514 Diaphragm Valve PROGEF Standard PP
Butt fusion spigots SDR11 metric

Model:

- Material: PP-H
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- For easy installation and removal
- Short overall length

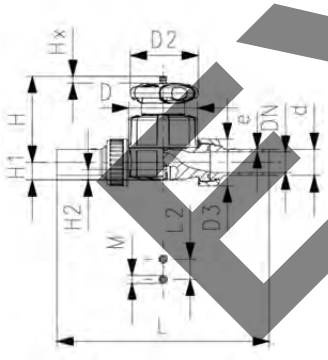
Option:

- Self adjusting multifunctional module with integrated limit switches

d (mm)	EPDM Part No.	PTFE/EPDM Part No.	FKM Part No.
20	167 514 112	167 514 132	167 514 162
25	167 514 113	167 514 133	167 514 163
32	167 514 114	167 514 134	167 514 164
40	167 514 115	167 514 135	167 514 165
50	167 514 116	167 514 136	167 514 166
63	167 514 117	167 514 137	167 514 167

d (mm)	D (mm)	D2 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L2 (mm)	M	e (mm)	Lift = Hx (mm)	closest inch (inch)
20	65	65	48	73	14	12	196	25	M6	1.9	7	½
25	80	65	58	81	18	12	221	25	M6	2.3	10	¾
32	88	87	65	107	22	12	234	25	M6	2.9	13	1
40	101	87	79	115	26	15	260	45	M8	3.7	15	1 ¼
50	117	135	91	148	32	15	284	45	M8	4.6	19	1 ½
63	144	135	111	166	39	15	321	45	M8	5.8	25	2

A



Type 514 Diaphragm Valve PROGEF Plus PP Silicone Free
Butt fusion spigots SDR11 metric

d (mm)	EPDM Part No.	PTFE/EPDM Part No.
20	167 514 122	167 514 172
25	167 514 123	167 514 173
32	167 514 124	167 514 174
40	167 514 125	167 514 175
50	167 514 126	167 514 176
63	167 514 127	167 514 177

d (mm)	D (mm)	D2 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L2 (mm)	M	e (mm)	Lift = Hx (mm)	closest inch (inch)
20	65	65	43	73	14	12	196	25	M6	1.9	7	½
25	80	65	51	81	18	12	221	25	M6	2.3	10	¾
32	88	87	58	107	22	12	234	25	M6	2.9	13	1
40	101	87	72	115	26	15	260	45	M8	3.7	15	1 ¼
50	117	135	83	148	32	15	284	45	M8	4.6	19	1 ½
63	144	135	100	166	39	15	321	45	M8	5.8	25	2

A

Type 317 Diaphragm Valve PROGEF Standard Flanged

Model:

- Material: PP-H
- Joining faces serrated
- Connecting dimensions: ISO 7005 / EN 1092 / DIN 2501 PN10 / BS4504
- With PP-V backing flanges DN 15-65

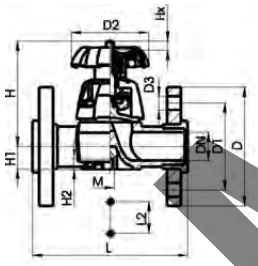
Option:

- Handwheel with built-in locking mechanism

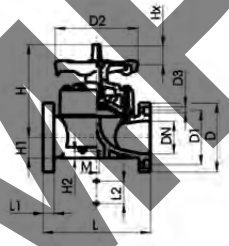
* With PP fixed flanges, jointing faces flat

Size (inch)	EPDM Part No.	PTFE Part No.
2 ½	* 167 317 523	* 167 317 538
3	* 167 317 024	* 167 317 039
4	* 167 317 325	* 167 317 340
6	* 167 317 027	* 167 317 042

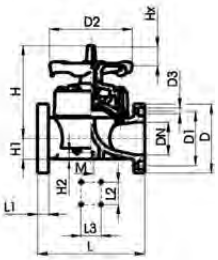
Size (inch)	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	M	Lift = Hx (mm)	AL
2 ½	185	140	152	19	210	46	15	290		70		M8	35	4
3	200	160	270	18	265	57	23	310	35	120		M12	40	8
4	225	190	270	19	304	69	23	350	38	120		M12	50	8
6	282	241	400	23	437	108	23	480	29	100	200	M12	70	8



DN 15-65



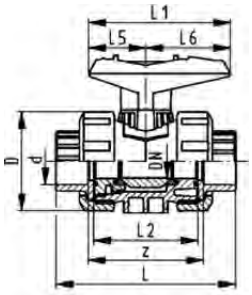
DN 80-100

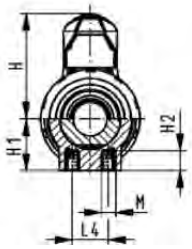


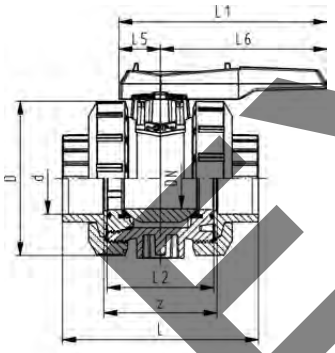
DN 150

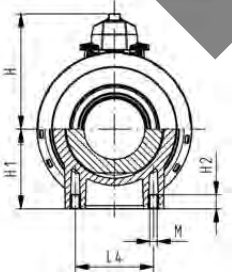
A

DN10/15 - 50









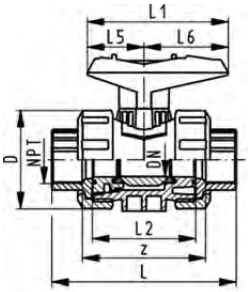
Type 546 Ball Valve PROGEF Standard
With mounting inserts
With fusion sockets metric

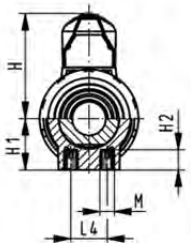
d (mm)	EPDM Part No.	FKM Part No.	weight (lb)
16	**167 546 401**	**167 546 411**	0.254
20	**167 546 402**	**167 546 412**	0.271
25	**167 546 403**	**167 546 413**	0.406
32	**167 546 404**	**167 546 414**	0.569
40	**167 546 405**	**167 546 415**	0.994
50	**167 546 406**	**167 546 416**	1.360
63	**167 546 407**	**167 546 417**	2.491
75	**167 546 408**	**167 546 418**	7.352
90	**167 546 409**	**167 546 419**	12.125
110	**167 546 410**	**167 546 420**	19.180

d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	z (mm)	closest inch (inch)
16	50	57	27	12	93	77	56	25	32	45	M6	67	⅜
20	50	57	27	12	95	77	56	25	32	45	M6	66	½
25	58	67	30	12	109	97	65	25	39	58	M6	77	¾
32	68	73	36	12	119	97	71	25	39	58	M6	83	1
40	84	90	44	15	135	128	85	45	54	74	M8	99	1 ¼
50	97	97	51	15	147	128	89	45	54	74	M8	105	1 ½
63	124	116	64	15	168	152	101	45	66	87	M8	117	2
75	166	149	85	15	233	270	136	70	64	206	M8	167	2 ½
90	200	161	105	15	254	270	141	70	64	206	M8	180	3
110	238	178	123	22	301	320	164	120	64	256	M12	215	4

A

DN10/15 - 50





Type 546 Ball Valve PROGEF Standard
With mounting inserts
With threaded sockets NPT

Option:

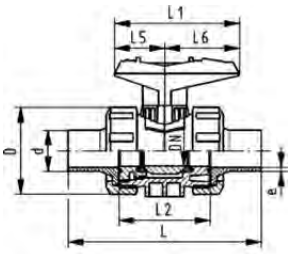
- Individual configuration of the valve (see diagram)

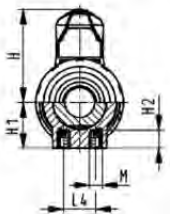
NPT (inch)	EPDM Part No.	FKM Part No.	weight (lb)
⅜	**167 546 321**	**167 546 331**	0.265
½	**167 546 322**	**167 546 332**	0.265
¾	**167 546 323**	**167 546 333**	0.397
1	**167 546 324**	**167 546 334**	0.595
1 ¼	**167 546 325**	**167 546 335**	1.014
1 ½	**167 546 326**	**167 546 336**	1.400
2	**167 546 327**	**167 546 337**	2.624

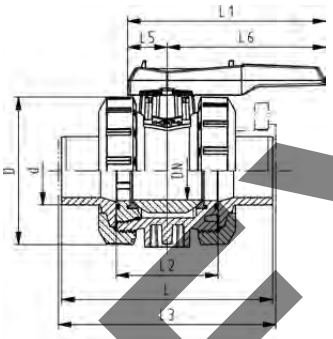
NPT (inch)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	z (mm)
⅜	50	57	27	12	96	77	56	25	32	45	M6	71
½	50	57	27	12	99	77	56	25	32	45	M6	64
¾	58	67	30	12	111	97	65	25	39	58	M6	76
1	68	73	36	12	127	97	71	25	39	58	M6	83
1 ¼	84	90	44	15	146	128	85	45	54	74	M8	100
1 ½	97	97	51	15	157	128	89	45	54	74	M8	111
2	124	116	64	15	183	152	101	45	66	87	M8	134

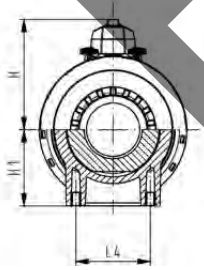
A

DN10/15 - 50









Type 546 Ball Valve PROGEF Standard
With mounting inserts
With butt fusion spigots IR-Plus

Model:

- Material: PP-H
- For easy installation and removal
- Ball seals PTFE
- Integrated stainless steel mounting inserts

Option:

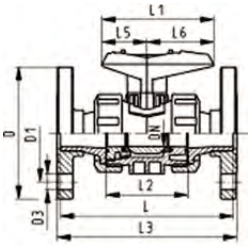
- Individual configuration of the valve (see diagram)
- Multifunctional module with integrated limit switches
- Pneumatic or electric actuators from GF

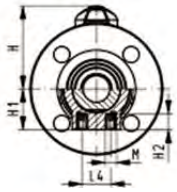
d (mm)	EPDM Part No.	FKM Part No.	weight (lb)
20	**167 546 442**	**167 546 452**	0.271
25	**167 546 443**	**167 546 453**	0.408
32	**167 546 444**	**167 546 454**	0.580
40	**167 546 445**	**167 546 455**	1.005
50	**167 546 446**	**167 546 456**	1.415
63	**167 546 447**	**167 546 457**	2.601
75	**167 546 448**	**167 546 458**	5.736
90	**167 546 449**	**167 546 459**	12.125
110	**167 546 450**	**167 546 460**	19.180

d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	e (mm)	closest inch (inch)
20	50	57	27	12	130	77	56	25	32	45	M6	1.9	½
25	58	67	30	12	143	97	65	25	39	58	M6	2.3	¾
32	68	73	36	12	150	97	71	25	39	58	M6	2.9	1
40	84	90	44	15	171	128	85	45	54	74	M8	3.7	1 ¼
50	97	97	51	15	191	128	89	45	54	74	M8	4.6	1 ½
63	124	116	64	15	220	152	101	45	66	87	M8	5.8	2
75	166	149	85	15	266	270	136	70	64	206	M8	6.8	2 ½
90	200	161	105	15	264	270	141	70	64	206	M8	8.2	3
110	238	178	123	22	301	320	164	120	64	256	M12	10.0	4

A

DN10/15 - 50





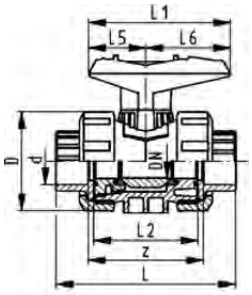
Type 546 True Union Ball Valve-PROGEF Standard
ANSI Flanged

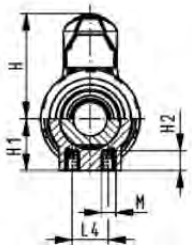
Size (inch)	EPDM Part No.	FKM Part No.	weight (lb)
½	^ 167 546 582	^ 167 546 592	1.455
¾	^ 167 546 583	^ 167 546 593	1.521
1	^ 167 546 584	^ 167 546 594	1.896
1 ¼	^ 167 546 585	^ 167 546 595	0.002
1 ½	^ 167 546 586	^ 167 546 596	3.891
2	^ 167 546 587	^ 167 546 597	5.512
2 ½	^ 167 546 588	^ 167 546 598	8.157
3	^ 167 546 589	^ 167 546 599	12.125
4	^ 167 546 590	^ 167 546 600	0.002

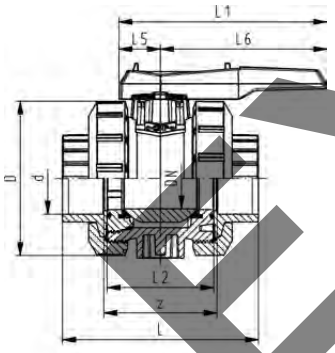
Size (inch)	D (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M (mm)
½	50	16	57	26	12	166	77	56	25	32	45	6
¾	58	16	67	30	12	177	97	65	25	39	58	6
1	68	16	73	36	12	191	97	71	25	39	58	6
1 ¼	84	16	90	44	15	209	128	85	45	54	74	6
1 ½	97	16	97	51	15	229	128	89	45	54	74	6
2	124	16	116	64	15	253	152	101	45	66	87	6
2 ½	166	19	149	85		416	379	136	70	64	206	8
3	200	19	161	105		414	419	141	70	64	506	8
4	238	19	178	123		451	456	164	120	64	206	12

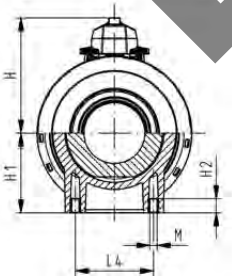
A

DN10/15 - 50









Type 546 Ball Valve PROGEF® Plus silicone free
With mounting inserts
Socket Fusion with PTFE seats, metric

Model:

- For easy installation and removal
- Ball seals PVDF
- Integrated stainless steel mounting inserts

Option:

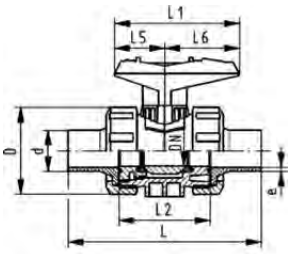
- Individual configuration of the valve (see diagram)
- Multifunctional module with integrated limit switches

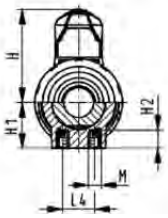
d (mm)	EPDM Part No.	FKM Part No.
16	**167 546 601**	**167 546 611**
20	**167 546 602**	**167 546 612**
25	**167 546 603**	**167 546 613**
32	**167 546 604**	**167 546 614**
40	**167 546 605**	**167 546 615**
50	**167 546 606**	**167 546 616**
63	**167 546 607**	**167 546 617**
75	**167 546 608**	**167 546 618**
90	**167 546 609**	**167 546 619**
110	**167 546 610**	**167 546 620**

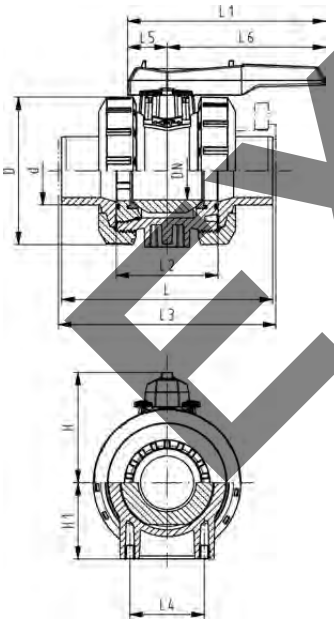
d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	z (mm)	closest inch (inch)
16	50	57	27	12	93	77	56	25	32	45	M6	67	⅜
20	50	57	27	12	95	77	56	25	32	45	M6	66	½
25	58	67	30	12	108	97	65	25	39	58	M6	77	¾
32	68	73	36	12	118	97	71	25	39	58	M6	83	1
40	84	90	44	15	137	128	85	45	54	74	M8	99	1 ¼
50	97	97	51	15	147	128	89	45	54	74	M8	105	1 ½
63	124	116	64	15	168	152	101	45	66	87	M8	117	2
75	166	149	85	15	233	270	136	70	64	206	M8	167	2 ½
90	200	161	105	15	254	270	141	70	64	206	M8	180	3
110	238	178	123	22	301	320	164	120	64	256	M12	215	4

A

DN10/15 - 50







PROGEF Plus silicone free
Ball valve Type 546
With mounting inserts,With butt fusion spigots, metric

Model:

- For easy installation and removal
- Ball seals PVDF
- Integrated stainless steel mounting inserts

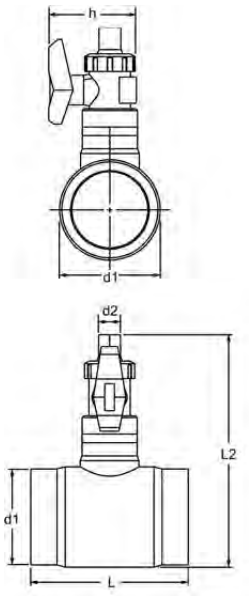
Option:

- Individual configuration of the valve (see diagram)
- Multifunctional module with integrated limit switches

d (mm)	EPDM Part No.	FKM Part No.
20	**167 546 662**	**167 546 672**
25	**167 546 663**	**167 546 673**
32	**167 546 664**	**167 546 674**
40	**167 546 665**	**167 546 675**
50	**167 546 666**	**167 546 676**
63	**167 546 667**	**167 546 677**
75	**167 546 668**	**167 546 678**
90	**167 546 669**	**167 546 679**
110	**167 546 670**	**167 546 680**

d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	e (mm)	closest inch (inch)
20	50	57	27	12	130	77	56	25	32	45	M6	1.9	½
25	58	67	30	12	143	97	65	25	39	58	M6	2.3	¾
32	68	73	36	12	150	97	71	25	39	58	M6	2.9	1
40	84	90	44	15	171	128	85	45	54	74	M8	3.7	1 ¼
50	97	97	51	15	191	128	89	45	54	74	M8	4.6	1 ½
63	124	116	64	15	220	152	101	45	66	87	M8	5.8	2
75	166	149	85	15	266	270	136	70	64	206	M8	6.8	2 ½
90	200	161	105	15	264	270	141	70	64	206	M8	8.2	3
110	238	178	123	22	301	320	164	120	64	256	M12	10.0	4

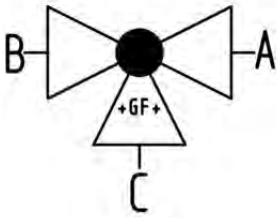
A

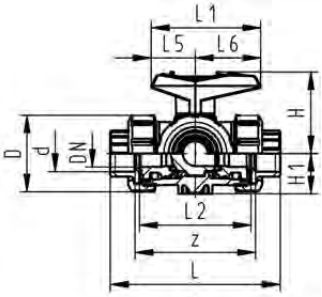


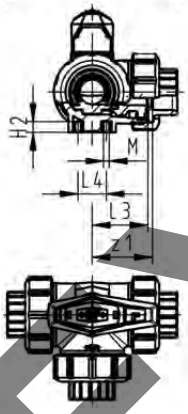
Tee Valves
PROGEF-PP

Tee Valve Size (mm)	FKM Part No.	EPDM Part No.	d1 (mm)	d2 (mm)	L (mm)	L2 (mm)	h (mm)
25 - 25	**157 319 203**	**157 319 103**	25	25	84	148	99
32 - 25	**157 319 204**	**157 319 104**	32	25	92	152	99
50 - 25	**157 319 205**	**157 319 105**	50	25	116	165	99
63 - 25	**^ 157 319 206**	**^ 157 319 106**	63	25	132	211	97
63 - 32	**^ 157 319 207**	**^ 157 319 107**	63	32	132	247	109
90 - 25	**^ 157 319 220**	**^ 157 319 120**	90	25	160	247	97
90 - 32	**^ 157 319 210**	**^ 157 319 110**	90	32	160	281	109
110 - 25	**^ 157 319 221**	**^ 157 319 121**	110	25	180	266	97
110 - 32	**^ 157 319 213**	**^ 157 319 113**	110	32	180	301	109
160 - 32	**^ 157 319 223**	**^ 157 319 123**	160	32	180	366	109
160 - 25	**157 319 222**	**157 319 122**	160	25	284	237	99
160 - 63	**^ 157 319 224**	**^ 157 319 124**	160	63	284	418	180

A





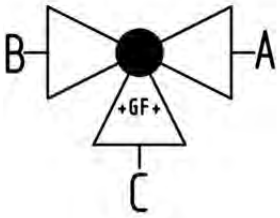


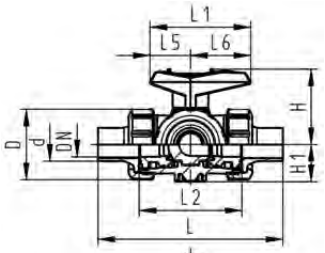
Type 543 3-Way Ball Valve
Horizontal/L-port PROGEF Standard
With fusion sockets metric

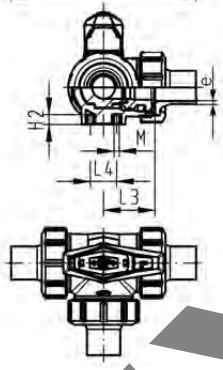
d (mm)	EPDM Part No.	FKM Part No.	weight (lb)
16	**167 543 001**	**167 543 011**	0.355
20	**167 543 002**	**167 543 012**	0.364
25	**167 543 003**	**167 543 013**	0.522
32	**167 543 004**	**167 543 014**	0.796
40	**167 543 005**	**167 543 015**	1.358
50	**167 543 006**	**167 543 016**	2.011
63	**167 543 007**	**167 543 017**	4.149

d (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	z (mm)	z1 (mm)	closest inch (inch)
16	50	110	77	72	36	25	32	45	57	28	8	6	82	41	⅜
20	50	112	77	72	36	25	32	45	57	28	8	6	82	41	½
25	58	129	97	85	43	25	39	58	67	32	8	6	97	49	¾
32	68	146	97	98	49	25	39	58	73	36	8	6	110	55	1
40	84	170	128	118	59	45	54	74	90	45	9	8	132	66	1 ¼
50	97	193	128	135	68	45	54	74	97	51	9	8	151	76	1 ½
63	124	244	152	176	88	45	66	87	116	65	9	8	188	94	2

A





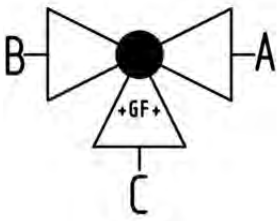


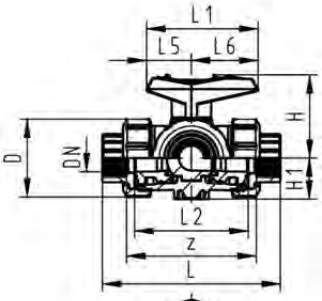
Type 543 3-Way Ball Valve
Horizontal/L-port PROGEF Standard
With butt fusion spigots IR-Plus
SDR11 metric

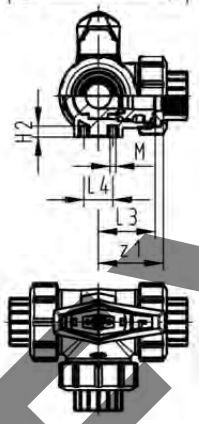
d (mm)	EPDM Part No.	FKM Part No.	weight (lb)
20	**167 543 062**	**167 543 072**	0.377
25	**167 543 063**	**167 543 073**	0.545
32	**167 543 064**	**167 543 074**	0.831
40	**167 543 065**	**167 543 075**	1.387
50	**167 543 066**	**167 543 076**	2.101
63	**167 543 067**	**167 543 077**	4.090

d (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	e (mm)	closest inch (inch)
20	50	146	77	72	36	25	32	45	57	28	8	6	1.9	½
25	58	163	97	85	43	25	39	58	67	32	8	6	2.3	¾
32	68	178	97	98	49	25	39	58	73	36	8	6	2.9	1
40	84	204	128	118	59	45	54	74	90	45	9	8	3.7	1 ¼
50	97	237	128	135	68	45	54	74	97	51	9	8	4.6	1 ½
63	124	296	152	176	88	45	66	87	116	65	9	8	5.8	2

A





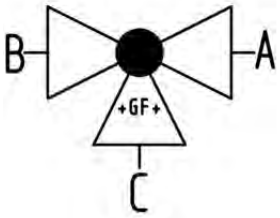


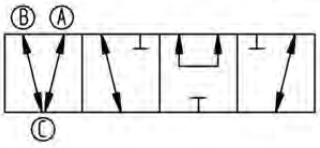
Type 543 3-Way Ball Valve
Horizontal/L-port PROGEF Standard
With threaded sockets NPT reinforced

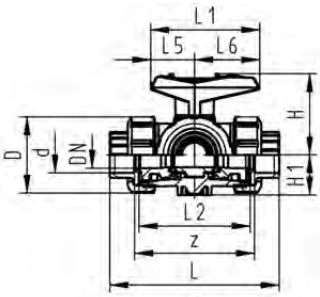
NPT (inch)	EPDM Part No.	FKM Part No.	weight (lb)
⅜	**167 543 161**	**167 543 171**	0.355
½	**167 543 162**	**167 543 172**	0.364
¾	**167 543 163**	**167 543 173**	0.522
1	**167 543 164**	**167 543 174**	0.796
1 ¼	**167 543 165**	**167 543 175**	1.358
1 ½	**167 543 166**	**167 543 176**	2.011
2	**167 543 167**	**167 543 177**	3.909

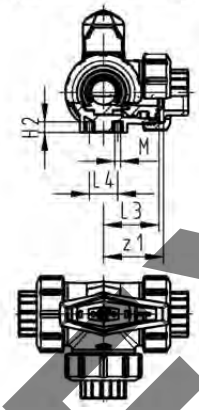
NPT (inch)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	z (mm)	z1 (mm)
⅜	50	112	77	72	36	25	32	45	57	28	8	6	86	43
½	50	114	77	72	36	25	32	45	57	28	8	6	80	40
¾	58	131	97	85	43	25	39	58	67	32	8	6	95	48
1	68	154	97	98	49	25	39	58	73	36	8	6	110	55
1 ¼	84	180	128	118	59	45	54	74	90	45	9	8	132	66
1 ½	97	203	128	135	68	45	54	74	97	51	9	8	157	79
2	124	258	152	176	88	45	66	87	116	65	9	8	210	105

A







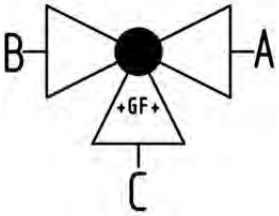


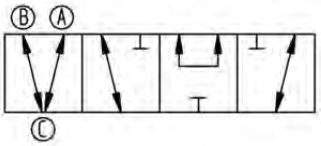
Type 543 3-Way Ball Valve
Horizontal/T-port PROGEF Standard
With fusion sockets metric

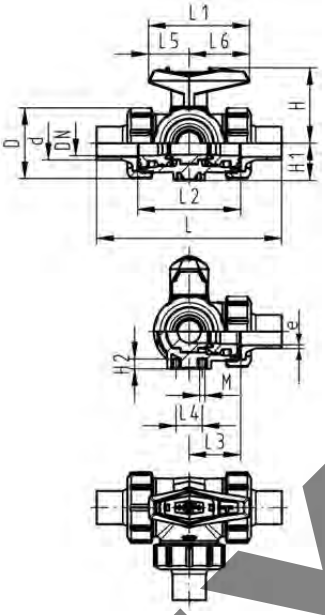
d (mm)	EPDM Part No.	FKM Part No.	weight (lb)
16	**167 543 201**	**167 543 211**	0.353
20	**167 543 202**	**167 543 212**	0.362
25	**167 543 203**	**167 543 213**	0.520
32	**167 543 204**	**167 543 214**	0.787
40	**167 543 205**	**167 543 215**	1.343
50	**167 543 206**	**167 543 216**	1.980
63	**167 543 207**	**167 543 217**	4.094

d (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	z (mm)	z1 (mm)	closest inch (inch)
16	50	110	77	72	36	25	32	45	57	28	8	6	82	41	⅜
20	50	112	77	72	36	25	32	45	57	28	8	6	82	41	½
25	58	129	97	85	43	25	39	58	67	32	8	6	97	49	¾
32	68	146	97	98	49	25	39	58	73	36	8	6	110	55	1
40	84	170	128	118	59	45	54	74	90	45	9	8	132	66	1 ¼
50	97	193	128	135	68	45	54	74	97	51	9	8	151	76	1 ½
63	124	244	152	176	88	45	66	87	116	65	9	8	188	94	2

A





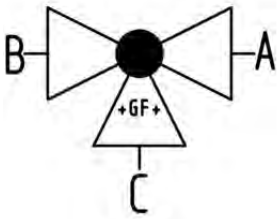


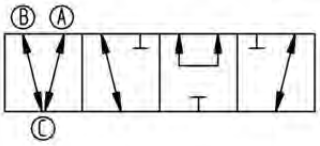
Type 543 3-Way Ball Valve
Horizontal/T-port PROGEF Standard
With butt fusion spigots IR-Plus
SDR11 metric

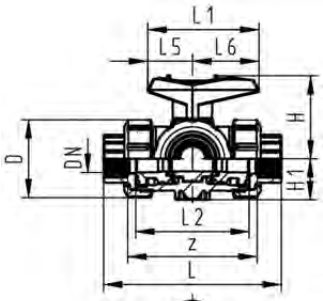
d (mm)	EPDM Part No.	FKM Part No.	weight (lb)
20	**167 543 262**	**167 543 272**	0.375
25	**167 543 263**	**167 543 273**	0.540
32	**167 543 264**	**167 543 274**	0.820
40	**167 543 265**	**167 543 275**	1.371
50	**167 543 266**	**167 543 276**	2.070
63	**167 543 267**	**167 543 277**	4.026

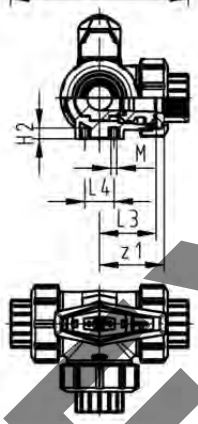
d (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	e (mm)	closest inch (inch)
20	50	146	77	72	36	25	32	45	57	28	8	6	1.9	½
25	58	163	97	85	43	25	39	58	67	32	8	6	2.3	¾
32	68	178	97	98	49	25	39	58	73	36	8	6	2.9	1
40	84	204	128	118	59	45	54	74	90	45	9	8	3.7	1 ¼
50	97	237	128	135	68	45	54	74	97	51	9	8	4.6	1 ½
63	124	296	152	176	88	45	66	87	116	65	9	8	5.8	2

A







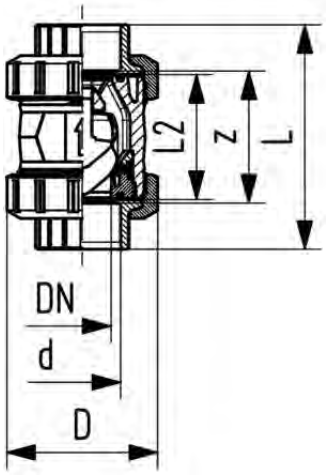


Type 543 3-Way Ball Valve
Horizontal/T-port PROGEF Standard
With threaded sockets NPT reinforced

NPT (inch)	EPDM Part No.	FKM Part No.	weight (lb)
⅜	**167 543 361**	**167 543 371**	0.353
½	**167 543 362**	**167 543 372**	0.362
¾	**167 543 363**	**167 543 373**	0.520
1	**167 543 364**	**167 543 374**	0.787
1 ¼	**167 543 365**	**167 543 375**	1.343
1 ½	**167 543 366**	**167 543 376**	1.980
2	**167 543 367**	**167 543 377**	3.845

NPT (inch)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	z (mm)	z1 (mm)
⅜	50	112	77	72	36	25	32	45	57	28	8	6	86	43
½	50	114	77	72	36	25	32	45	57	28	8	6	80	40
¾	58	131	97	85	43	25	39	58	67	32	8	6	95	48
1	68	154	97	98	49	25	39	58	73	36	8	6	110	55
1 ¼	84	180	128	118	59	45	54	74	90	45	9	8	132	66
1 ½	97	203	128	135	68	45	54	74	97	51	9	8	157	79
2	124	258	152	176	88	45	66	87	116	65	9	8	210	105

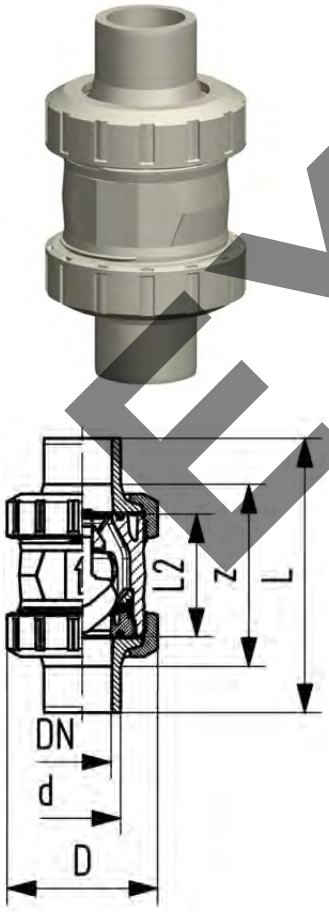
A



Check valve type 561 PROGEF Standard
With fusion sockets metric

d (mm)	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	z (mm)	closest inch (inch)
16	**167 561 001**	**167 561 011**	0.176	50	93	56	67	⅜
20	**167 561 002**	**167 561 012**	0.176	50	95	56	66	½
25	**167 561 003**	**167 561 013**	0.397	58	109	65	77	¾
32	**167 561 004**	**167 561 014**	0.419	68	119	71	83	1
40	**167 561 005**	**167 561 015**	0.750	84	135	85	99	1 ¼
50	**167 561 006**	**167 561 016**	1.058	97	147	89	105	1 ½
63	**167 561 007**	**167 561 017**	2.147	124	168	101	117	2
75	**^ 167 561 008**	**^ 167 561 018**	5.093	166	233	136	167	2 ½
90	**^ 167 561 009**	**^ 167 561 019**	7.893	200	254	141	180	3
110	**^ 167 561 010**	**^ 167 561 020**	13.073	238	301	164	215	4

A



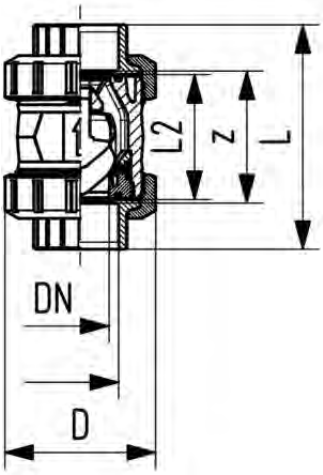
Check valve type 561 PROGEF Standard
With butt fusion spigots IR-Plus
SDR11 metric

d (mm)	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	e (mm)	closest inch (inch)
20	**167 561 082**	**167 561 092**	0.176	50	130	56	1.9	½
25	**167 561 083**	**167 561 093**	0.397	58	143	65	2.3	¾
32	**167 561 084**	**167 561 094**	0.419	68	150	71	2.9	1
40	**167 561 085**	**167 561 095**	0.750	84	171	85	3.7	1 ¼
50	**167 561 086**	**167 561 096**	1.080	97	191	89	4.6	1 ½
63	**167 561 087**	**167 561 097**	2.264	124	220	101	5.8	2
75	**^ 167 561 088**	**^ 167 561 098**	5.203	166	266	136	6.8	2 ½
90	**^ 167 561 089**	**^ 167 561 099**	8.113	200	264	141	8.2	3
110	**^ 167 561 090**	**^ 167 561 100**	12.853	238	301	164	10.0	4

A

Check valve type 561 PROGEF Standard
With threaded sockets reinforced NPT

NPT (inch)	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	z (mm)
⅜	**167 561 101**	**167 561 111**	0.176	50	96	56	71
½	**167 561 102**	**167 561 112**	0.198	50	99	56	64
¾	**167 561 103**	**167 561 113**	0.397	58	111	65	76
1	**167 561 104**	**167 561 114**	0.463	68	127	71	83
1 ¼	**167 561 105**	**167 561 115**	0.794	84	146	85	100
1 ½	**167 561 106**	**167 561 116**	1.124	97	157	89	111
2	**167 561 107**	**167 561 117**	2.028	124	183	101	134



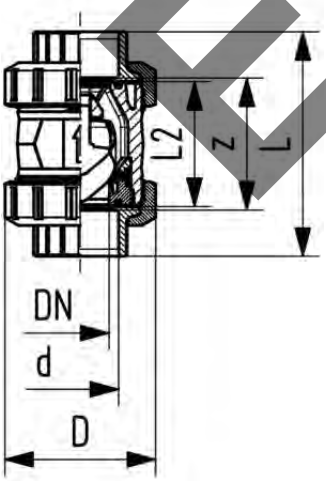
A

Check valve type 561
PROGEF Plus silicone free
With fusion sockets metric

Model:

- Sealing at a minimum water column of 2 m
- Designed for easy installation and removal
- Vibration free even at high flow velocity
- Flow-optimized return cone, double guided
- For vertical installation
- Compact installation length, same as ball valve type 546

d (mm)	EPDM Part No.	FKM Part No.	D (mm)	L (mm)	L2 (mm)	z (mm)	closest inch (inch)
16	* **167 561 201**	* **167 561 211**	50	93	56	67	⅜
20	* **167 561 202**	* **167 561 212**	50	95	56	66	½
25	* **167 561 203**	* **167 561 213**	58	109	65	77	¾
32	* **167 561 204**	* **167 561 214**	68	119	71	83	1
40	* **167 561 205**	* **167 561 215**	84	135	85	99	1 ¼
50	* **167 561 206**	* **167 561 216**	97	147	89	105	1 ½
63	* **167 561 207**	* **167 561 217**	124	168	101	117	2
75	* **167 561 208**	* **167 561 218**	166	233	136	167	2 ½
90	* **167 561 209**	* **167 561 219**	200	254	141	180	3
110	* **167 561 210**	* **167 561 220**	238	301	164	215	4

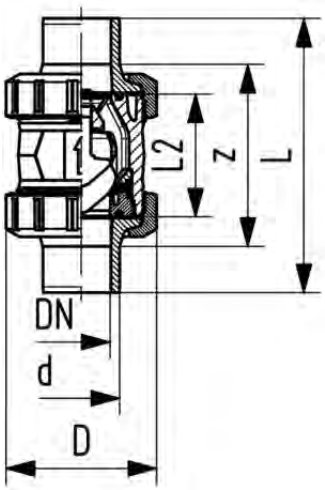


A

Check valve type 561
PROGEF Plus silicone free
With butt fusion spigots IR-Plus
SDR11 metric

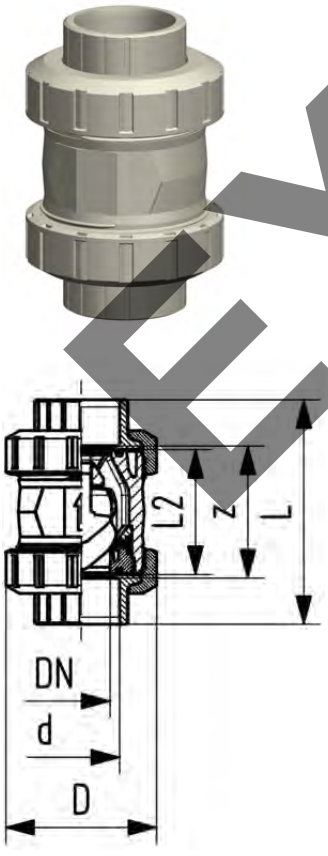
Model:

- Sealing at a minimum water column of 2 m
- Designed for easy installation and removal
- Vibration free even at high flow velocity
- Flow-optimized return cone, double guided
- For vertical installation
- Compact installation length, same as ball valve type 546



d (mm)	EPDM Part No.	FKM Part No.	D (mm)	L (mm)	L2 (mm)	e (mm)	closest inch (inch)
20	* 167 561 242	* 167 561 252	50	130	56	1.9	½
25	* 167 561 243	* 167 561 253	58	143	65	2.3	¾
32	* 167 561 244	* 167 561 254	68	150	71	3.0	1
40	* 167 561 245	* 167 561 255	84	171	85	3.7	1 ¼
50	* 167 561 246	* 167 561 256	97	191	89	4.6	1 ½
63	* 167 561 247	* 167 561 257	124	220	101	5.8	2
75	* 167 561 248	* 167 561 258	166	266	136	6.8	2 ½
90	* 167 561 249	* 167 561 259	200	264	141	8.2	3
110	* 167 561 250	* 167 561 260	238	301	164	10.0	4

A



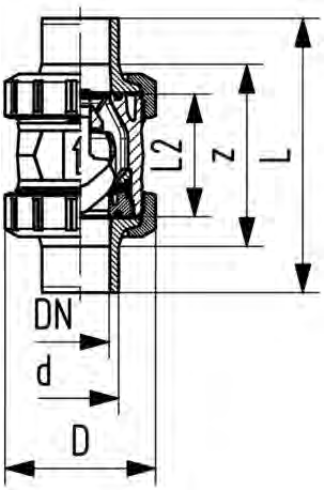
Check valve type 562 PROGEF Standard
With fusion sockets metric

d (mm)	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	z (mm)	closest inch (inch)
16	167 562 001	167 562 011	0.176	50	93	56	67	⅜
20	167 562 002	167 562 012	0.176	50	95	56	66	½
25	167 562 003	167 562 013	0.397	58	109	65	77	¾
32	167 562 004	167 562 014	0.419	68	119	71	83	1
40	167 562 005	167 562 015	0.750	84	135	85	99	1 ¼
50	167 562 006	167 562 016	1.058	97	147	89	105	1 ½
63	167 562 007	167 562 017	1.940	124	168	101	117	2
75	^ 167 562 008	^ 167 562 018	5.093	166	233	136	167	2 ½
90	^ 167 562 009	^ 167 562 019	7.893	200	254	141	180	3
110	^ 167 562 010	^ 167 562 020	13.073	238	301	164	215	4

A

Check valve type 562 PROGEF Standard
With butt fusion spigots metric

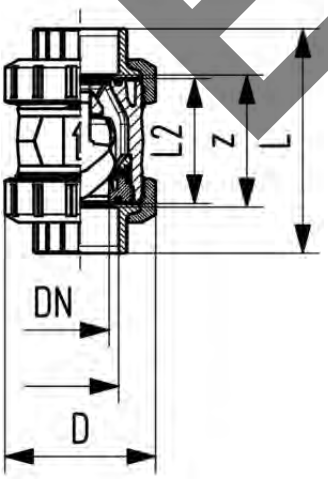
d (mm)	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	e (mm)	closest inch (inch)
20	**167 562 082**	**167 562 092**	0.176	50	130	56	1.9	½
25	**167 562 083**	**167 562 093**	0.397	58	143	65	2.3	¾
32	**167 562 084**	**167 562 094**	0.419	68	150	71	2.9	1
40	**167 562 085**	**167 562 095**	0.750	84	171	85	3.7	1 ¼
50	**167 562 086**	**167 562 096**	1.080	97	191	89	4.6	1 ½
63	**167 562 087**	**167 562 097**	2.050	124	220	101	5.8	2
75	**^ 167 562 088**	**^ 167 562 098**	5.203	166	266	136	6.8	2 ½
90	**^ 167 562 089**	**^ 167 562 099**	8.113	200	264	141	8.2	3
110	**^ 167 562 090**	**^ 167 562 100**	12.853	238	301	164	10.0	4



A

Check valve type 562 PROGEF Standard
With threaded sockets reinforced NPT

NPT (inch)	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	z (mm)
⅜	**167 562 101**	**167 562 111**	0.176	50	96	56	71
½	**167 562 102**	**167 562 112**	0.198	50	99	56	64
¾	**167 562 103**	**167 562 113**	0.397	58	111	65	76
1	**167 562 104**	**167 562 114**	0.463	68	127	71	83
1 ¼	**167 562 105**	**167 562 115**	0.794	84	146	85	100
1 ½	**167 562 106**	**167 562 116**	1.124	97	157	89	111
2	**167 562 107**	**167 562 117**	2.028	124	183	101	134

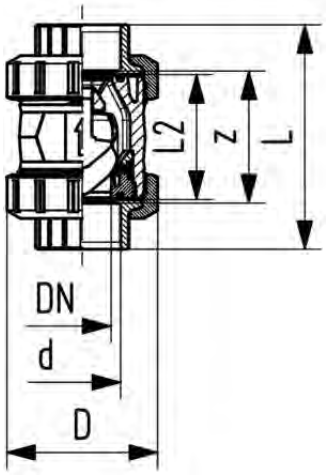


A

Check valve type 562 PROGEF Standard silicone free
With fusion sockets metric

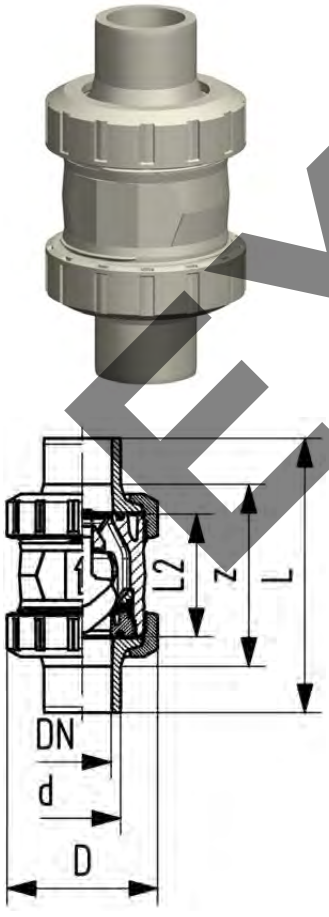
Model:

- For horizontal or vertical installation
- Sealing at a minimum water column of1m
- Spring loaded, spring made of stainless steel (1.4310)
- Spring available in other materials, see spare parts
- Designed for easy installation and removal
- Vibration free even at high flow velocity
- Flow-optimized return cone, double guided
- Compact installation length, same as ball valve type 546



d (mm)	EPDM Part No.	FKM Part No.	D (mm)	L (mm)	L2 (mm)	z (mm)	closest inch (inch)
16	* 167 562 201	* 167 562 211	50	93	56	67	⅜
20	* 167 562 202	* 167 562 212	50	95	56	66	½
25	* 167 562 203	* 167 562 213	58	109	65	77	¾
32	* 167 562 204	* 167 562 214	68	119	71	83	1
40	* 167 562 205	* 167 562 215	84	135	85	99	1 ¼
50	* 167 562 206	* 167 562 216	97	147	89	105	1 ½
63	* 167 562 207	* 167 562 217	124	168	101	117	2
75	* 167 562 208	* 167 562 218	166	233	136	167	2 ½
90	* 167 562 209	* 167 562 219	200	254	141	180	3
110	* 167 562 210	* 167 562 220	238	301	164	215	4

A



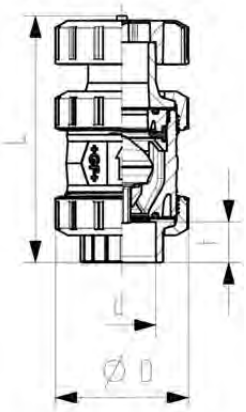
Check valve type 562 PROGEF Standard silicone free
With butt fusion spigots metric

Model:

- For horizontal or vertical installation
- Sealing at a minimum water column of1m
- Spring loaded, spring made of stainless steel (1.4310)
- Spring available in other materials, see spare parts
- Designed for easy installation and removal
- Vibration free even at high flow velocity
- Flow-optimized return cone, double guided
- Compact installation length, same as ball valve type 546

d (mm)	EPDM Part No.	FKM Part No.	D (mm)	L (mm)	L2 (mm)	e (mm)	closest inch (inch)
20	* 167 562 242	* 167 562 252	50	130	56	1.9	½
25	* 167 562 243	* 167 562 253	58	143	65	2.3	¾
32	* 167 562 244	* 167 562 254	68	150	71	3.0	1
40	* 167 562 245	* 167 562 255	84	171	85	3.7	1 ¼
50	* 167 562 246	* 167 562 256	97	191	89	4.6	1 ½
63	* 167 562 247	* 167 562 257	124	220	101	5.8	2
75	* 167 562 248	* 167 562 258	166	266	136	8.2	2 ½
90	* 167 562 249	* 167 562 259	200	264	141	9.9	3
110	* 167 562 250	* 167 562 260	238	301	164	12.0	4

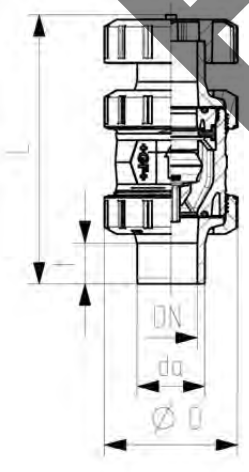
A



Type 591 PROGEF Standard
Ventilating and bleed valve
With fusion sockets metric

d (mm)	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	t (mm)	closest inch (inch)
16	^ 167 591 001	^ 167 591 011	0.214	50	126	14	⅜
20	167 591 002	167 591 012	0.214	50	127	15	½
25	^ 167 591 003	^ 167 591 013	0.448	58	142	16	¾
32	167 591 004	167 591 014	0.494	68	153	18	1
40	^ 167 591 005	^ 167 591 015	0.864	84	171	19	1 ¼
50	167 591 006	167 591 016	1.210	97	190	21	1 ½
63	167 591 007	167 591 017	2.174	124	219	28	2
75	* 167 591 008	* 167 591 018	5.093	166	256	29	2 ½
90	* 167 591 009	* 167 591 019	7.893	200	275	33	3
110	* 167 591 010	* 167 591 020	13.073	238	318	39	4

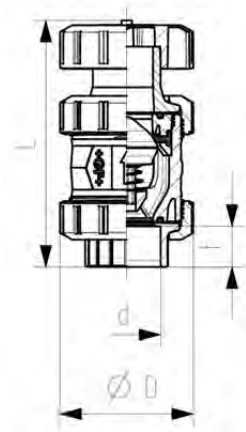
A



Type 591 PROGEF Standard
Ventilating and bleed valve
With socket fusion spigots metric

d (mm)	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	t (mm)	closest inch (inch)
16	^ 167 591 041	^ 167 591 051	0.214	50	135	13	⅜
20	167 591 042	167 591 052	0.236	50	140	14	½
25	^ 167 591 043	^ 167 591 053	0.470	58	157	16	¾
32	167 591 044	167 591 054	0.516	68	168	18	1
40	^ 167 591 045	^ 167 591 055	0.886	84	189	20	1 ¼
50	167 591 046	167 591 056	1.276	97	211	23	1 ½
63	167 591 047	167 591 057	2.328	124	245	27	2
75	* 167 591 048	* 167 591 058	5.225	166	280	48	2 ½
90	* 167 591 049	* 167 591 059	8.267	200	296	49	3
110	* 167 591 050	* 167 591 060	13.184	238	336	54	4

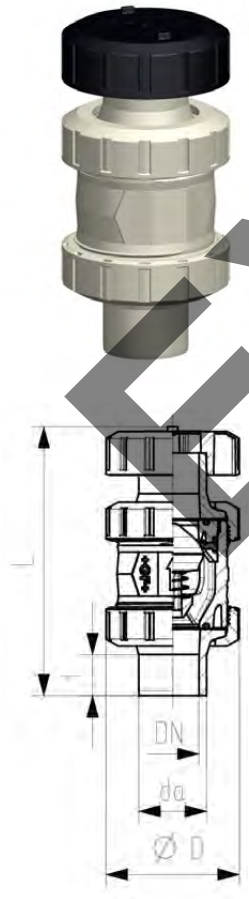
A



Type 595 PROGEF Standard
Ventilating valve
With fusion sockets metric

d (mm)	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	t (mm)	closest inch (inch)
16	^ 167 595 001	^ 167 595 011	0.214	50	126	14	⅜
20	167 595 002	167 595 012	0.214	50	127	15	½
25	^ 167 595 003	^ 167 595 013	0.448	58	142	16	¾
32	167 595 004	167 595 014	0.494	68	153	18	1
40	^ 167 595 005	^ 167 595 015	0.864	84	171	19	1 ¼
50	167 595 006	167 595 016	1.210	97	190	21	1 ½
63	167 595 007	167 595 017	2.174	124	219	28	2
75	* 167 595 008	* 167 595 018	5.093	166	256	29	2 ½
90	* 167 595 009	* 167 595 019	7.893	200	275	33	3
110	* 167 595 010	* 167 595 020	13.073	238	318	39	4

A



Type 595 PROGEF Standard
Ventilating valve
With socket fusion spigots metric

d (mm)	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	t (mm)	closest inch (inch)
16	^ 167 595 041	^ 167 595 051	0.214	50	135	13	⅜
20	167 595 042	167 595 052	0.236	50	140	14	½
25	^ 167 595 043	^ 167 595 053	0.470	58	157	16	¾
32	167 595 044	167 595 054	0.516	68	168	18	1
40	^ 167 595 045	^ 167 595 055	0.886	84	189	20	1 ¼
50	167 595 046	167 595 056	1.276	97	211	23	1 ½
63	167 595 047	167 595 057	2.328	124	245	27	2
75	* 167 595 048	* 167 595 058	5.225	166	280	48	2 ½
90	* 167 595 049	* 167 595 059	8.267	200	296	49	3
110	* 167 595 050	* 167 595 060	13.184	238	336	54	4

A

PROGEF Standard
Lugstyle butterfly valve type 578
Hand lever with ratchet settings

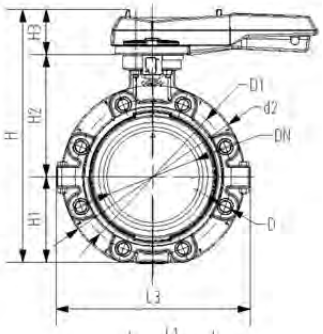
Model:

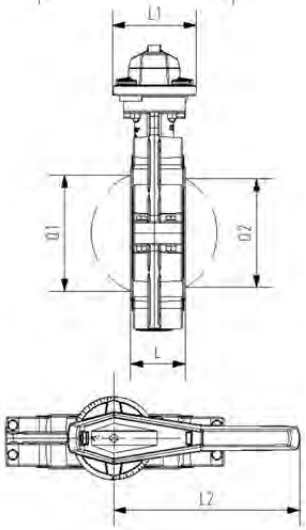
- Housing material: PP-GF30 with 316SS lug inserts
- Overall length according to EN 558, ISO 5752 (DN50 - 200 line 25, DN250 - 300 line 10)
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759

Option:

- Optional accessory: Integrated position feedback with limit switches (sold separately)

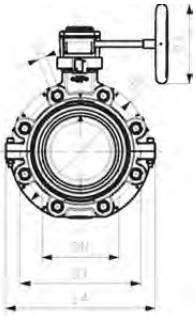
Size (inch)	DN (mm)	PN (bar)	Cv-value (l/min)	EPDM Part No.	FKM Part No.	weight (kg)
2	50	10	1470	**167 578 102**	**167 578 122**	1.800
2 ½	65	10	2200	**167 578 103**	**167 578 123**	1.895
3	80	10	3000	**167 578 104**	**167 578 124**	2.251
4	100	10	6500	**167 578 105**	**167 578 125**	3.146
5	125	10	11500	**167 578 106**	**167 578 126**	4.660
6	150	10	16600	**167 578 107**	**167 578 127**	6.430
8	200	10	39600	**167 578 108**	**167 578 128**	8.625
10	250	8	55200	**167 578 109**	**167 578 129**	19.528
12	300	8	80000	**167 578 110**	**167 578 130**	26.106

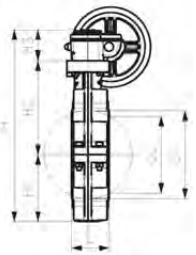


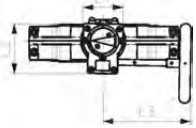


Size (inch)	d2 (mm)	D	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Q1 (mm)	Q2 (mm)
2	160	UNC 5/8	120.6	265	77	134	54	45	106	205	165	40	
2 ½	180	UNC 5/8	139.7	277	83	140	54	46	106	205	182	54	35
3	195	UNC 5/8	152.4	289	89	146	54	49	106	205	210	67	50
4	226	UNC 5/8	190.5	326	106	167	55	56	106	255	240	88	74
5	258	UNC 3/4	215.9	357	121	181	55	64	106	255	272	113	97
6	284	UNC 3/4	241.3	377	133	189	55	72	106	255	300	139	123
8	341	UNC 3/4	298.4	436	159	210	67	73	140	408	360	178	169
10	412	UNC 7/8	362.0	536	205	264	67	113	140	408	440	210	207
12	482	UNC 7/8	431.8	586	234	285	67	113	140	408	510	256	253

A







PROGEF Standard
Lugstyle butterfly valve type 578
Reduction gear with handwheel

Model:

- Housing material: PP-GF30 with 316SS lug inserts
- Overall length according to EN 558, ISO 5752 (DN50 - 200 line 25, DN250 - 300 line 10)
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759

Option:

- Optional accessory: Integrated position feedback with limit switches (sold separately)

Size (inch)	DN (mm)	PN (bar)	Cv-value (l/min)	EPDM Part No.	FKM Part No.	weight (kg)
2	50	10	1470	**167 578 142**	**167 578 162**	3.447
2 ½	65	10	2200	**167 578 143**	**167 578 163**	3.585
3	80	10	3000	**167 578 144**	**167 578 164**	3.929
4	100	10	6500	**167 578 145**	**167 578 165**	4.834
5	125	10	11500	**167 578 146**	**167 578 166**	6.348
6	150	10	16600	**167 578 147**	**167 578 167**	8.109
8	200	10	39600	**167 578 148**	**167 578 168**	9.353
10	250	8	55200	**167 578 149**	**167 578 169**	21.210
12	300	8	80000	**167 578 150**	**167 578 170**	27.746

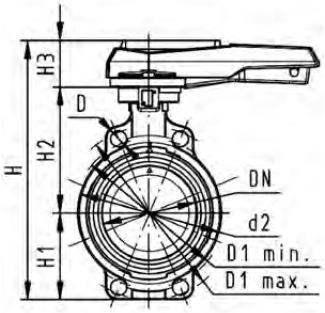
Size (inch)	d2 (mm)	D	D1 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	Q1 (mm)
2	160	UNC 5/8	120.6	160	273	77	134	62	45	78	112	179	165	40
2 ½	80	UNC 5/8	139.7	160	285	83	140	62	46	78	112	179	182	54
3	195	UNC 5/8	152.4	160	297	89	146	62	49	78	112	179	210	67
4	226	UNC 5/8	190.5	160	335	106	167	62	56	78	112	179	240	88
5	258	UNC 3/4	215.9	160	364	121	181	62	64	78	112	179	272	113
6	284	UNC 3/4	241.3	160	384	133	189	62	72	78	112	179	300	139
8	341	UNC 3/4	298.4	160	431	159	210	62	73	78	112	179	360	178
10	412	UNC 7/8	362.0	200	555	205	264	69	113	97	130	198	440	210
12	482	UNC 7/8	431.8	200	605	234	285	69	113	97	130	198	510	256

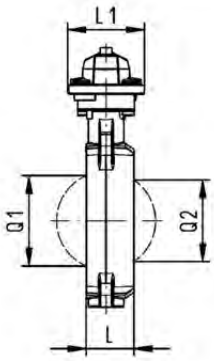
Size (inch)	Q2 (mm)
2	
2 ½	35
3	50
4	74
5	97
6	123
8	169
10	207
12	253

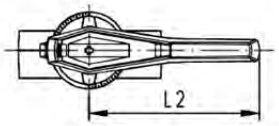
A

Type 567 Butterfly valve PROGEF Standard
Hand lever with ratchet settings

d (mm)	Size (inch)	EPDM Part No.	FKM Part No.	weight (kg)
63	2	**167 567 002**	**167 567 022**	1.627
75	2 ½	**167 567 003**	**167 567 023**	1.061
90	3	**167 567 004**	**167 567 024**	1.404
110	4	**167 567 005**	**167 567 025**	1.998
140	5	**167 567 006**	**167 567 026**	2.429
160	6	**167 567 007**	**167 567 027**	3.246
225	8	**167 567 008**	**167 567 028**	5.609
280	10	**167 567 009**	**167 567 029**	11.841
315	12	**167 567 010**	**167 567 030**	13.245

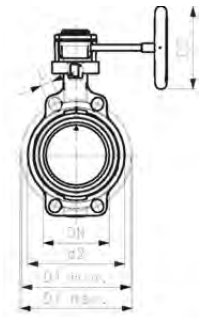


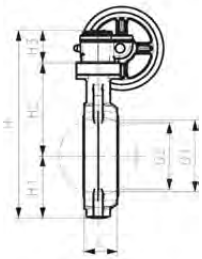


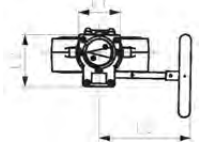


d (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	d2 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	Q1 (mm)	Q2 (mm)
63	19	120	125	104	264	77	134	54	45	106	205	40	
75	19	140	145	115	277	83	140	54	46	106	205	54	35
90	19	150	160	131	289	89	146	54	49	106	205	67	50
110	19	175	191	161	325	104	167	55	56	106	255	88	74
140	23	210	216	187	352	117	181	55	64	106	255	113	97
160	24	241	241	215	373	130	189	55	72	106	255	139	123
225	23	290	295	267	435	158	210	67	73	140	408	178	169
280	25	353	362	329	554	205	264	85	113	149	408	210	207
315	25	400	432	379	598	228	285	85	113	149	408	256	253

A







Type 567 Butterfly valve PROGEF Standard
Reduction gear with handwheel

Size (inch)	EPDM Part No.	FKM Part No.	weight (lb)
2	**167 567 042**	**167 567 062**	6.629
2 ½	**167 567 043**	**167 567 063**	6.832
3	**167 567 044**	**167 567 064**	7.119
4	**167 567 045**	**167 567 065**	8.247
5	**167 567 046**	**167 567 066**	9.354
6	**167 567 047**	**167 567 067**	11.107
8	**167 567 048**	**167 567 068**	14.416
10	**167 567 049**	**167 567 069**	28.823
12	**167 567 050**	**167 567 070**	35.419
14	*** 167 567 051**	*** 167 567 071**	88.185
16	*** 167 567 052**	*** 167 567 072**	110.231
18	*** 167 567 053**	*** 167 567 073**	154.324
20	*** 167 567 054**	*** 167 567 074**	198.416
24	*** 167 567 055**	*** 167 567 075**	275.578

D (inch)	D1 min. (inch)	D1 max. (inch)	d2 (inch)	D3 (inch)	H (inch)	H1 (inch)	H2 (inch)	H3 (inch)	L (inch)	L1 (inch)	L2 (inch)	L3 (inch)	Q1 (inch)	Q2 (inch)
1	5	5	4	6	11	3	5	2	2	3	4	7	2	
1	6	6	5	6	11	3	6	2	2	3	4	7	2	1
1	6	6	5	6	12	4	6	2	2	3	4	7	3	2
1	7	8	6	6	13	4	7	2	2	3	4	7	3	3
1	8	9	7	6	14	5	7	2	3	3	4	7	4	4
1	9	9	8	6	15	5	7	2	3	3	4	7	5	5
1	11	12	11	6	17	6	8	2	3	3	4	7	7	7
1	14	14	13	8	22	8	10	3	4	4	5	8	8	8
1	16	17	15	8	24	9	11	3	4	4	5	8	10	10
1	18	19	21	8		11	16	3	5	7	7	9	13	12
1	20	21	23	8		12	17	3	7	7	8	9	14	14
1	22	23	25	10		13	20	3	7	9	8	9	15	15
1	24	25	28	14		14	22	4	7	9	9	10	17	17
1	29	30	32	14		17	24	4	8	9	10	10	21	21

A

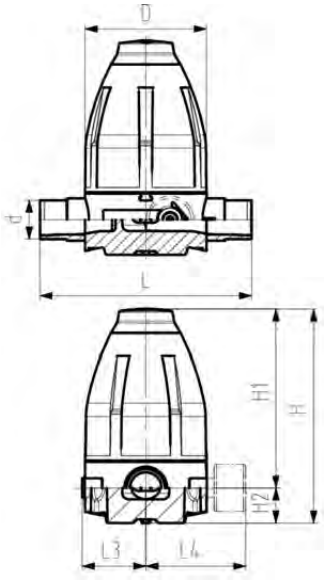
Type 582 Pressure Reducing Valve PROGEF Standard PP Butt fusion spigots SDR11 metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings EPDM Part No.	weight (kg)	O-rings FKM Part No.
25	20	10	**167 582 003**	1.250	**167 582 013**
20	15	10	**167 582 002**	0.560	**167 582 012**
32	25	10	**167 582 004**	1.250	**167 582 014**
40	32	10	**167 582 005**	3.450	**167 582 015**
50	40	10	**167 582 006**	3.460	**167 582 016**
63	50	10	**167 582 007**	3.520	**167 582 017**



d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L3 (mm)	M	closest inch (inch)
25	100	177	148	29	14	190	53	M6	¾
20	79	132	111	21	14	150	42	M6	½
32	100	177	148	29	14	190	53	M6	1
40	147	251	207	44	21	240	76	M8	1 ¼
50	147	251	207	44	21	240	76	M8	1 ½
63	147	251	207	44	21	260	76	M8	2

A

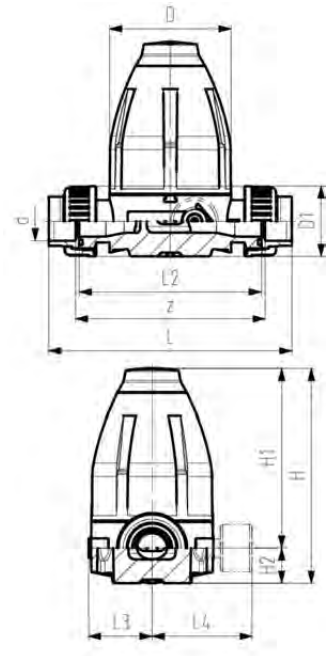
Type 582 Pressure Reducing Valve PROGEF Standard PP Unions with fusion sockets metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings EPDM Part No.	weight (kg)	O-rings FKM Part No.
20	15	10	**167 582 102**	0.600	**167 582 112**
25	20	10	**167 582 103**	1.300	**167 582 113**
32	25	10	**167 582 104**	1.320	**167 582 114**
40	32	10	**167 582 105**	3.530	**167 582 115**
50	40	10	**167 582 106**	3.650	**167 582 116**
63	50	10	**167 582 107**	3.800	**167 582 117**



d (mm)	D (mm)	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L2 (mm)	L3 (mm)	M	z (mm)	closest inch (inch)
20	79	48	132	111	21	12	158	120	42	M6	126	½
25	100	58	177	148	29	14	192	150	53	M6	156	¾
32	100	65	177	148	29	14	196	150	53	M6	156	1
40	147	77	251	207	44	21	255	205	76	M8	211	1 ¼
50	147	84	251	207	44	21	261	205	76	M8	211	1 ½
63	147	111	251	207	44	21	269	205	76	M8	211	2

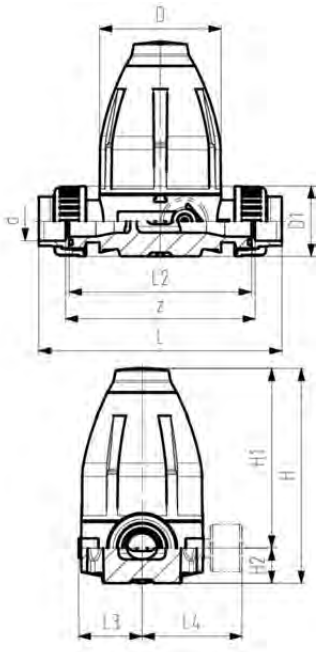
Type 582 Pressure Reducing Valve PROGEF Standard PP Unions with butt fusion spigots SDR11 metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings EPDM Part No.	weight (kg)	O-rings FKM Part No.
20	15	10	**167 582 502**	0.640	**167 582 512**
25	20	10	**167 582 503**	1.350	**167 582 513**
32	25	10	**167 582 504**	1.370	**167 582 514**
40	32	10	**167 582 505**	3.660	**167 582 515**
50	40	10	**167 582 506**	3.710	**167 582 516**
63	50	10	**167 582 507**	3.860	**167 582 517**



d (mm)	D (mm)	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L2 (mm)	L3 (mm)	M	z (mm)	closest inch (inch)
20	79	48	132	111	21	12	158	120	42	M6	126	½
25	100	58	177	148	29	14	192	150	53	M6	156	¾
32	100	65	177	148	29	14	196	150	53	M6	156	1
40	147	77	251	207	44	21	255	205	76	M8	211	1 ¼
50	147	84	251	207	44	21	261	205	76	M8	211	1 ½
63	147	111	251	207	44	21	269	205	76	M8	211	2

A

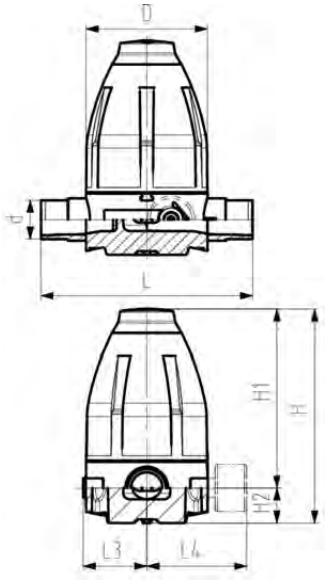
Type 586 Pressure Retaining Valve PROGEF Standard PP Butt fusion spigots SDR11 metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings EPDM Part No.	weight (kg)	O-rings FKM Part No.
20	15	10	**167 586 002**	0.550	**167 586 012**
25	20	10	**167 586 003**	1.260	**167 586 013**
32	25	10	**167 586 004**	1.260	**167 586 014**
40	32	10	**167 586 005**	3.460	**167 586 015**
50	40	10	**167 586 006**	3.470	**167 586 016**
63	50	10	**167 586 007**	3.540	**167 586 017**



d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L3 (mm)	M	closest inch (inch)
20	79	132	111	21	14	150	42	M6	½
25	100	177	148	29	14	190	53	M6	¾
32	100	177	148	29	14	190	53	M6	1
40	147	251	207	44	21	240	76	M8	1 ¼
50	147	251	207	44	21	240	76	M8	1 ½
63	147	251	207	44	21	260	76	M8	2

A

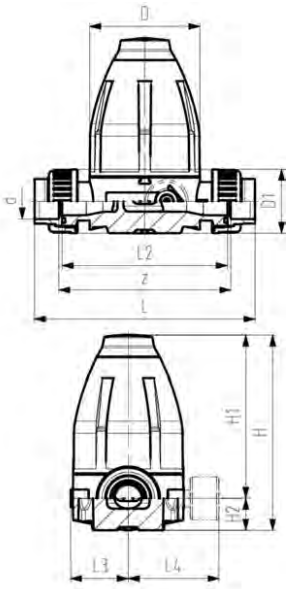
Type 586 Pressure Retaining Valve PROGEF Standard PP Union with fusion sockets metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings EPDM Part No.	weight (kg)	O-rings FKM Part No.
20	15	10	**167 586 102**	0.590	**167 586 112**
25	20	10	**167 586 103**	1.310	**167 586 113**
32	25	10	**167 586 104**	1.330	**167 586 114**
40	32	10	**167 586 105**	3.610	**167 586 115**
50	40	10	**167 586 106**	3.660	**167 586 116**
63	50	10	**167 586 107**	3.810	**167 586 117**



d (mm)	D (mm)	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L2 (mm)	L3 (mm)	M	z (mm)	closest inch (inch)
20	79	48	132	111	21	12	158	120	42	M6	126	½
25	100	58	177	148	29	14	192	150	53	M6	156	¾
32	100	65	177	148	29	14	196	150	53	M6	156	1
40	147	77	251	207	44	21	255	205	76	M8	211	1 ¼
50	147	84	251	207	44	21	261	205	76	M8	211	1 ½
63	147	111	251	207	44	21	269	205	76	M8	211	2

A

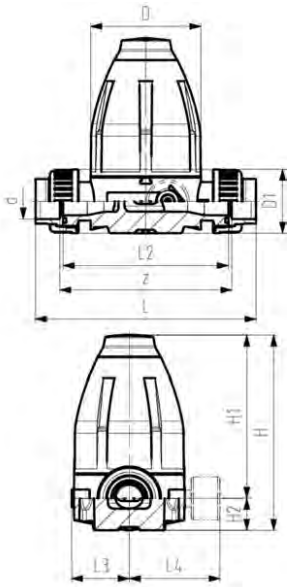
Type 586 Pressure Retaining Valve PROGEF Standard PP Union with butt fusion spigots SDR11 metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

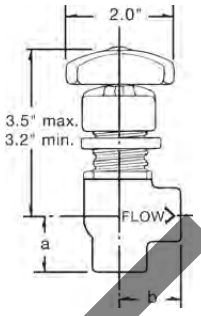
d (mm)	DN (mm)	PN (bar)	O-rings EPDM Part No.	weight (kg)	O-rings FKM Part No.
20	15	10	**167 586 502**	0.630	**167 586 512**
25	20	10	**167 586 503**	1.350	**167 586 513**
32	25	10	**167 586 504**	1.370	**167 586 514**
40	32	10	**167 586 505**	3.650	**167 586 515**
50	40	10	**167 586 506**	3.700	**167 586 516**
63	50	10	**167 586 507**	3.850	**167 586 517**



d (mm)	D (mm)	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L2 (mm)	L3 (mm)	M	z (mm)	closest inch (inch)
20	79	48	132	111	21	12	228	120	42	M6	126	½
25	100	58	177	148	29	14	264	150	53	M6	156	¾
32	100	65	177	148	29	14	270	150	53	M6	156	1
40	147	77	251	207	44	21	331	205	76	M8	211	1 ¼
50	147	84	251	207	44	21	337	205	76	M8	211	1 ½
63	147	111	251	207	44	21	343	205	76	M8	211	2

A

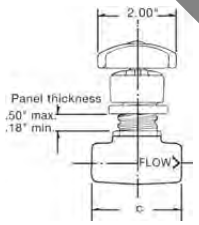
Type 522 Angle Body Needle Valve, PROGEF Standard



Size (inch)	Part No.	a (mm)	b (mm)
½	**157 522 581**	28	31

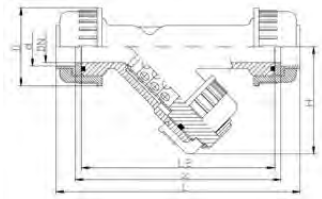
A

Type 522 Globe Body Needle Valve, PROGEF Standard



Size (inch)	Part No.	weight (lb)	c (mm)
½	**157 522 556**	0.276	65

B



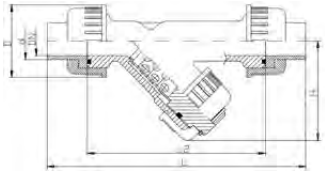
Line Strainer Type 305 PROGEF Standard
Socket fusion

Model:

- Material: PP-H
- Protects valves, pumps, etc. from becoming damaged
- Easy dismantling to clean or replace the screen
- Screen perforation 0.5 mm
- For easy installation and removal
- Overall length according to EN 558

d (mm)	EPDM Part No.	FKM Part No.	D (mm)	H (mm)	L (mm)	L2 (mm)	z (mm)	closest inch (inch)
20	* 167 305 000	* 167 305 049	52	75	168	130	140	½
25	* 167 305 050	* 167 305 099	62	80	192	150	160	¾
32	* 167 305 100	* 167 305 149	68	90	206	160	170	1
40	* 167 305 150	* 167 305 199	85	110	230	180	190	1 ¼
50	* 167 305 200	* 167 305 249	85	125	256	200	210	1 ½
63	* 167 305 250	* 167 305 299	102	150	294	230	240	2

B



Line Strainer Type 305 PROGEF Standard
IR Plus fusion

Model:

- Material: PP-H
- Protects valves, pumps, etc. from becoming damaged
- Easy dismantling to clean or replace the screen
- Screen perforation 0.5 mm
- For easy installation and removal
- Overall length according to EN 558

d (mm)	EPDM Part No.	FKM Part No.	D (mm)	H (mm)	L (mm)	L2 (mm)	e (mm)	closest inch (inch)
20	* 167 305 300	* 167 305 349	52	75	238	130	1.9	½
25	* 167 305 350	* 167 305 399	62	80	264	150	2.3	¾
32	* 167 305 400	* 167 305 449	68	90	280	160	3.0	1
40	* 167 305 450	* 167 305 499	85	110	306	180	3.7	1 ¼
50	* 167 305 500	* 167 305 549	85	125	332	200	4.6	1 ½
63	* 167 305 550	* 167 305 599	102	150	368	230	5.8	2

A

Stainless Steel Screen for Type 306
30 mesh, 1/64" hole

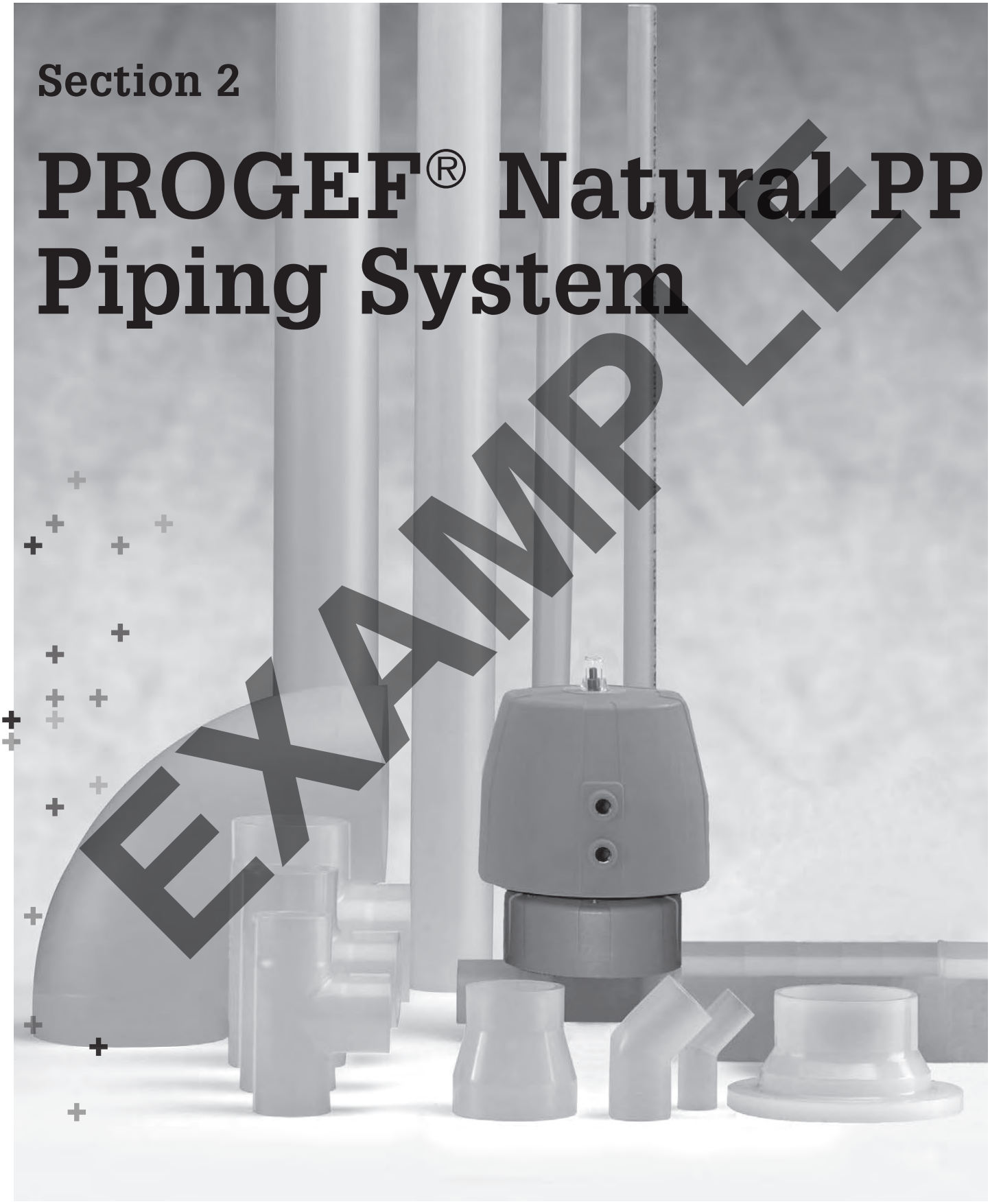
Model:

- Stainless Steel A4 Quality (AISI 316)
- For line strainers Type 306

d (mm)	Part No.	D (mm)	L (mm)	closest inch (inch)
20	^ 161 486 100	14	39	½
25	^ 161 486 101	18	48	¾
32	^ 161 486 102	24	60	1
40	^ 161 486 103	30	71	1 ¼
50	^ 161 486 104	38	87	1 ½
63	^ 161 486 105	48	106	2
75	161 486 106	61	100	2 ½
90	^ 161 486 107	73	118	3

Section 2

PROGEF® Natural PP Piping System



PROGEF Natural – System Specification

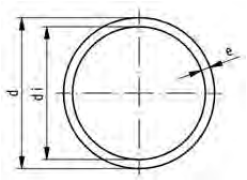
Material	Polypropylene Random Copolymer
Color	Unpigmented, translucent
Density	~0.90 g/cm^3 (ISO 1183 / ASTM D 792)
Surface tension	30–35 mJ/m^2
Linear expansion coefficient	0.16-0.18 mm/mK (DIN 53752))
E-modulus	900 N/mm^2 (ISO 527 / ASTM D 790)
Thermal conductivity	0.23 W/mK (EN 12664)
Surface resistivity	> 10^{16} Ω (IEC 60093)
Dimension	d 20–d 90 in accordance with EN ISO 15494
Pressure Rating	Pipes/Fittings/Diaphragm valves: d 20 – d 63 SDR11, PN10 (150 PSI), c = 2.0 d 75 – d 110 SDR17.6, PN6 (90 PSI), c = 2.0
Temperature Rating	from 0 °C to 80 °C (< 60 °C for valves) (32 °F–176 °F)
Production	Fittings/valves: injection molded Pipes: extruded
Surface Finish	Inner surface Ra ≤ 1 µm (39 µin)
Marking	Fittings, pipes and valves are embossed with a permanent identification during the production process to ensure full traceability: Lot No Material Dimension Pressure Rating
Testing and Inspection (EN ISO 15494)	Inclusions Visual inspection Surface finish Dimension tolerance Pressure testing Full product range passed the Initial Type Test (ITT)
Approvals/Conformance [1]	FDA CFR 21 177.1520 USP 25 class VI (physiological non-toxic)
Welding Technology	BCF Plus, bead and crevice free fusion IR Plus, infrared fusion (DVS 2207-6) Butt fusion (DVS 2207-11)
Documentation[2]	Certificate of Conformance with FDA, USP EN 10204 2.2 EN 10204 3.1 ASME BPE
Packing	Pipes: Capped & single bagged Fittings/valves: Bulk bagged; quantities vary
Labeling	Brand Name Product Description Code Number Material Dimension CE-labeling Approvals
Main Applications	Uses include cost effective, pure distribution of DI-water and critical biological fluids where chemical sanitization is needed. **B**ead and **C**revice **F**ree jointing and minimal metallic leachout ensure the highest product quality.

[1] For thermoplastic material only
[2] On request

Table of contents		Page
	Pipe for IR Plus/BCF Plus Fusion	138
	IR Plus Fusion/BCF Plus Fusion Fittings	139
	Manual Valves	152

Pipe for IR Plus/BCF Plus Fusion

A



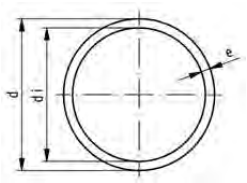
Pipe, PN 10, Natural PP

Model:

- PP-R material, translucent / unpigmented color
- Supplied in 5m lengths
- Single bagged with both ends capped

Note	d (mm)	Part No.	lbs/meter	e (mm)	di (mm)	closest inch (inch)
	20	* 168 480 151	0.236	1.9	16.2	½
	25	* 168 480 152	0.362	2.3	20.4	¾
	32	* 168 480 153	0.575	2.9	26.2	1
	40	* 168 480 154	0.908	3.7	32.6	1 ¼
	50	* 168 480 155	1.407	4.6	40.8	1 ½
	63	* 168 480 156	2.227	5.8	51.4	2

A



Pipe, PN 6, Natural PP

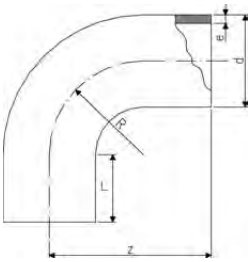
Model:

- Material: PP-R unpigmented
- colour: natural
- Supplied in 5m (16.4 foot) length

d (mm)	Part No.	lbs/meter	e (mm)	di (mm)	closest inch (inch)
90	* 168 480 283	2.932	5.1	79.8	3

IR Plus Fusion/BCF Plus Fusion Fittings

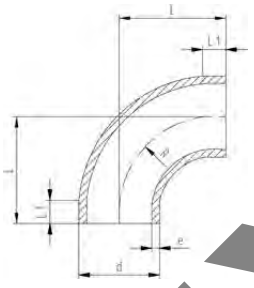
A



90° Elbow Sweep Radius, PN 10, Natural PP

d (mm)	FM	Part No.	weight (kg)	z (mm)	L (mm)	R (mm)	e (mm)
20	BCF, IR	**728 018 606**	0.007	38	23	15	1.9
25	BCF, IR	**728 018 607**	0.012	42	23	19	2.3
32	BCF, IR	**728 018 608**	0.026	46	22	24	2.9
40	BCF, IR	**^ 728 018 609**	0.038	51	21	30	3.7
50	BCF, IR	**728 018 610**	0.065	58	21	37	4.6
63	BCF, IR	**728 018 611**	0.115	66	21	45	5.8

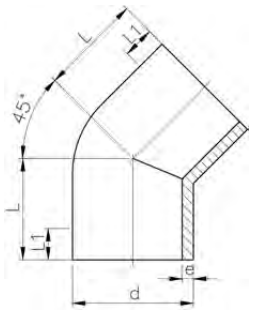
A



90° Elbow Sweep Radius, PN 6, Natural PP

d (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	e (mm)	R (mm)
90	BCF, IR	**728 018 413**	0.225	100	20	5.1	90

A



45° Elbow, PN 10, Natural PP

d (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	e (mm)
20	BCF, IR	**728 158 506**	0.007	32	24	1.9
25	BCF, IR	**728 158 507**	0.002	34	25	2.3
32	BCF, IR	**728 158 508**	0.019	36	25	2.9
40	BCF, IR	**^ 728 158 509**	0.037	39	25	3.7
50	BCF, IR	**728 158 510**	0.054	42	26	4.6
63	BCF, IR	**728 158 511**	0.097	47	29	5.8

A

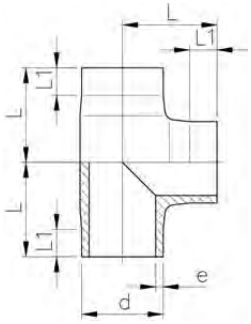
45° Elbow, PN 6, Natural PP

d (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	e (mm)
90	BCF, IR	**728 158 413**	0.164	57	21	5.1

A

Tee, PN 10, Natural PP

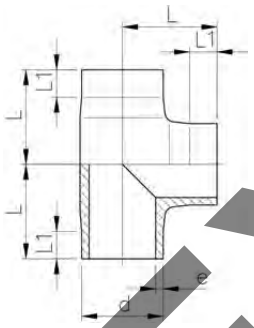
d (mm)	FM	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)
20	BCF, IR	**728 208 506**	0.024	1.9	38	24
25	BCF, IR	**728 208 507**	0.040	2.3	42	26
32	BCF, IR	**728 208 508**	0.071	2.9	46	26
40	BCF, IR	**^ 728 208 509**	0.130	3.7	51	23
50	BCF, IR	**728 208 510**	0.223	4.6	58	22
63	BCF, IR	**728 208 511**	0.401	5.8	66	20



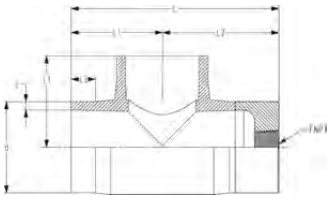
A

Tee, PN 6, Natural PP

d (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	e (mm)
90	BCF, IR	**728 208 413**	0.401	90	20	5.1



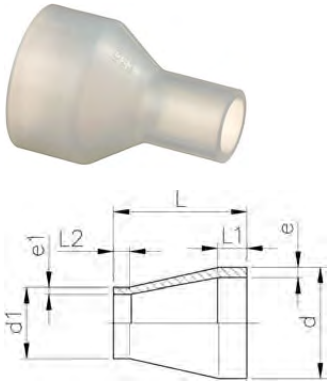
B



Analytical Threaded Sensor, PN 10/PN 6, Natural PP

d (mm)	FNPT (inch)	FM	Part No.	e (mm)	L (mm)	L1 (mm)	L2 (mm)
50	¼	BCF, IR	* 728 991 840	4.6	135	58	77
50	½	BCF, IR	* 728 991 841	4.6	135	58	77
50	¾	BCF, IR	* 728 991 842	4.6	135	58	77
50	1	BCF, IR	* 728 991 843	4.6	135	58	77
63	¼	BCF, IR	* 728 991 844	5.8	148	66	82
63	½	BCF, IR	* 728 991 845	5.8	148	66	82
63	¾	BCF, IR	* 728 991 846	5.8	148	66	82
63	1	BCF, IR	* 728 991 847	5.8	148	66	82
90	¼	BCF, IR	* 728 991 852	5.1	208	90	118
90	½	BCF, IR	* 728 991 853	5.1	208	90	118
90	¾	BCF, IR	* 728 991 854	5.1	208	90	118
90	1	BCF, IR	* 728 991 855	5.1	208	90	118

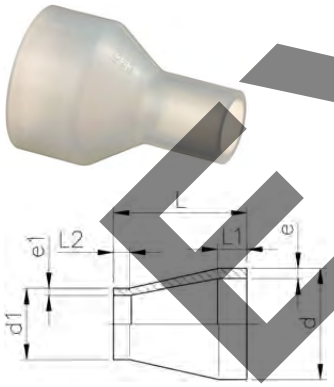
A



Reducer, PN 10, Natural PP

d (mm)	d1 (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	L2 (mm)	e (mm)	e1 (mm)
25	20	BCF, IR	728 908 537	0.007	50	20	20	2.3	1.9
32	20	BCF, IR	728 908 542	0.010	50	20	20	3.0	1.9
32	25	BCF, IR	728 908 541	0.011	50	20	20	3.0	2.3
40	20	BCF, IR	^ 728 908 548	0.015	58	20	23	3.7	1.9
40	25	BCF, IR	^ 728 908 547	0.016	55	20	20	3.7	2.3
40	32	BCF, IR	^ 728 908 546	0.019	55	20	20	3.7	2.9
50	25	BCF, IR	728 908 554	0.025	60	20	20	4.6	2.3
50	32	BCF, IR	728 908 553	0.027	60	20	20	4.6	2.9
50	40	BCF, IR	^ 728 908 552	0.030	60	20	20	4.6	3.7
63	32	BCF, IR	728 908 560	0.043	65	20	20	5.8	2.9
63	40	BCF, IR	^ 728 908 559	0.047	65	20	20	5.8	3.7
63	50	BCF, IR	728 908 558	0.052	65	20	20	5.8	4.6

A



Reducer, PN 6, Natural PP

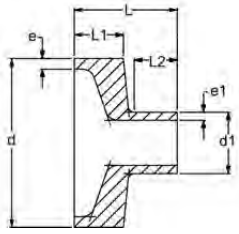
* 90mm side SDR17.6 - 63mm side SDR11

	d (mm)	d1 (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	L2 (mm)	e (mm)	e1 (mm)
*	90	63	BCF, IR	728 908 471	0.087	75	22	19	5.1	5.8

B

Flush Style Reducer, PN 10, Natural PP

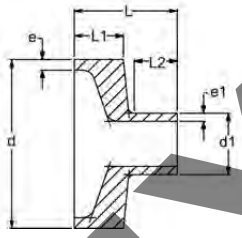
d (mm)	d1 (mm)	FM	Part No.	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)
50	20	IR	* 728 909 607	4.6	1.9	52	24	25
63	20	IR	* 728 909 611	5.8	1.9	52	24	25
63	25	IR	* 728 909 612	5.8	2.3	52	23	26



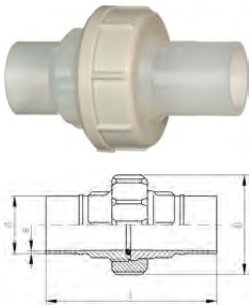
B

Flush Style Reducer, PN 6, Natural PP

d (mm)	d1 (mm)	FM	Part No.	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)
90	20	IR	* 728 909 622	5.1	1.9	63	32	25
90	25	IR	* 728 909 623	5.1	2.3	64	32	26
90	32	IR	* 728 909 624	5.1	2.9	65	32	26
90	40	IR	* 728 909 625	5.1	3.7	66	32	28
90	50	IR	* 728 909 626	5.1	4.6	67	32	28



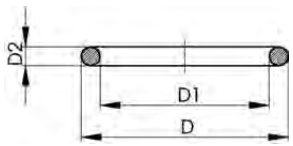
A



Union, PN 10, Natural PP

d (mm)	FM	EPDM Part No.	FKM Part No.	weight (lb)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	e (mm)
20	BCF, IR	**728 518 526**	*** 728 528 526**	0.106	48	107	53	25	1.9
25	BCF, IR	**728 518 527**	*** 728 528 527**	0.168	58	113	56	25	2.3
32	BCF, IR	**728 518 528**	*** 728 528 528**	0.234	65	119	59	25	2.9
40	BCF, IR	**^ 728 518 529**	*** 728 528 529**	0.324	79	126	63	25	3.7
50	BCF, IR	**728 518 530**	*** 728 528 530**	0.428	91	131	65	25	4.6
63	BCF, IR	**728 518 531**	*** 728 528 531**	0.756	111	137	68	25	5.8

B



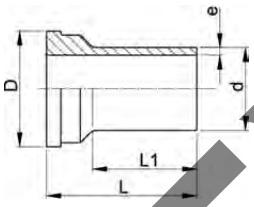
O-Ring Gasket

Model:

- Hardness approx. 65° Shore
- Suitable for unions with part numbers 728518526-531 and 728528526-531, respectively

d (mm)	Size (inch)	EPDM Part No.	FKM Part No.	D (mm)	D1 (mm)	D2 (mm)
20	½	*** 748 410 140**	*** 749 410 140**	20	15	2.62
25	¾	**^ 748 410 006**	**^ 749 410 006**	27	20	3.53
32	1	*** 748 410 025**	*** 749 410 025**	32	25	3.53
40	1 ¼	*** 748 410 152**	*** 749 410 152**	42	31	5.34
50	1 ½	**748 410 009**	**749 410 009**	51	41	5.34
63	2	*** 748 410 171**	*** 749 410 171**	61	50	5.34

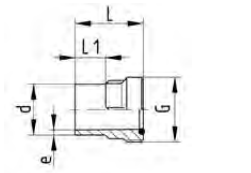
B



Union End, PN 10, Natural PP

d (mm)	FM	Part No.	weight (kg)	D (mm)	L (mm)	L1 (mm)	e (mm)
20	BCF, IR	**728 608 506**	0.004	30	53	35	1.9
25	BCF, IR	**728 608 507**	0.013	39	56	36	2.3
32	BCF, IR	**728 608 508**	0.024	45	59	38	2.9
40	BCF, IR	**728 608 509**	0.042	57	63	39	3.7
50	BCF, IR	**728 608 510**	0.055	63	65	41	4.6
63	BCF, IR	**728 608 511**	0.092	78	69	43	5.8

A



Union Bushing, PN 10, Natural PP

d (mm)	FM	Part No.	weight (kg)	G (R/Rp BS Thread) (inch)	L (mm)	L1 (mm)	e (mm)
20	BCF, IR	*** 728 648 526**	0.012	1	54	26	1.9
25	BCF, IR	*** 728 648 527**	0.020	1 1/4	57	26	2.3
32	BCF, IR	*** 728 648 528**	0.029	1 1/2	60	25	2.9
40	BCF, IR	*** 728 648 529**	0.047	2	63	25	3.7
50	BCF, IR	*** 728 648 530**	0.072	2 1/4	66	25	4.6
63	BCF, IR	*** 728 648 531**	0.104	2 3/4	69	25	5.8

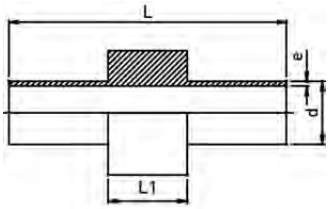
B

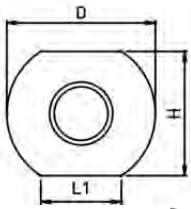
Union Nut, PN 10, Standard PP

Socket Fusion d (mm)	Butt Fusion d (mm)	G (R/Rp BS Thread) (inch)	Part No.	D (mm)	L (mm)
16	16	3/4	**727 890 405**	35	21
20	20	1	**727 890 406**	48	24
25	25	1 1/4	**727 890 407**	58	26
32	32	1 1/2	**727 890 408**	65	28
40	40	2	**727 890 409**	77	27
50	50	2 1/4	**727 890 410**	84	30
63	63	2 3/4	**727 890 411**	111	39
75	75 - 90	S107,5x3,6	***727 890 422**	135	40
90	110	S127,5x3,6	***727 890 423**	158	43
110	-	S152,5x3,6	***727 890 424**	188	48

B

Instrument Installation Fitting, PN 10, Natural PP





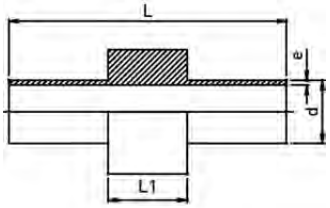
Add "T" to end of part number and fee to list price for each factory milled thread (max. diameter is 3/4"). See published price list for fee.

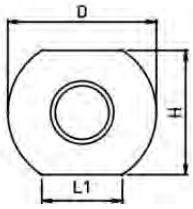
d (mm)	FM	Part No.	e (mm)	L (mm)	D (mm)	H (mm)	L1 (mm)
20	BCF, IR	***728 918 606**	1.9	140	71	58	40
25	BCF, IR	***728 918 607**	2.3	140	75	63	40
32	BCF, IR	***728 918 608**	2.9	140	81	70	40
40	BCF, IR	***728 918 609**	3.7	140	88	78	40
50	BCF, IR	***728 918 610**	4.6	140	97	88	40
63	BCF, IR	***728 918 611**	5.8	140	109	101	40

B

Instrument Installation Fitting, PN 6, Natural PP

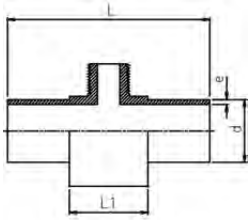
d (mm)	FM	Part No.	e (mm)	L (mm)	D (mm)	H (mm)	L1 (mm)
90	BCF, IR	* 728 918 613	5.1	140	134	128	40

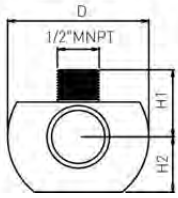




B

1/2" MNPT Low Profile Adapter, PN 10, Natural PP

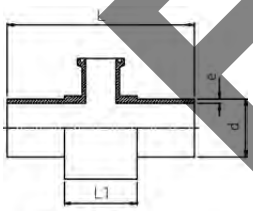




d (mm)	FM	Part No.	e (mm)	L (mm)	D (mm)	H1 (mm)	H2 (mm)	L1 (mm)
20	BCF, IR	* 728 918 626	1.9	140	71	28	29	40
25	BCF, IR	* 728 918 627	2.3	140	75	31	32	40
32	BCF, IR	* 728 918 628	2.9	140	81	34	35	40
40	BCF, IR	* 728 918 629	3.7	140	88	38	39	40
50	BCF, IR	* 728 918 630	4.6	140	97	43	44	40
63	BCF, IR	* 728 918 631	5.8	140	109	50	51	40

B

3/4" (3A) Sanitary Adapter, PN 10 Natural PP

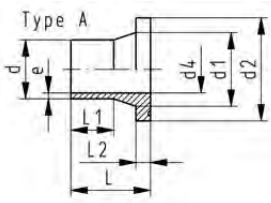


3/4" size sanitary adapter port, i.e. 0.985" flange OD

d (mm)	FM	Part No.	e (mm)	L (mm)	D (mm)	H1 (mm)	H2 (mm)	L1 (mm)
20	BCF, IR	* 728 918 646	1.9	140	71	28	29	40
25	BCF, IR	* 728 918 647	2.3	140	75	31	32	40
32	BCF, IR	* 728 918 648	2.9	140	81	34	35	40
40	BCF, IR	* 728 918 649	3.7	140	88	38	39	40
50	BCF, IR	* 728 918 650	4.6	140	97	43	44	40
63	BCF, IR	* 728 918 651	5.8	140	109	50	51	40

A

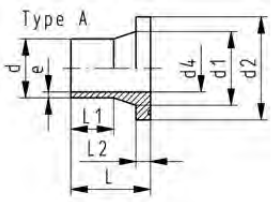
Flange Adapter - ANSI Serrated, PN 10, Natural PP



d (mm)	FM	Part No.	weight (lb)	e (mm)	d1 (mm)	d2 (mm)	d4 (mm)	L (mm)	L1 (mm)	L2 (mm)
20	BCF, IR	**728 798 706**	0.033	1.9	27	45	16	50	29	7
25	BCF, IR	**728 798 657**	0.053	2.3	33	54	20	52	27	9
32	BCF, IR	**728 798 658**	0.079	3.0	40	63	26	54	28	10
40	BCF, IR	**^ 728 798 659**	0.132	3.7	50	73	32	56	25	11
50	BCF, IR	**728 798 660**	0.176	4.6	61	82	40	62	32	12
63	BCF, IR	**728 798 711**	0.306	5.8	75	102	51	68	38	14

A

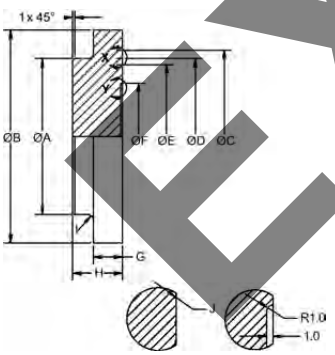
Flange Adapter - ANSI Serrated, PN 6, Natural PP



d (mm)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	L2 (mm)	e (mm)	d1 (mm)	d2 (mm)	d4 (mm)
90	BCF, IR	**728 798 788**	0.271	80	41	17	5.7	105	138	78

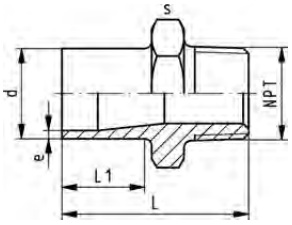
A

Blind Flange, PN 10, Standard PP



d (mm)	ANSI (inch)	Part No.	weight (lb)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	Rad I (mm)	Rad J (mm)
20	½	**727 991 362**	0.040	26	44	28	22		16	7	14	1.0	0.4
25	¾	**727 991 363**	0.062	32	54	36	29		20	9	16	1.5	0.4
32	1	**727 991 364**	0.093	40	63	43	36		26	10	17	1.5	0.4
40	1 ¼	**^ 727 991 365**	0.132	49	73	54	47		33	11	19	2.0	0.4
50	1 ½	**727 991 366**	0.172	60	79	64	56		41	12	20	2.0	0.4
63	2	**727 991 367**	0.309	75	99	83	75	69	51	14	24	2.5	0.4
90	3	**727 991 369**	0.672	105	133	115	106	97	74	17	27	3.0	0.4

A



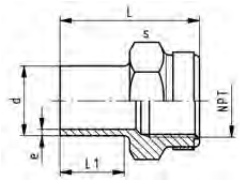
Male Adapter, PN 10, Natural PP

Model:

- With butt fusion spigot SDR11 and NPT tapered male thread
- Connection to plastic thread only
- Do not use thread sealing pastes that are harmful to PP
- Install with low mechanical stress and avoid large cyclic temperature changes

d (mm)	NPT (inch)	FM	Part No.	weight (kg)	L (mm)	L1 (mm)	s (mm)	e (mm)
20	½	BCF, IR	**728 914 106**	0.013	51	28	32	1.9
25	¾	BCF, IR	**728 914 107**	0.017	52	28	36	2.3
32	1	BCF, IR	**728 914 108**	0.027	55	28	46	2.9
40	1 ¼	BCF, IR	**^ 728 914 109**	0.039	58	28	55	3.7
50	1 ½	BCF, IR	**728 914 110**	0.054	60	28	65	4.6
63	2	BCF, IR	**728 914 111**	0.093	67	28	80	5.8

A



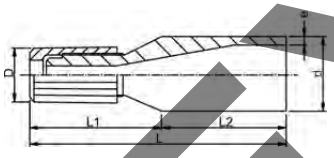
Female Adapter, PN 10, Natural PP

Model:

- Connection to plastic or metal threads
- Reinforcing ring stainless (A2)
- Install with low mechanical stress and avoid large cyclic temperature changes

d (mm)	FM	NPT (inch)	Part No.	weight (kg)	L (mm)	L1 (mm)	s (mm)	e (mm)
20	BCF, IR	½	**728 914 056**	0.016	49	28	32	1.9
25	BCF, IR	¾	**728 914 057**	0.019	51	28	36	2.3
32	BCF, IR	1	**728 914 058**	0.039	54	28	46	2.9
40	BCF, IR	1 ¼	**^ 728 914 059**	0.052	56	28	55	3.7
50	BCF, IR	1 ½	**728 914 060**	0.085	60	28	64	4.6
63	BCF, IR	2	**728 914 061**	0.140	62	28	80	5.8

A

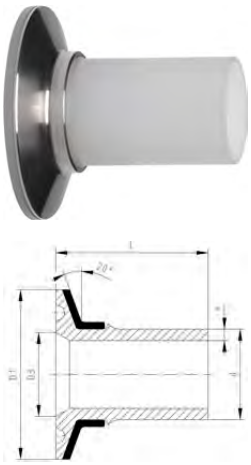


Flare Tube Adapter, PN 10, Natural PP

Nut is PVDF material

d (mm)	Tube Size (inch)	FM	Part No.	e (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)
20	¼	BCF, IR	*** 728 991 430**	1.9	19	74	43	31
20	⅜	BCF, IR	*** 728 991 431**	1.9	22	77	46	31
20	½	BCF, IR	*** 728 991 432**	1.9	25	79	48	31
20	¾	BCF, IR	*** 728 991 433**	1.9	34	83	52	31
25	¼	BCF, IR	*** 728 991 435**	2.3	19	74	43	31
25	⅜	BCF, IR	*** 728 991 436**	2.3	22	77	46	31
25	½	BCF, IR	*** 728 991 437**	2.3	25	79	48	31
25	¾	BCF, IR	*** 728 991 438**	2.3	34	83	52	31
25	1	BCF, IR	*** 728 991 439**	2.3	37	84	58	31
32	½	BCF, IR	*** 728 991 442**	3.0	25	79	48	31
32	¾	BCF, IR	*** 728 991 443**	3.0	34	83	52	31
32	1	BCF, IR	*** 728 991 444**	3.0	37	89	58	31

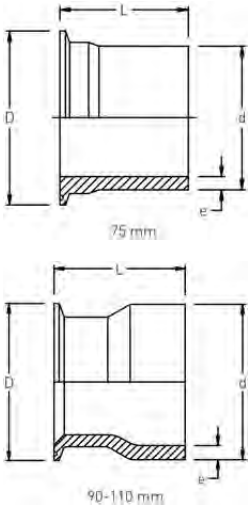
A



Sanitary Adapter, PN 10, Natural PP Connection to ASME BPE

	d (mm)	Size (inch)	FM	Part No.	weight (lb)	L (mm)	e (mm)	D3 (mm)	D1 (mm)
*	20	¾	BCF, IR	**728 598 357**	0.011	49	1.9	16	25
	25	1	BCF, IR	**728 598 359**	0.064	50	2.3	22	51
	32	1 ½	BCF, IR	**728 598 362**	0.066	53	2.9	35	51
	40	1 ½	BCF, IR	**^ 728 598 365**	0.082	54	3.7	35	51
	50	2	BCF, IR	**728 598 367**	0.139	61	4.6	48	64
	63	2 ½	BCF, IR	**728 598 369**	0.212	67	5.8	60	78

B

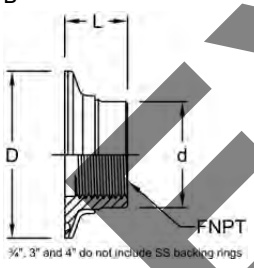


Large Sanitary Adapter

Does not use a Sanitary Backing Ring

	d (mm)	Tube (3A) (inch)	FM	Part No.	e (mm)	D (mm)	L (mm)
**	90	3	BCF, IR	*** 728 598 371**	5.1	91	76

B

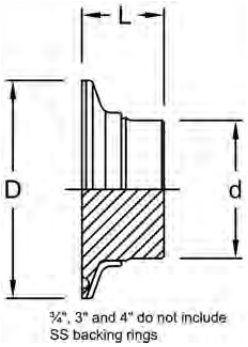


Sanitary Instrument Adapter, PN 10/PN 6, Natural PP

For use when a threaded connection is required in a sanitary system
Does not use a Sanitary Backing Ring

	Tube (3A) (inch)	FNPT (inch)	Part No.	D (mm)	d (mm)	L (mm)
**	¾	¼	*** 728 992 400**	25	20	13
	1	¼	*** 728 992 401**	51	40	19
	1	⅜	*** 728 992 402**	51	40	19
	1 ½	¼	*** 728 992 403**	51	40	19
	1 ½	½	*** 728 992 404**	51	40	19
	1 ½	¾	*** 728 992 405**	51	40	19

B

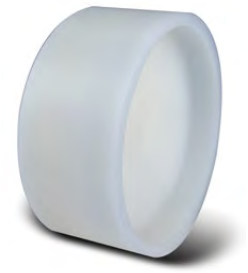


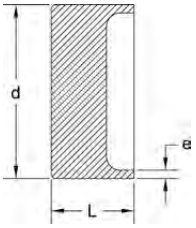
Sanitary Blank, PN 10/PN 6, Natural PP

Does not use a Sanitary Backing Ring

	Tube (3A) (inch)	Part No.	D (mm)	d (mm)	L (mm)
**	3/4	* 728 992 390	25	20	13
	1 & 1 1/2	* 728 992 391	51	32	19
	2	* 728 992 392	64	50	19
**	3	* 728 992 394	91	75	19

B



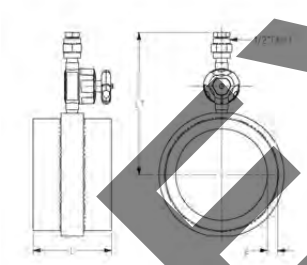


End cap, PN 10/PN 6, Natural PP

Sizes 63mm and smaller are PN 10. Size 90mm is PN 6.
Add "T" to end of part number and fee to list price for each factory milled thread (max. diameter is 3/4"). See published price list for fee.

d (mm)	FM	Part No.	e (mm)	L (mm)
20	IR	* 728 992 680	1.9	30
25	IR	* 728 992 681	2.3	30
32	IR	* 728 992 682	3.0	30
40	IR	* 728 992 683	3.7	30
50	IR	* 728 992 684	4.6	36
63	IR	* 728 992 685	5.8	37
90	IR	* 728 992 687	5.1	40

B

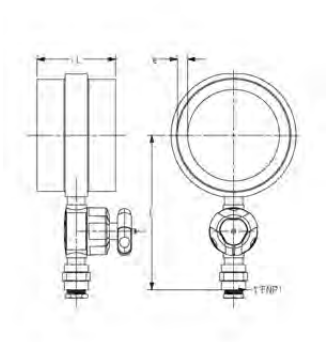


Vent Port Assembly, PN 10/PN 6, Natural PP

Sizes 63mm and smaller are PN 10. Size 90mm is PN 6.
Vent is 1/2" PP-N Type 515 Diaphragm Valve with MPT plug

d (mm)	FM	Part No.	e (mm)	L (mm)	L1 (mm)
50	BCF, IR	* 728 992 600	4.6	140	183
63	BCF, IR	* 728 992 601	5.8	140	189
90	BCF, IR	* 728 992 603	5.1	140	201

B

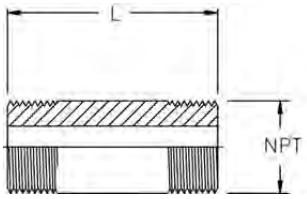


Drain Port Assembly, PN 10/PN 6, Natural PP

Sizes 63mm and smaller are PN 10. Size 90mm is PN 6.
Drain is 1" PP-N Type 515 Diaphragm Valve with MPT plug

d (mm)	FM	Part No.	e (mm)	L (mm)	L1 (mm)
50	BCF, IR	**728 992 610**	4.6	140	215
63	BCF, IR	**728 992 611**	5.8	140	221
90	BCF, IR	**728 992 613**	8.2	140	233

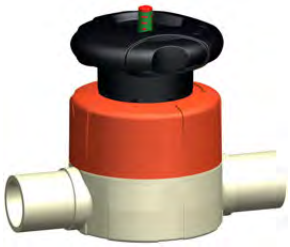
A

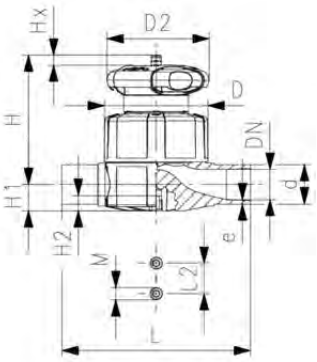


Nipples, PN 10, Natural PP

Male NPT (inch)	L (inch)	Part No.
½	2	* 728 992 350
½	3	* 728 992 351
½	4	* 728 992 352
¾	2	* 728 992 353
¾	3	* 728 992 354
¾	4	* 728 992 355
1	2	* 728 992 356
1	3	* 728 992 357
1	4	* 728 992 358
1 ¼	3	* 728 992 359
1 ¼	4	* 728 992 360
1 ½	3	* 728 992 361
1 ½	4	* 728 992 362
2	3	* 728 992 363
2	4	* 728 992 364

A





Type 515 Diaphragm Valve PROGEF Natural PP
Butt fusion spigots SDR11 metric

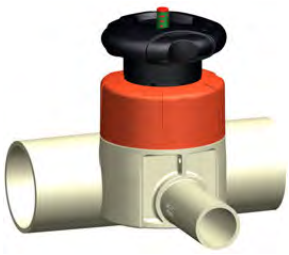
Model:

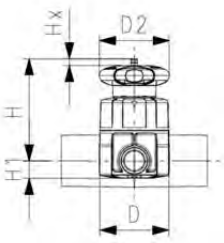
- EPDM version is PN 10 pressure rated. PTFE/EPDM version is PN 6 pressure rated.

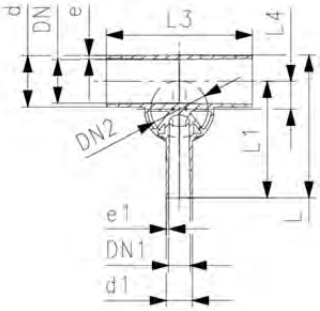
d (mm)	DN	PN (bar)	EPDM Part No.	PTFE/EPDM Part No.	weight (lb)
20	DN15	10/6*	**168 515 112**	**168 515 132**	0.679
25	DN20	10/6*	**168 515 113**	**168 515 133**	0.866
32	DN25	10/6*	**168 515 114**	**168 515 134**	2.136
40	DN32	10/6*	**168 515 115**	**168 515 135**	2.480
50	DN40	10/6*	**168 515 116**	**168 515 136**	4.592
63	DN50	10/6*	**168 515 117**	**168 515 137**	5.798

d (mm)	D (mm)	D2 (mm)	L (mm)	L2 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	Lift = Hx (mm)	closest inch (inch)
20	65	65	124	25	73	14	12	M6	7	½
25	80	65	144	25	81	18	12	M6	10	¾
32	88	87	155	25	107	22	12	M6	13	1
40	101	87	176	45	115	26	15	M8	15	1 ¼
50	117	135	193	45	148	32	15	M8	19	1 ½
63	144	135	223	45	166	39	15	M8	25	2

A







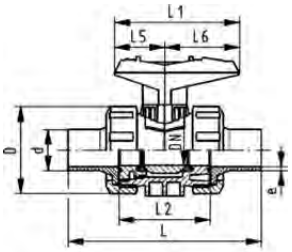
Type 519 Diaphragm Valve Zero Static
PROGEF Natural PP
Butt fusion spigots SDR11 metric

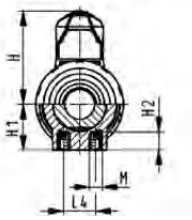
d (mm)	d1 (mm)	Valve Size d (mm)	DN2 (mm)	EPDM Part No.	PTFE/EPDM Part No.	weight (lb)
20	20	20	15	^ 168 519 101	^ 168 519 301	0.710
25	20	25	20	^ 168 519 103	^ 168 519 303	0.877
25	25	25	20	^ 168 519 104	^ 168 519 304	0.880
32	20	25	20	^ 168 519 107	^ 168 519 307	0.937
32	25	25	20	^ 168 519 108	^ 168 519 308	0.941
32	32	32	25	^ 168 519 109	^ 168 519 309	2.163
40	20	32	25	^ 168 519 112	^ 168 519 312	2.222
40	40	40	25	168 519 115	168 519 315	2.280
50	20	25	20	^ 168 519 118	^ 168 519 318	1.069
50	25	32	25	^ 168 519 119	^ 168 519 319	2.324
50	32	32	25	^ 168 519 120	^ 168 519 320	2.328
63	20	25	20	^ 168 519 125	^ 168 519 325	1.155
63	25	32	25	^ 168 519 126	^ 168 519 326	2.418
63	32	32	25	^ 168 519 127	^ 168 519 327	2.425

d (mm)	D (mm)	D2 (mm)	L (mm)	L1 (mm)	L3 (mm)	L4 (mm)	H (mm)	Lift = Hx (mm)	e (mm)	e1 (mm)	closest inch (inch)
20	65	65	117	96	162	12	75	7	1.9	1.9	½
25	80	65	133	108	162	16	80	10	2.3	1.9	¾
25	80	65	133	108	162	16	80	10	2.3	2.3	¾
32	80	65	142	120	162	19	84	10	2.9	1.9	1
32	80	65	142	120	162	19	84	10	2.9	2.3	1
32	88	87	145	120	160	19	107	13	2.9	2.9	1
40	88	87	149	128	180	23	115	13	3.7	1.9	1 ¼
40	88	87	174	153	180	23	115	13	3.7	3.7	1 ¼
50	80	65	160	134	180	27	97	10	4.6	1.9	1 ½
50	88	87	160	134	180	28	120	13	4.6	2.3	1 ½
50	88	87	160	134	180	28	120	13	4.6	2.9	1 ½
63	80	65	177	144	180	33	104	10	5.8	1.9	2
63	88	87	177	144	180	35	127	13	5.8	2.3	2
63	88	87	177	144	180	35	127	13	5.8	2.9	2

A

DN10/15 - 50





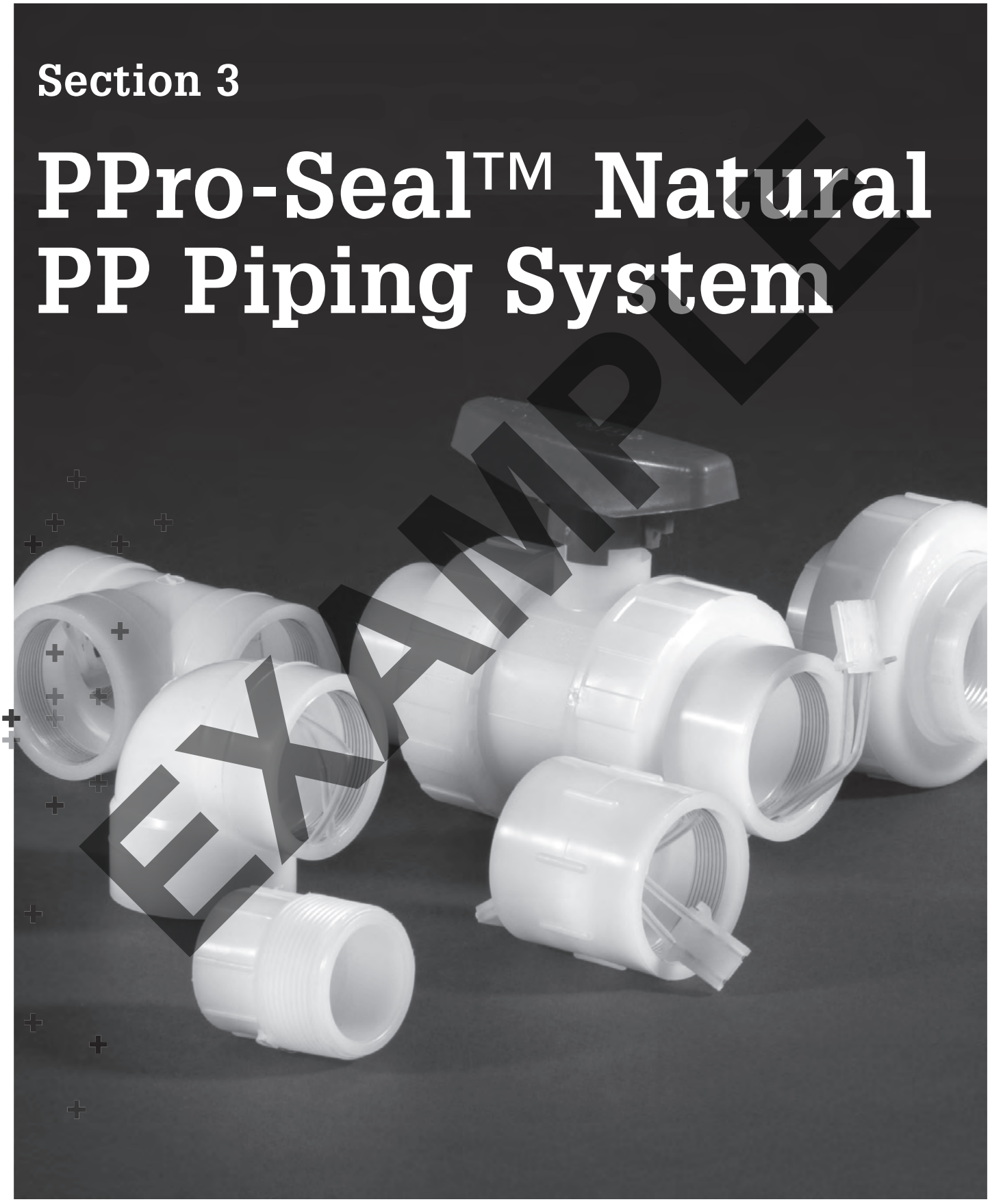
Type 546 Ball Valve PROGEF Standard
With PROGEF Natural Valve Ends
IR/BCF Fusion Spigots

d (mm)	EPDM Part No.	FKM Part No.
20	^ 157 546 442	^ 157 546 452
25	^ 157 546 443	^ 157 546 453
32	^ 157 546 444	^ 157 546 454
40	^ 157 546 445	^ 157 546 455
50	^ 157 546 446	^ 157 546 456
63	^ 157 546 447	^ 157 546 457
90	^ 157 546 448	^ 157 546 458

d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	e (mm)	closest inch (inch)
20	50	57	27	12	130	77	56	25	32	45	M6	1.9	½
25	58	67	30	12	143	97	65	25	39	58	M6	2.3	¾
32	68	73	36	12	150	97	71	25	39	58	M6	3.0	1
40	84	90	44	15	171	128	85	45	54	74	M8	3.7	1 ¼
50	97	97	51	15	191	128	89	45	54	74	M8	4.6	1 ½
63	124	116	64	15	220	152	101	45	66	87	M8	5.8	2
90	200	161	105	15	264	270	141	70	64	206	M8	9.9	3

Section 3

PPro-Seal™ Natural PP Piping System



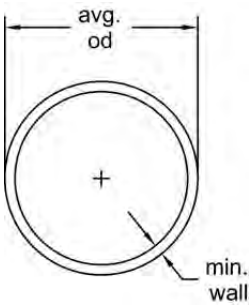
PPro-Seal™ Natural – System Specification

Material	Polypropylene Random Copolymer
Color	Unpigmented, translucent
Specific gravity	0.905
Tensile strength	4,000 psi @ 72°F
Flexural modulus	1.5×10^5 psi
Izod impact strength	8.0 ft-lbs/inch notch @ 72°F
Coefficient of thermal expansion	6.1×10^{-5}
Hardness	87 Rockwell R Scale
Dimension	½" – 2" Schedule 80 IPS
Pressure Rating	Pipes/Fittings/Diaphragm valves: up to 150 psi @ 23°C (72°F) (Electrofusion only)
Temperature Rating	from 0 °C to 80 °C (< 60 °C for valves) (32 °F–176 °F)
Production	Fittings/valves: injection molded Pipes: extruded
Marking	Size Lot No. (pipe only) Material Dimension Pressure Rating (pipe only)
Testing and Inspection	Inclusions Visual inspection Dimension Pressure testing
Approvals/Conformance	FDA CFR 21 177.1520 USP 25 class VI (physiological non-toxic) ASTM D4101 ASTM F1290
Joining Technology	Electrofusion Threaded (NPT)
Documentation	Certificate of Compliance to FDA & USP
Packing	Pipes: Bulk bagged; quantities vary Fittings/valves: Bulk bagged; quantities vary
Labeling	Brand Name Product Description Code Number Material Dimension
Main Applications	Uses include cost effective, pure distribution of DI-water and critical biological fluids where chemical sanitization is needed.

Table of contents		Page
	PPro-Seal Pipe	158
	PPro-Seal Electrofusion Fittings	159
	PPro-Seal Valves	163
	PPro-Seal Fusion Accessories	164
	PPro-Seal Threaded Fittings	165

PPro-Seal Pipe

A



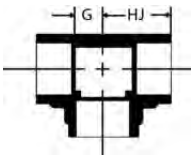
Pipe - Schedule 80 PPn

20' lengths available upon request
All pipe must be ordered in lift quantities to maintain cleanliness.

Size (inch)	lengths (ft)	Part No.	Lift Qty (ft)	avg. od (inch)	min. wall (inch)
1/2	10	* **37K011005**	250	0.840	0.147
3/4	10	* **37K011007**	150	1.050	0.154
1	10	* **37K011010**	100	1.315	0.179
1 1/2	10	* **37K011015**	40	1.900	0.200
2	10	* **37K011020**	30	2.375	0.218

PPro-Seal Electrofusion Fittings

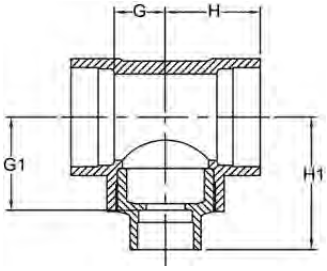
A



Tee (S x S x S)

Size (inch)	Part No.	Pack Qty	G (inch)	HJ (inch)
1/2	**801-005F**	5	0.51	1.22
3/4	**801-007F**	5	0.58	1.36
1	**801-010F**	5	0.70	1.67
1 1/2	**801-015F**	2	1.00	2.03
2	**801-020F**	2	1.26	2.32

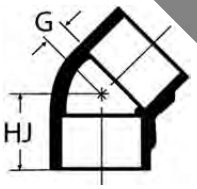
A



Tee - Reducing (S x S x S)

Size (inch)	Part No.	Pack Qty	G (inch)	G1 (inch)	H (inch)	H1 (inch)
1 x ½	**801-130F**	2	0.89	0.91	1.86	1.63
1 ½ x ½	**801-209F**	2	0.88	1.35	1.91	1.88
1 ½ x 1	*** 801-211FFB**	2	1.00	2.03	2.03	3.00
2 x ½	**801-247F**	2	0.86	1.62	2.02	2.16
2 x 1	*** 801-249FFB**	2	1.26	2.29	2.32	3.26

A

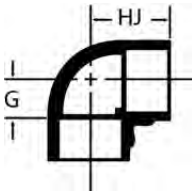


45° Ell (S x S)

Size (inch)	Part No.	Pack Qty	G (inch)	HJ (inch)
1/2	**817-005F**	5	0.31	1.02
3/4	**817-007F**	5	0.33	1.11
1	**817-010F**	5	0.39	1.36
1 1/2	**817-015F**	2	0.52	1.55
2	**817-020F**	2	0.64	1.70

A

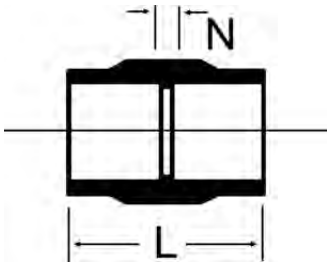
90° Ell (S x S)



Size (inch)	Part No.	Pack Qty	G (inch)	HJ (inch)
1/2	**806-005F**	5	0.51	1.22
3/4	**806-007F**	5	0.58	1.36
1	**806-010F**	5	0.70	1.67
1 1/2	**806-015F**	2	1.00	2.03
2	**806-020F**	2	1.26	2.32

A

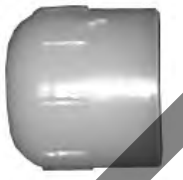
Coupling (S x S)

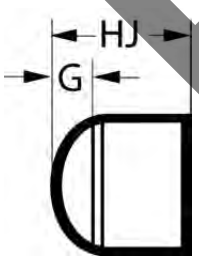


Size (inch)	Part No.	Pack Qty	L (inch)	N (inch)
1/2	**829-005F**	5	1.56	0.12
3/4	**829-007F**	5	1.68	0.12
1	**829-010F**	5	2.06	0.12
1 1/2	**829-015F**	2	2.25	0.18
2	**829-020F**	2	2.26	0.13

A

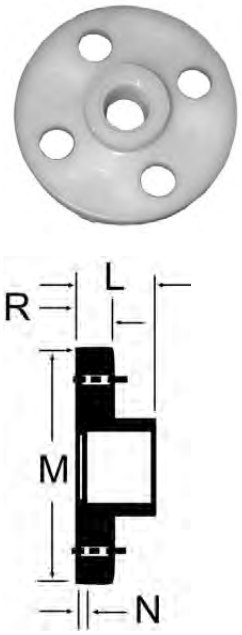
Cap (S)





Size (inch)	Part No.	Pack Qty	G (inch)	HJ (inch)
1/2	**847-005F**	5	0.42	1.14
3/4	**847-007F**	5	0.45	1.23
1	**847-010F**	5	0.53	1.50
1 1/2	**847-015F**	2	0.63	1.71
2	**847-020F**	2	0.75	1.84

A



Flange (S) without Backing Ring

Flange Backing Ring recommended for assembly

Size (inch)	Part No.	# holes	bolt hole dia. (inch)	bolt cir. dia. (inch)	L (inch)	M (inch)	N (inch)	R (inch)
½	**859-005F**	4	0.50	2.38	0.86	3.50	0.14	0.41
¾	**859-007F**	4	0.50	2.75	0.97	3.88	0.19	0.47
1	**859-010F**	4	0.50	3.13	1.16	4.25	0.19	0.53
1 ½	**859-015F**	4	0.50	3.88	1.24	5.00	0.21	0.66
2	**859-020F**	4	0.63	4.75	1.34	6.00	0.28	0.71

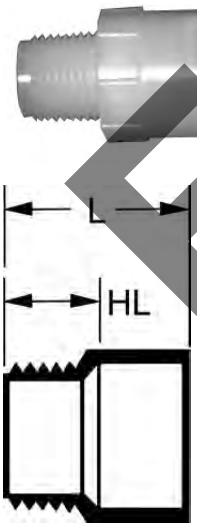
A

Flange Backing Ring

Flange Ring Material: 304SS

Size (inch)	Part No.
1/2	*** 855-005F**
3/4	*** 855-007F**
1	*** 855-010F**
1 1/2	*** 855-015F**
2	*** 855-020F**

A

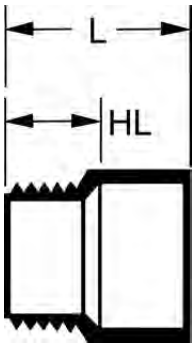


Male Adapter (MPT x S)

Threaded fittings not recommended for pressure applications

Size (inch)	Part No.	Pack Qty	HL (inch)	L (inch)
1/2	**836-005F**	5	1.02	1.73
3/4	**836-007F**	5	1.05	1.83
1	**836-010F**	5	1.28	2.25
1 1/2	**836-015F**	2	1.32	2.35
2	**836-020F**	2	1.37	2.43

A

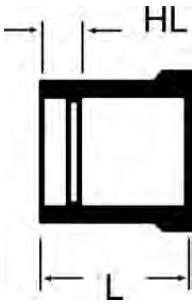


Male Adapter - Reducing (S x MPT)

Threaded fittings not recommended for pressure applications

Size (inch)	Part No.	Pack Qty	HL (inch)	L (inch)
½ x ¼	**836-036F**	5	0.79	2.00

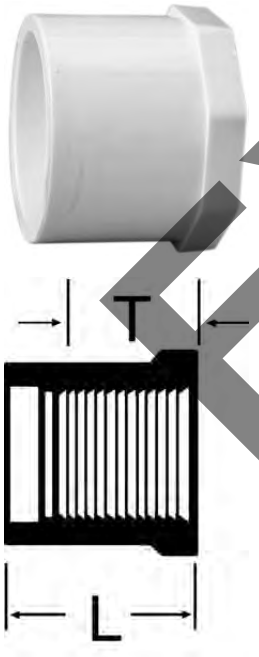
A



Reducer Bushing (Spg x S)

Size (inch)	Part No.	Pack Qty	HL (inch)	L (inch)
¾ x ½	**837-101F**	5	1.14	1.86
1 x ½	**837-130F**	5	1.03	1.75
1 x ¾	**837-131F**	5	1.10	1.88
1 ½ x ¾	**837-210F**	2	0.95	1.67
1 ½ x 1	**837-211F**	2	1.03	2.00
2 x 1	**837-249F**	2	1.03	2.00
2 x 1 ½	**837-251F**	2	0.81	1.84

A



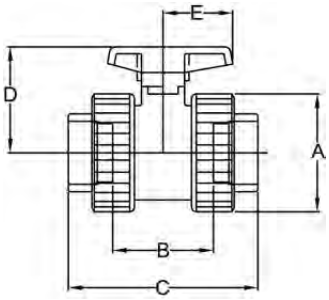
Reducer Bushing (Spg x FPT)

Threaded fittings not recommended for pressure applications

Size (inch)	Part No.	Pack Qty	L (inch)	T min. (inch)	Style
¾ x ½	**^ 838-101F**	5	1.13	0.53	Flush
1 x ½	**^ 838-130F**	5	1.75	0.53	Extended
1 x ¾	**^ 838-131F**	5	1.31	0.55	Flush
1 ½ x ¾	**^ 838-210F**	2	1.67	0.55	Flush
1 ½ x 1	**^ 838-211F**	2	1.67	0.68	Flush
2 x 1	**^ 838-249F**	2	2.00	0.68	Extended
2 x 1 ½	**^ 838-251F**	2	1.81	0.72	Flush

PPro-Seal Valves

A

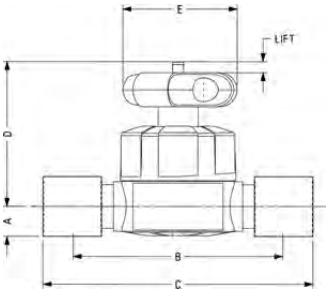


Type 375 Ball Valve (S x S) and (FPT x FPT)

O-Ring Material: FKM

Size (inch)	FKM Part No.	A (inch)	B (inch)	C (inch)	D (inch)	E (inch)
1/2	**1088375005F**	1.88	1.84	3.86	2.31	1.44
3/4	**1088375007F**	2.27	2.08	4.37	2.50	1.44
1	**1088375010F**	2.63	2.34	4.86	3.05	1.85
1 1/2	**1088375015F**	3.67	3.13	5.87	3.60	2.41
2	**1088375020F**	4.48	3.68	6.73	3.95	2.41

A

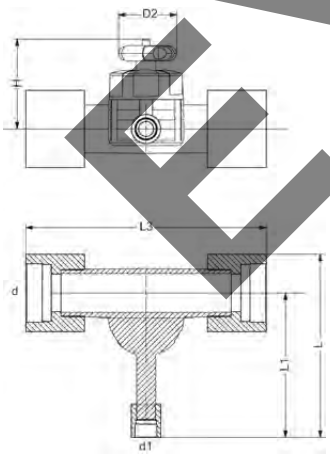


Type 515 Diaphragm Valve (S x S)

Valve is metric size with IPS size PPro-Seal electrofusion ends

EPDM Part No.	Size (inch)	A (inch)	B (inch)	C (inch)	D (inch)	E (inch)
150 901 005	½	0.55	5.12	6.54	3.54	3.15
150 901 007	¾	0.69	5.82	7.50	4.02	3.15
150 901 010	1	0.83	6.06	8.00	4.67	3.70
150 901 015	1 ½	1.28	8.27	10.33	10.33	4.61
150 901 020	2	1.53	9.10	11.22	11.22	5.98

A



Type 519 Zero Static Diaphragm Valve (S x S)

Valve is metric size with IPS size PPro-Seal electrofusion ends

Part No.	Size d (inch)	Size d1 (inch)	Valve Size d (mm)	H (inch)	D2 (inch)	L (inch)	L1 (inch)	L3 (inch)
150 519 011	½	½	20	3.0	2.6	5.3	4.6	8.0
150 519 000	¾	½	25	3.1	2.6	6.0	5.0	8.0
150 519 001	¾	¾	25	3.1	2.6	6.1	5.1	8.0
150 519 002	1	½	25	3.3	2.6	6.3	5.4	8.5
150 519 003	1	¾	25	3.3	2.6	6.4	5.5	8.5
150 519 004	1	1	32	4.2	3.4	6.6	5.6	8.5
150 519 005	1 ½	½	25	3.8	2.6	7.1	6.0	9.8
150 519 006	1 ½	¾	32	4.7	3.4	7.3	6.1	9.8
150 519 007	1 ½	1	32	4.7	3.4	7.5	6.3	9.8
150 519 008	2	½	25	4.2	2.6	7.7	6.4	10.0
150 519 009	2	¾	32	5.0	3.4	7.9	6.5	10.0
150 519 010	2	1	32	5.0	3.4	8.3	7.0	10.0

PPro-Seal Fusion Accessories

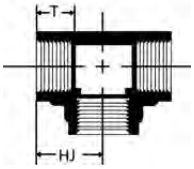
A

Loose Coil

Size (inch)	Part No.	Pack Qty
1/2	* 37K164005	10
3/4	* 37K164007	10
1	* 37K164010	10
1 1/2	* 37K164015	10
2	* 37K164020	10

PPro-Seal Threaded Fittings

A

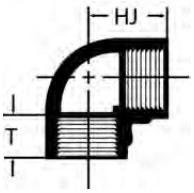


Tee (FPT x FPT x FPT)

Threaded fittings not recommended for pressure applications

Size (inch)	Part No.	Pack Qty	HJ (inch)	T min. (inch)
1/2	**805-005F**	5	1.22	0.53
3/4	**805-007F**	5	1.36	0.55
1	**805-010F**	5	1.67	0.68
1 1/2	**805-015F**	2	2.03	0.72
2	**805-020F**	2	2.32	0.76

A

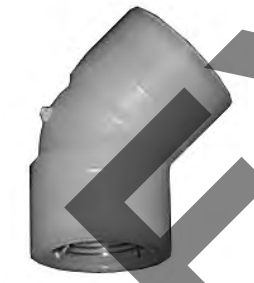


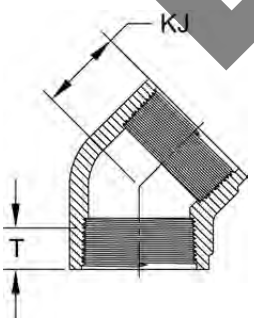
90° Ell (FPT x FPT)

Threaded fittings not recommended for pressure applications

Size (inch)	Part No.	Pack Qty	HJ (inch)	T min. (inch)
1/2	**808-005F**	5	1.22	0.53
3/4	**808-007F**	5	1.36	0.55
1	**808-010F**	5	1.67	0.68
1 1/2	**808-015F**	2	2.03	0.72
2	**808-020F**	2	2.32	0.76

A





45° Ell (FPT x FPT)

Threaded fittings not recommended for pressure applications

Size (inch)	Part No.	Pack Qty	KJ (inch)	T min. (inch)
1/2	**819-005F**	5	1.02	0.53
3/4	**819-007F**	5	1.11	0.55
1	**819-010F**	5	1.36	0.68
1 1/2	**819-015F**	2	1.55	0.72
2	**819-020F**	2	1.70	0.76

A

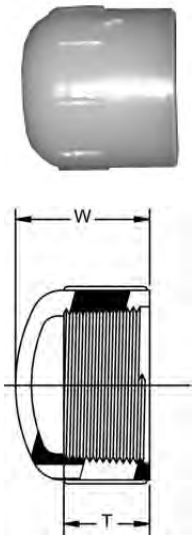
Coupling (FPT x FPT)

Threaded fittings not recommended for pressure applications

Size (inch)	Part No.	Pack Qty	L (inch)	T min. (inch)
1/2	**830-005F**	5	1.56	0.53
3/4	**830-007F**	5	1.68	0.55
1	**830-010F**	5	2.06	0.68
1 1/2	**830-015F**	2	2.25	0.72
2	**830-020F**	2	2.26	0.76

A

Cap (FPT)

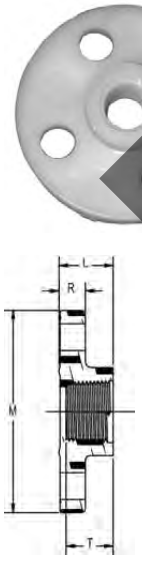


Threaded fittings not recommended for pressure applications

Size (inch)	Part No.	Pack Qty	W (inch)	T min. (inch)
1/2	**848-005F**	5	1.14	0.53
3/4	**848-007F**	5	1.23	0.55
1	**848-010F**	5	1.50	0.68
1 1/2	**848-015F**	2	1.71	0.72
2	**848-020F**	2	1.84	0.76

A

Flange (FPT) without Backing Ring



Flange Backing Ring recommended for assembly
Threaded fittings not recommended for pressure applications

Size (inch)	Part No.	# holes	bolt hole dia. (inch)	bolt cir. dia. (inch)	L (inch)	M (inch)	R (inch)	T min. (inch)
1/2	**852-005F**	4	0.50	2.38	0.86	3.50	0.41	0.69
3/4	**852-007F**	4	0.50	2.75	0.97	3.88	0.47	0.69
1	**852-010F**	4	0.50	3.13	1.16	4.25	0.53	0.81
1 1/2	**852-015F**	4	0.50	3.88	1.24	5.00	0.66	0.88
2	**852-020F**	4	0.63	4.75	1.34	6.00	0.71	0.94

A

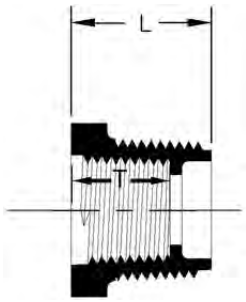
Flange Backing Ring

Flange Ring Material: 304SS

Size (inch)	Part No.
1/2	* 855-005F
3/4	* 855-007F
1	* 855-010F
1 1/2	* 855-015F
2	* 855-020F

A

Reducer Bushing (MPT x FPT)

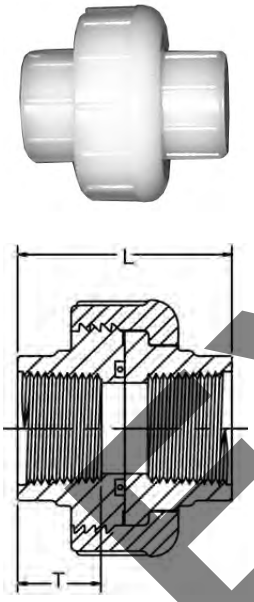


Threaded fittings not recommended for pressure applications

Size (inch)	Part No.	Pack Qty	L (inch)	T min. (inch)
¾ x ½	839-101F	5	1.70	0.53
1 x ½	839-130F	5	1.77	0.53
1 x ¾	839-131F	5	1.89	0.55
1 ½ x 1	839-211F	2	2.00	0.68
2 x 1	839-249F	2	2.00	0.68
2 x 1 ½	839-251F	2	1.81	0.72

A

Union (FPT x FPT)

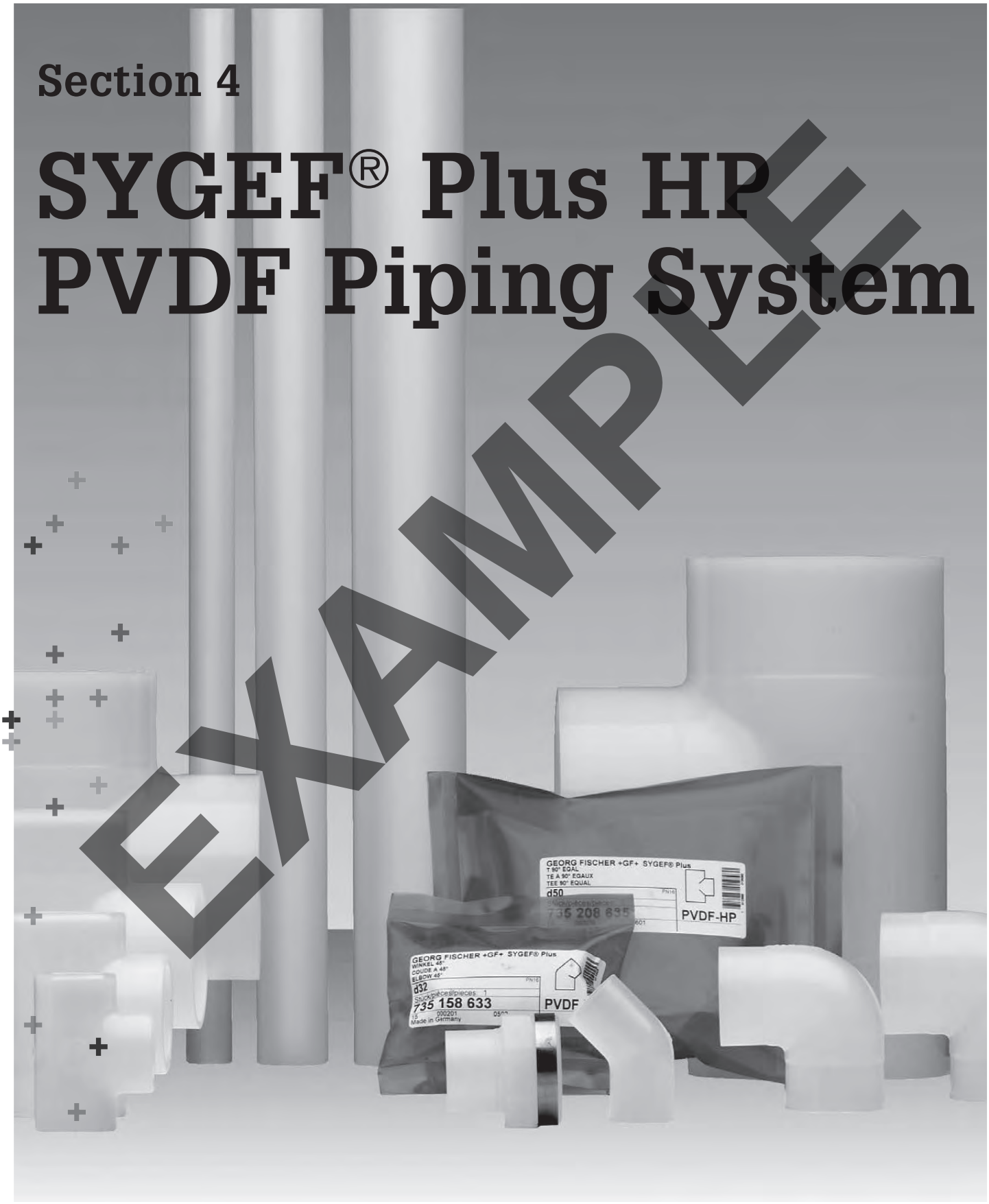


Threaded fittings not recommended for pressure applications
O-Ring Material: FKM

Size (inch)	Part No.	Pack Qty	L (inch)	T min. (inch)
1/2	898-005F	5	2.00	0.53
3/4	898-007F	5	2.08	0.55
1	898-010F	5	2.50	0.68
1 1/2	898-015F	2	2.69	0.72
2	898-020F	2	2.88	0.76

Section 4

SYGEF® Plus HP PVDF Piping System



SYGEF® Plus HP PVDF – Product Specification

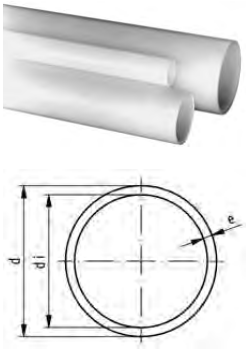
Material	High Purity Polyvinylidene Fluoride (PVDF HP)
Color	Virgin material, translucent
Density	~1.78 g/cm³ (ISO 1183 / ASTM D 792)
Surface tension	30–35 mJ/m²
Linear expansion coefficient	0.12–0.18 mm/mK (DIN 53752)
E-module (tensile strength)	2100 N/mm² (EN ISO 527 / ASTM D 790)
Thermal conductivity	0.19 W/mK (DIN 52612)
Surface resistivity	5×10^{14} Ωcm (IEC 60093)
Dimension	d 20 (½")–d 450 (18") in accordance to ISO 10931
Pressure rating	Pipes/fittings: PN 16/232 PSI (d 20–d 225), PN 10/150PSI (d 90–d 450) Valves: separate specification
Temperature rating	from –20 °C to 140 °C (-4 °F–284 °F)
Production[1]	Fittings/diaphragm valves: injection moulded Pipes: extruded Produced under clean room ISO 14644-1 Class 7 (U.S. Fed. Std. 209E Class 10'000) conditions. Subsequent assembling, quality inspection and cleaning is carried out using 18 MΩ pure water under clean room ISO 14644-1 Class 5-6 (U.S. Fed. Std. 209E Class 100-1000) conditions.
Surface finish	Inner surface ≤ d 225 Ra ≤ 0.2 µm (9 µin) / > d 225 Ra ≤ 0.3 µm (12 µin) for injection moulded and extruded components
Marking	All components are embossed with a permanent identification during the production process to ensure full traceability. Lot No Material Dimension Pressure Rating
Testing and inspection (ISO 10931)	Inclusions Visual inspection Surface finish Dimension tolerance Pressure testing Periodic leachout per SEMI F 40 / F 57
Approvals/conformance	ASME BPE FDA CFR 21 177.2510 USP 25 class VI (physiological non-toxic) SEMI F57
Welding technology	BCF® Plus, bead and crevice free fusion, size d 20 (½")–d 110 (4") IR® Plus, infrared fusion (DVS 2207-6), size d 20 (½")–d 450 (18")
Documentation[1]	Certificate of Conformance with FDA, USP EN 10204 2.2 EN 10204 3.1b
Packing[2]	Pipes capped and each component double bagged in an specified inner bag and an outer bag under clean room ISO 14644-1 Class 6 (U.S. Fed. Std. 209E Class 1000) conditions.
Labeling	Brand Name Product Description Code Number Material Dimension CE-labeling
Main applications	Uses include delivery of ultrapure water in the semiconductor/electronic industry, pharmaceutical grade water (WFI/PW) and analytical DI water to highest purity requirements. A wide range of sanitization methods is suitable such as Ozone, hot water or steam.

[1] on request
[2] Excluding pressure regulating valves. Products are cleaned and double bagged after production assuring controlled process and highest product standards.

Table of contents		Page
	Pipe	172
	IR Plus/BCF Plus Fusion Fittings	173
	Manual Valves	201
	Rotameters	208

Pipe

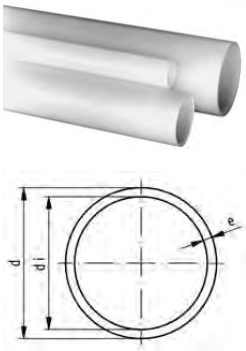
A



Pipe, PN 16, PVDF-HP

d (mm)	FM	Part No.	lbs/meter	e (mm)	di (mm)
20	BCF, IR	* 175 481 203	0.463	1.9	16.2
25	BCF, IR	* 175 481 204	0.593	1.9	21.2
32	BCF, IR	* 175 481 205	0.959	2.4	27.2
40	BCF, IR	* 175 481 206	1.241	2.4	35.2
50	BCF, IR	* 175 481 207	1.874	3.0	44.0
63	BCF, IR	* 175 481 208	2.403	3.0	57.0
75	BCF, IR	* 175 481 209	3.417	3.6	67.8
90	BCF, IR	* 175 481 210	4.916	4.3	81.4
110	BCF, IR	* 175 481 211	7.341	5.3	99.4
160	IR	* 175 481 214		7.7	144.6
200	IR	* 175 481 216		9.6	180.8
225	IR	* 175 481 217		10.8	202.6
250	IR	* 175 481 218		11.9	226.2
315	IR	* 175 481 220		15.0	285.0

A



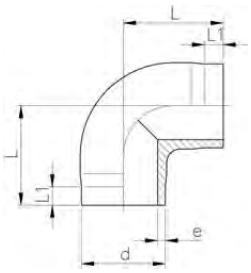
Pipe, PN 10, PVDF-HP

d (mm)	FM	Part No.	lbs/meter	e (mm)	di (mm)
90	BCF, IR	* 175 481 665	3.263	2.8	84.4
110	BCF, IR	* 175 481 666	4.850	3.4	103.2
160		* 175 481 668	10.009	4.9	150.2
200		* 175 481 669	15.851	6.2	187.6
225		* 175 481 670	19.731	6.9	211.2
250		* 175 481 671	24.471	7.7	234.6
315		* 175 481 674	38.801	9.7	295.6
355		* 175 481 657	46.208	10.9	333.2
400		* 175 481 658	58.753	12.3	375.4
450		* 175 481 659	74.163	13.8	422.4

IR Plus/BCF Plus Fusion Fittings

A

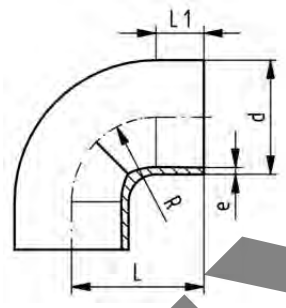
90° Elbow Short Radius, PN 16, PVDF-HP



FM	d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)
BCF, IR	20	**735 108 631**	0.037	1.9	38	25
BCF, IR	25	**735 108 632**	0.051	1.9	42	26
BCF, IR	32	**735 108 633**	0.088	2.4	46	26
BCF, IR	40	**^ 735 108 634**	0.132	2.4	51	28
BCF, IR	50	**735 108 635**	0.231	3.0	58	28
BCF, IR	63	**735 108 636**	0.437	3.0	66	28

A

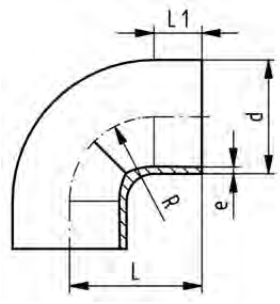
90° Elbow Sweep Radius, PN 16, PVDF-HP



d (mm)	FM	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)	R (mm)
75	BCF, IR	**^ 735 018 737**	0.536	3.6	75	23	62
90	BCF, IR	**^ 735 018 738**	0.933	4.3	90	23	77
110	BCF, IR	**^ 735 018 739**	1.554	5.3	110	23	98
160	IR	**735 018 742**	4.524	7.7	160	33	141
200	IR	**735 018 744**	8.488	9.6	200	33	181
225	IR	**735 018 745**	11.612	10.8	220	33	200
250	IR	**^ 735 018 746**	14.409	11.9	254	48	232
315	IR	**^ 735 018 748**	28.728	15.0	321	48	297

A

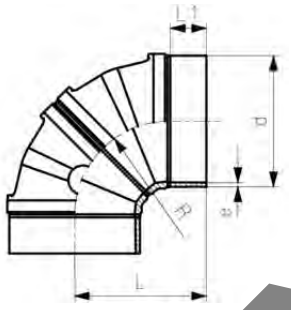
90° Elbow Sweep Radius, PN 10, PVDF-HP



d (mm)	FM	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)	R (mm)
90	BCF, IR	**^ 735 018 538**	0.728	2.8	90	23	77
110	BCF, IR	**^ 735 018 539**	1.268	3.4	110	23	98
160	IR	**735 018 542**	3.395	4.9	160	33	141
200	IR	**735 018 544**	4.449	6.2	200	33	181
225	IR	*** 735 018 545**	8.713	6.9	220	33	200
250	IR	**^ 735 018 546**	9.489	7.7	254	48	232
315	IR	**^ 735 018 548**	19.912	9.7	321	48	297

A

90° Elbow Sweep Radius, PN 10, PVDF-HP



d (mm)	FM	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)	R (mm)
355	IR	**^ 735 018 549**	39.842	10.9	359	100	257
400	IR	**^ 735 018 550**	52.878	12.3	392	100	290
450	IR	**^ 735 018 551**	70.652	13.8	430	100	328

A

45° Elbow, PN 16, PVDF-HP

FM	d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)
BCF, IR	20	**735 158 631**	0.031	1.9	32	25
BCF, IR	25	**735 158 632**	0.042	1.9	34	26
BCF, IR	32	**735 158 633**	0.073	2.4	36	26
BCF, IR	40	**^ 735 158 634**	0.093	2.4	39	28
BCF, IR	50	**735 158 635**	0.185	3.0	42	30
BCF, IR	63	**735 158 636**	0.267	3.0	47	31
BCF, IR	75	**^ 735 158 637**	0.437	3.6	49	32
BCF, IR	90	**735 158 638**	0.597	4.3	57	37
BCF, IR	110	**735 158 639**	1.100	5.3	70	46
	160	**735 158 642**	3.538	7.7	100	62
	200	**735 158 644**	6.654	9.6	124	77
	225	*** 735 158 645**	9.533	10.8	140	88

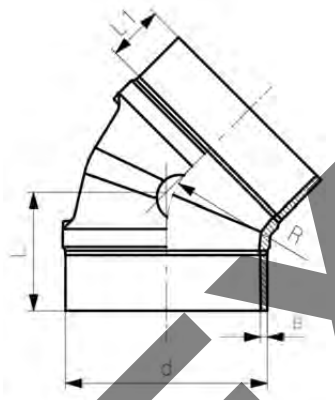
A

45° Elbow, PN 16, PVDF-HP

Model:

- Material: PVDF

d (mm)	PN (bar)	FM	Part No.	SP	weight (kg)	e (mm)	L (mm)	L1 (mm)	R (mm)
250	16		**735 158 646**	1	3.669	11.9	120	47	232
315	16		*** 735 158 648**	1	7.162	15.0	147	47	297



A

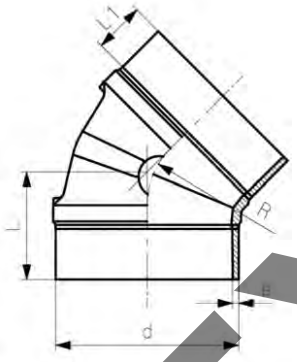
45° Elbow, PN 10, PVDF-HP

d (mm)	FM	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)
90	BCF, IR	**^ 735 158 538**	0.430	2.8	57	37
110	BCF, IR	**^ 735 158 539**	0.767	3.4	70	46
160	IR	**735 158 542**	2.174	4.9	100	62
200	IR	**735 158 544**	4.251	6.2	124	77
225	IR	*** 735 158 545**	6.023	6.9	140	88

A

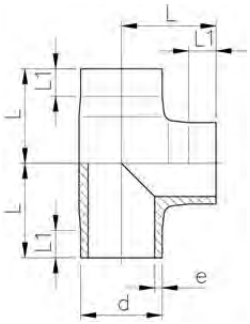
45° Elbow, PN 10, PVDF-HP

d (mm)	FM	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)	R (mm)
250	IR	*** 735 158 546**	5.296	7.7	120	47	232
315	IR	*** 735 158 548**	10.853	9.7	147	47	297



A

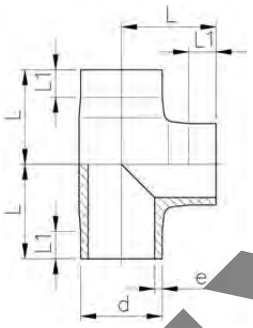
Tee, PN 16, PVDF-HP



FM	d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)
BCF, IR	20	**735 208 631**	0.051	1.9	38	25
BCF, IR	25	**735 208 632**	0.071	1.9	42	27
BCF, IR	32	**735 208 633**	0.123	2.4	46	27
BCF, IR	40	**^ 735 208 634**	0.183	2.4	51	28
BCF, IR	50	**735 208 635**	0.344	3.0	58	28
BCF, IR	63	**735 208 636**	0.595	3.0	66	28
BCF, IR	75	**^ 735 208 637**	0.741	3.6	75	32
BCF, IR	90	**735 208 638**	1.294	4.3	90	39
BCF, IR	110	**735 208 639**	2.324	5.3	110	48
	160	**735 208 642**	7.513	7.7	160	71
	200	**735 208 644**	15.091	9.6	200	80
	225	*** 735 208 645**	21.506	10.8	220	86
IR	250	*** 735 208 646**	23.861	11.9	223	70
IR	315	**735 208 648**	47.227	15.0	274	74

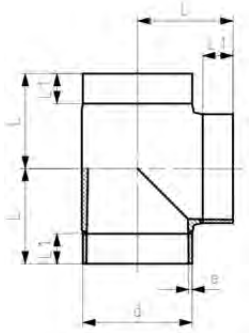
A

Tee, PN 10, PVDF-HP



d (mm)	FM	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)
90	BCF, IR	**^ 735 208 538**	0.955	2.8	90	39
110	BCF, IR	**^ 735 208 539**	1.689	3.4	110	48
160	IR	**735 208 542**	4.960	4.9	160	71
200	IR	**735 208 544**	11.845	6.2	200	80
225	IR	*** 735 208 545**	16.028	6.9	220	86
250	IR	**^ 735 208 546**	15.298	7.7	223	70
315	IR	**^ 735 208 548**	30.605	9.7	274	74

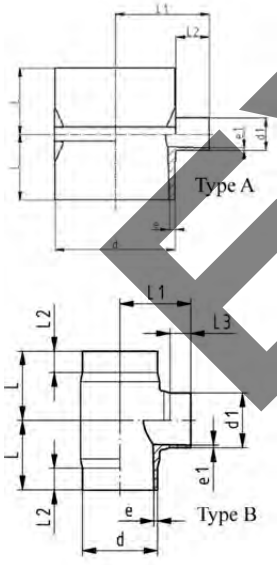
A



Tee, PN 10, PVDF-HP

d (mm)	FM	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)
355	IR	^ 735 208 549	47.492	10.9	311	100
400	IR	^ 735 208 550	64.027	12.3	332	100
450	IR	^ 735 208 551	85.709	13.8	357	100

A

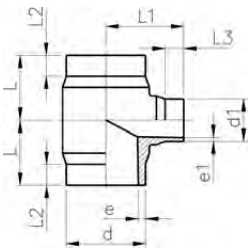


Molded Reducing Tee, PN 16, PVDF-HP

	d - d1 (mm)	FM	Part No.	weight (lb)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
A	63 - 20	BCF, IR	^ 735 208 956	0.551	3.0	1.9	60	67	25	35
A	63 - 25	BCF, IR	^ 735 208 957	0.540	3.0	1.9	60	66	25	34
A	63 - 32	BCF, IR	^ 735 208 958	0.567	3.0	2.4	60	67	25	25
A	63 - 40	BCF, IR	^ 735 208 959	0.560	3.0	2.4	60	66	25	26
A	75 - 20	BCF, IR	^ 735 208 961	0.767	3.6	1.9	65	69	25	31
A	75 - 25	BCF, IR	^ 735 208 962	0.785	3.6	1.9	65	72	25	34
A	75 - 32	BCF, IR	^ 735 208 963	0.679	3.6	2.4	65	69	25	31
A	75 - 40	BCF, IR	^ 735 208 964	0.688	3.6	2.4	65	72	25	26
A	75 - 50	BCF, IR	^ 735 208 965	0.820	3.6	3.0	65	69	25	26
A	90 - 20	BCF, IR	^ 735 208 967	1.036	4.3	1.9	65	76	25	31
A	90 - 25	BCF, IR	^ 735 208 968	1.027	4.3	1.9	65	79	25	34
A	90 - 32	BCF, IR	^ 735 208 969	0.893	4.3	2.4	65	76	25	31
A	90 - 40	BCF, IR	^ 735 208 970	1.049	4.3	2.4	65	79	25	26
A	90 - 50	BCF, IR	^ 735 208 971	0.996	4.3	3.0	65	76	25	26
B	90 - 63	BCF, IR	^ 735 208 972	1.347	4.3	3.0	80	85	25	25
A	110 - 20	BCF, IR	^ 735 208 974	1.413	5.3	1.9	65	86	25	31
A	110 - 25	BCF, IR	^ 735 208 975	1.257	5.3	1.9	65	89	25	34
A	110 - 32	BCF, IR	^ 735 208 976	1.257	5.3	2.4	65	86	25	31
A	110 - 40	BCF, IR	^ 735 208 977	1.411	5.3	2.4	65	89	25	26
A	110 - 50	BCF, IR	^ 735 208 978	1.411	5.3	3.0	65	86	25	26
B	110 - 63	BCF, IR	^ 735 208 979	2.039	5.3	3.0	90	95	30	25
B	110 - 75	BCF, IR	^ 735 208 980	2.094	5.3	3.0	90	95	30	25
B	110 - 90	BCF, IR	^ 735 208 981	2.114	5.3	4.3	90	95	30	25
B	160 - 90	IR	^ 735 208 687	6.814	7.7	4.3	155	130	60	25
B	160 - 110	IR	^ 735 208 686	6.786	7.7	5.3	155	130	60	25
B	225 - 90	IR	^ 735 208 695	11.956	10.8	4.3	155	160	60	25
B	225 - 110	IR	^ 735 208 694	13.448	10.8	5.3	155	160	60	25

A

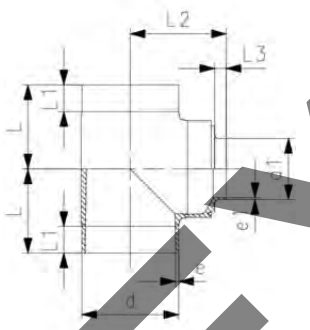
Molded Reducing Tee, PN 10, PVDF-HP



d - d1 (mm)	PN (bar)	SDR	FM	Part No.	weight (lb)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
160 - 90	10	33 - 21	IR	^ 735 208 587	5.359	4.9	4.3	155	130	60	25
160 - 110	10	33 - 21	IR	^ 735 208 586	5.498	4.9	5.3	155	130	60	25
225 - 90	10	33 - 21	IR	^ 735 208 595	9.919	6.9	4.3	155	160	60	25
225 - 110	10	33 - 21	IR	^ 735 208 594	10.110	6.9	5.3	155	160	60	25
225 - 160	10	33 - 33	IR	^ 735 208 593	9.815	6.9	4.9	155	170	60	35

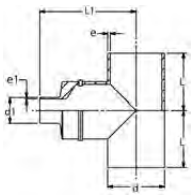
A

Molded Reducing Tee, PN 10, PVDF-HP



d - d1 (mm)	d fusion	d1 fusion	Part No.	weight (lb)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
355 - 225	IR450	IR315	* 735 209 815	51.718	10.9	6.9	309	353	100	43
355 - 315	IR450	IR450, IR315	* 735 209 818	49.924	10.9	9.7	309	348	100	55
400 - 225	IR450	IR315	* 735 209 827	70.374	12.3	6.9	332	376	100	43
400 - 315	IR450	IR450, IR315	* 735 209 830	68.178	12.3	9.7	332	371	100	55
450 - 225	IR450	IR315	* 735 209 840	94.876	13.8	6.9	357	401	100	43
450 - 315	IR450	IR450, IR315	* 735 209 843	92.354	13.8	9.7	357	396	100	55

B

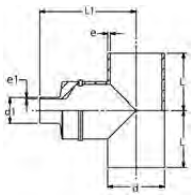


Fabricated Reducing Tee (25-110mm)
PN 16, PVDF-HP

IR Plus/BCF Plus Fusion
Uses Molded Reducer

d (mm)	d1 (mm)	FM	Part No.	e (mm)	e1 (mm)	L (mm)	L1 (mm)
25	20	IR	* 735 992 450	1.9	1.9	42	87.0
32	20	IR	* 735 992 451	2.4	1.9	46	91.0
32	25	IR	* 735 992 452	2.4	2.4	46	91.0
40	20	IR	* 735 992 453	2.4	1.9	51	98.0
40	25	IR	* 735 992 454	2.4	1.9	51	99.0
40	32	IR	* 735 992 455	2.4	2.4	51	99.0
50	20	IR	* 735 992 456	3.0	1.9	58	103.0
50	25	IR	* 735 992 457	3.0	1.9	58	106.0
50	32	IR	* 735 992 458	3.0	2.4	58	106.0
50	40	IR	* 735 992 459	3.0	2.4	58	108.0
63	20	IR	* 735 992 460	3.0	1.9	66	111.0
63	25	IR	* 735 992 461	3.0	1.9	66	112.0
63	32	IR	* 735 992 462	3.0	2.4	66	114.0
63	40	IR	* 735 992 463	3.0	2.4	66	116.0
63	50	IR	* 735 992 464	3.0	3.0	66	116.0
75	20	IR	* 735 992 465	3.6	1.9	75	123.0
75	25	IR	* 735 992 466	3.6	1.9	75	124.0
75	32	IR	* 735 992 467	3.6	2.4	75	125.0
75	40	IR	* 735 992 468	3.6	2.4	75	127.0
75	50	IR	* 735 992 469	3.6	3.0	75	128.0
75	63	IR	* 735 992 470	3.6	3.0	75	125.0
90	20	IR	* 735 992 471	4.3	1.9	90	148.0
90	25	IR	* 735 992 472	4.3	1.9	90	149.0
90	32	IR	* 735 992 473	4.3	2.4	90	150.0
90	40	IR	* 735 992 474	4.3	2.4	90	152.0
90	50	IR	* 735 992 475	4.3	3.0	90	153.0
90	63	IR	* 735 992 476	4.3	3.0	90	150.0
90	75	IR	* 735 992 477	4.3	3.6	90	145.0
110	20	IR	* 735 992 478	5.3	1.9	110	168.0
110	25	IR	* 735 992 479	5.3	1.9	110	169.0
110	32	IR	* 735 992 480	5.3	2.4	110	170.0
110	40	IR	* 735 992 481	5.3	2.4	110	172.0
110	50	IR	* 735 992 482	5.3	3.0	110	173.0
110	63	IR	* 735 992 483	5.3	3.0	110	170.0
110	75	IR	* 735 992 484	5.3	3.6	110	165.0
110	90	IR	* 735 992 485	5.3	4.3	110	165.0

B

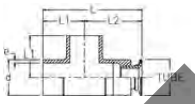


Fabricated Reducing Tee (160-315mm)
PN 10, PVDF-HP

For sizes 250 mm and above, the L1 dimension is +/- 6 mm.

d (mm)	d1 (mm)	FM	Part No.	e (mm)	e1 (mm)	L (mm)	L1 (mm)
160	63	IR	* 735 992 486	4.9	3.0	160	250
160	75	IR	* 735 992 487	4.9	3.6	160	225
160	90	IR	* 735 992 488	4.9	4.3	160	225
160	110	IR	* 735 992 489	4.9	5.3	160	225
200	63	IR	* 735 992 490	6.2	3.0	200	280
200	75	IR	* 735 992 491	6.2	3.6	200	275
200	90	IR	* 735 992 492	6.2	4.3	200	275
200	110	IR	* 735 992 493	6.2	5.3	200	275
200	160	IR	* 735 992 494	6.2	4.9	200	285
225	63	IR	* 735 992 495	6.9	3.0	220	310
225	75	IR	* 735 992 496	6.9	3.6	220	305
225	90	IR	* 735 992 497	6.9	4.3	220	305
225	110	IR	* 735 992 498	6.9	5.3	220	305
225	160	IR	* 735 992 499	6.9	4.9	220	315
225	200	IR	* 735 992 500	6.9	6.2	220	303
250	63	IR	* 735 992 501	7.7	3.0	223	313
250	75	IR	* 735 992 502	7.7	3.6	223	308
250	90	IR	* 735 992 503	7.7	4.3	223	309
250	110	IR	* 735 992 504	7.7	5.3	223	311
250	160	IR	* 735 992 505	7.7	4.9	223	310
250	200	IR	* 735 992 506	7.7	6.2	223	312
250	225	IR	* 735 992 507	7.7	6.9	223	294
315	63	IR	* 735 992 508	9.7	3.0	274	364
315	75	IR	* 735 992 509	9.7	3.6	274	359
315	90	IR	* 735 992 510	9.7	4.3	274	360
315	110	IR	* 735 992 511	9.7	5.3	274	362
315	160	IR	* 735 992 512	9.7	4.9	274	361
315	200	IR	* 735 992 513	9.7	6.2	274	363
315	225	IR	* 735 992 514	9.7	6.9	274	363
315	250	IR	* 735 992 515	9.7	7.7	274	367

B

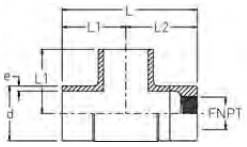


Analytical Sanitary Sensor, PN 10
PVDF-HP

IR Plus/BCF Plus Fusion

d (mm)	Tube Size (inch)	FM	Part No.	e (mm)	L (mm)	L1 (mm)	L2 (mm)
50	¾	BCF, IR	* 735 991 820	3.0	150	58	92
50	1	BCF, IR	* 735 991 821	3.0	150	58	92
50	1 ½	BCF, IR	* 735 991 822	3.0	150	58	92
63	¾	BCF, IR	* 735 991 823	3.0	166	66	100
63	1	BCF, IR	* 735 991 824	3.0	166	66	100
63	1 ½	BCF, IR	* 735 991 825	3.0	166	66	100
75	¾	BCF, IR	* 735 991 826	3.6	180	75	105
75	1	BCF, IR	* 735 991 827	3.6	180	75	105
75	1 ½	BCF, IR	* 735 991 828	3.6	180	75	105
90	¾	BCF, IR	* 735 991 829	4.3	203	90	113
90	1	BCF, IR	* 735 991 830	4.3	203	90	113
90	1 ½	BCF, IR	* 735 991 831	4.3	203	90	113
110	¾	BCF, IR	* 735 991 832	5.3	234	110	124
110	1	BCF, IR	* 735 991 833	5.3	234	110	124
110	1 ½	BCF, IR	* 735 991 834	5.3	234	110	124

B

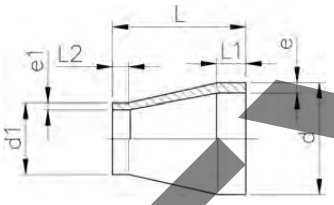


Analytical Threaded Sensor, PN 16
PVDF-HP

IR Plus/BCF Plus Fusion

d (mm)	FNPT (inch)	FM	Part No.	e (mm)	L (mm)	L1 (mm)	L2 (mm)
50	¼	BCF, IR	* 735 991 840	3.0	135	58	77
50	½	BCF, IR	* 735 991 841	3.0	135	58	77
50	¾	BCF, IR	* 735 991 842	3.0	135	58	77
50	1	BCF, IR	* 735 991 843	3.0	135	58	77
63	¼	BCF, IR	* 735 991 844	3.0	151	66	85
63	½	BCF, IR	* 735 991 845	3.0	151	66	85
63	¾	BCF, IR	* 735 991 846	3.0	151	66	85
63	1	BCF, IR	* 735 991 847	3.0	151	66	85
75	¼	BCF, IR	* 735 991 848	3.6	165	75	90
75	½	BCF, IR	* 735 991 849	3.6	165	75	90
75	¾	BCF, IR	* 735 991 850	3.6	165	75	90
75	1	BCF, IR	* 735 991 851	3.6	165	75	90
90	¼	BCF, IR	* 735 991 852	4.3	188	90	98
90	½	BCF, IR	* 735 991 853	4.3	188	90	98
90	¾	BCF, IR	* 735 991 854	4.3	188	90	98
90	1	BCF, IR	* 735 991 855	4.3	188	90	98
110	¼	BCF, IR	* 735 991 856	5.3	219	110	109
110	½	BCF, IR	* 735 991 857	5.3	219	110	109
110	¾	BCF, IR	* 735 991 858	5.3	219	110	109
110	1	BCF, IR	* 735 991 859	5.3	219	110	109

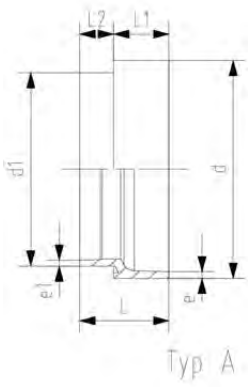
A

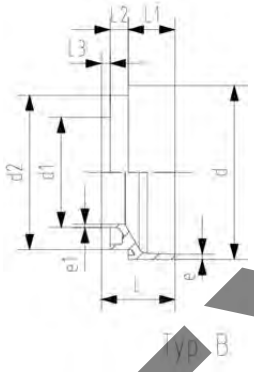


Reducer, PN 16, PVDF-HP

d - d1 (mm)	FM	Part No.	weight (lb)	e1 (mm)	e (mm)	L (mm)	L1 (mm)	L2 (mm)
25 - 20	BCF, IR	735 908 600	0.026	1.9	1.9	50	22	22
32 - 20	BCF, IR	735 908 602	0.037	1.9	2.4	50	22	22
32 - 25	BCF, IR	735 908 601	0.040	1.9	2.4	50	22	22
40 - 20	BCF, IR	735 908 605	0.053	1.9	2.4	58	22	24
40 - 25	BCF, IR	735 908 604	0.055	1.9	2.4	55	22	24
40 - 32	BCF, IR	735 908 603	0.064	2.4	2.4	55	22	24
50 - 25	BCF, IR	735 908 608	0.119	1.9	3.0	60	22	25
50 - 32	BCF, IR	735 908 607	0.130	2.4	3.0	60	22	25
50 - 40	BCF, IR	735 908 606	0.132	2.4	3.0	60	22	25
63 - 32	BCF, IR	735 908 611	0.172	2.4	3.0	65	22	25
63 - 40	BCF, IR	735 908 610	0.181	2.4	3.0	65	22	25
63 - 50	BCF, IR	735 908 609	0.198	3.0	3.0	65	22	25
75 - 40	BCF, IR	735 908 614	0.240	2.4	3.6	68	24	25
75 - 50	BCF, IR	735 908 613	0.276	3.0	3.6	65	24	25
75 - 63	BCF, IR	735 908 612	0.282	3.0	3.6	65	24	25
90 - 63	BCF, IR	735 908 616	0.362	3.0	4.3	75	25	30
90 - 75	BCF, IR	735 908 615	0.412	3.6	4.3	75	25	35
110 - 63	BCF, IR	735 908 619	0.664	3.0	5.3	90	30	30
110 - 75	BCF, IR	735 908 618	0.639	3.6	5.3	90	30	35
110 - 90	BCF, IR	735 908 617	0.708	4.3	5.3	90	30	35

A





Reducer, PN 16, PVDF-HP

Model:

- Material: PVDF

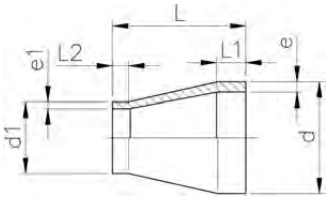
Note:

For Type B, must clamp spigot d2 in IR machine when welding spigot d1.

d - d1 (mm)	PN (bar)	fusion d - d1	FM	Part No.
250 - 160	16	IR	IR	**735 908 628**
250 - 225	16	IR	IR	*** 735 908 629**
315 - 160	16	IR	IR	**735 908 632**
315 - 225	16	IR	IR	*** 735 908 633**

d - d1 (mm)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Type	d2 (mm)
250 - 160	11.9	7.7	100	42	33	10	B	225
250 - 225	11.9	10.8	90	42	33		A	
315 - 160	15.0	7.7	115	50	33	10	B	225
315 - 225	15.0	10.8	105	50	33		A	

A



Reducer, PN 10, PVDF-HP

d - d1 (mm)	PN (bar)	SDR	FM	Part No.	weight (lb)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)
90 - 63	10	33 - 21	BCF, IR	**^ 735 908 511**	0.328	2.8	3.0	75	25	30
110 - 63	10	33 - 21	BCF, IR	**^ 735 908 513**	0.362	3.4	3.0	90	30	30
110 - 90	10	33 - 33	BCF, IR	**^ 735 908 515**	0.527	3.4	2.8	90	30	35
160 - 110	10	33 - 21	IR	**735 908 504**	1.382	4.9	5.3	120	40	40
200 - 160	10	33 - 33	IR	**^ 735 908 505**	2.275	6.2	4.9	145	50	40
225 - 110	10	33 - 21	IR	*** 735 908 506**	3.027	6.9	5.3	160	55	35
225 - 160	10	33 - 33	IR	*** 735 908 507**	2.974	6.9	4.9	160	55	40
225 - 200	10	33 - 33	IR	**^ 735 908 508**	3.252	6.9	6.2	160	55	50
250 - 225	10	33 - 33	IR	**^ 735 908 531**	4.883	7.7	6.9	182	60	55
315 - 225	10	33 - 33	IR	**^ 735 908 533**	8.620	9.7	6.9	231	80	55

A

Reducer, PN 10, PVDF-HP

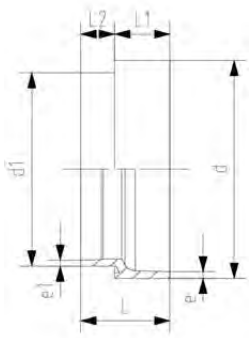
Model:

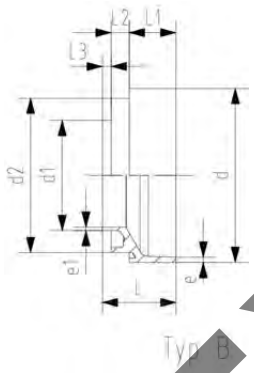
- Material: PVDF

Note:

For Type B, must clamp spigot d2 in IR machine when welding spigot d1.

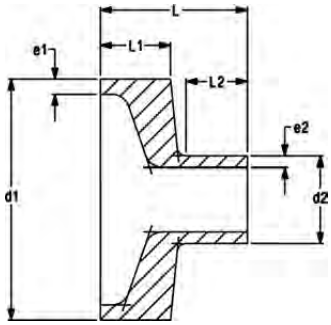
d - d1 (mm)	PN (bar)	SDR	FM	Part No.	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Type	d2 (mm)
250 - 160	10	33 - 33	IR	**^ 735 908 522**	7.7	4.9	100	42	33	10	B	225
250 - 160	10	33 - 21	IR	**^ 735 908 542**	7.7	7.7	100	42	33	10	B	225
250 - 225	10	33 - 33	IR	**^ 735 908 524**	7.7	6.9	90	42	33		A	
250 - 225	10	33 - 21	IR	**^ 735 908 544**	7.7	10.8	90	42	33		A	
315 - 160	10	33 - 33	IR	*** 735 908 528**	9.7	4.9	115	50	33	10	B	225
315 - 160	10	33 - 21	IR	*** 735 908 548**	9.7	7.7	115	50	33	10	B	225
315 - 225	10	33 - 33	IR	*** 735 908 530**	9.7	6.9	105	50	33		A	
315 - 225	10	33 - 21	IR	*** 735 908 550**	9.7	10.8	105	50	33		A	





B

Flush Style Reducer (40-110mm), PN 16, PVDF-HP

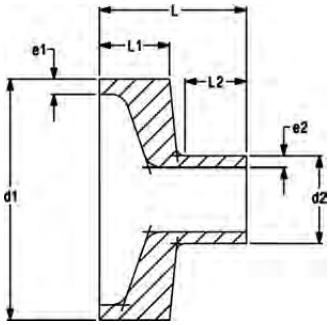


IR Plus Fusion

d1 (mm)	d2 (mm)	FM	Part No.	e1 (mm)	e2 (mm)	L (mm)	L1 (mm)	L2 (mm)
40	20	IR	* 735 909 604	2.4	1.9	52	24	25
40	25	IR	* 735 909 605	2.4	1.9	53	24	26
40	32	IR	* 735 909 606	2.4	2.4	53	23	26
50	20	IR	* 735 909 607	3.0	1.9	50	22	25
50	25	IR	* 735 909 608	3.0	1.9	53	24	26
50	32	IR	* 735 909 609	3.0	2.4	53	23	26
50	40	IR	* 735 909 610	3.0	2.4	55	23	28
63	20	IR	* 735 909 611	3.0	1.9	50	22	25
63	25	IR	* 735 909 612	3.0	1.9	51	22	26
63	32	IR	* 735 909 613	3.0	2.4	53	23	26
63	40	IR	* 735 909 614	3.0	2.4	55	23	28
63	50	IR	* 735 909 615	3.0	3.0	55	22	28
75	20	IR	* 735 909 616	3.6	1.9	53	22	25
75	25	IR	* 735 909 617	3.6	1.9	54	22	26
75	32	IR	* 735 909 618	3.6	2.4	55	22	26
75	40	IR	* 735 909 619	3.6	2.4	57	22	28
75	50	IR	* 735 909 620	3.6	3.0	58	22	28
75	63	IR	* 735 909 621	3.6	3.0	55	22	28
90	20	IR	* 735 909 622	4.3	1.9	63	32	25
90	25	IR	* 735 909 623	4.3	1.9	64	32	26
90	32	IR	* 735 909 624	4.3	2.4	65	32	26
90	40	IR	* 735 909 625	4.3	2.4	67	32	28
90	50	IR	* 735 909 626	4.3	3.0	68	32	28
90	63	IR	* 735 909 627	4.3	3.0	65	32	28
90	75	IR	* 735 909 628	4.3	3.6	60	32	23
110	20	IR	* 735 909 629	5.3	1.9	63	32	25
110	25	IR	* 735 909 630	5.3	1.9	64	32	26
110	32	IR	* 735 909 631	5.3	2.4	65	32	26
110	40	IR	* 735 909 632	5.3	2.4	67	32	28
110	50	IR	* 735 909 633	5.3	3.0	68	32	28
110	63	IR	* 735 909 634	5.3	3.0	65	32	28
110	75	IR	* 735 909 635	5.3	3.6	60	32	23
110	90	IR	* 735 909 636	5.3	4.3	60	31	23

B

Flush Style Reducer (160-315mm), PN 10, PVDF-HP

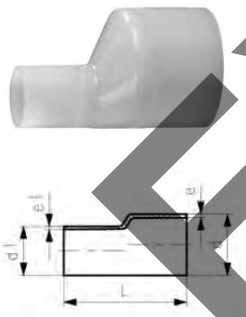


IR Plus Fusion

d1 (mm)	d2 (mm)	FM	Part No.	e1 (mm)	e2 (mm)	L (mm)	L1 (mm)	L2 (mm)
160	63	IR	* 735 909 656	4.9	3.0	95	62	28
160	75	IR	* 735 909 657	4.9	3.6	70	42	23
160	90	IR	* 735 909 658	4.9	4.3	70	41	23
160	110	IR	* 735 909 659	4.9	5.3	70	39	23
200	63	IR	* 735 909 662	6.2	3.0	85	52	28
200	75	IR	* 735 909 663	6.2	3.6	80	52	23
200	90	IR	* 735 909 664	6.2	4.3	80	51	23
200	110	IR	* 735 909 665	6.2	5.3	80	49	23
200	160	IR	* 735 909 668	6.2	4.9	90	45	33
225	63	IR	* 735 909 669	6.9	3.0	95	62	28
225	75	IR	* 735 909 670	6.9	3.6	90	62	23
225	90	IR	* 735 909 671	6.9	4.3	90	61	23
225	110	IR	* 735 909 672	6.9	5.3	90	59	23
225	160	IR	* 735 909 675	6.9	4.9	100	55	33
225	200	IR	* 735 909 676	6.9	6.2	88	41	33
250	63	IR	* 735 909 677	7.7	3.0	98	60	28
250	75	IR	* 735 909 678	7.7	3.6	93	60	23
250	90	IR	* 735 909 679	7.7	4.3	94	60	23
250	110	IR	* 735 909 680	7.7	5.3	96	60	23
250	160	IR	* 735 909 683	7.7	4.9	95	50	33
250	200	IR	* 735 909 684	7.7	6.2	97	50	33
250	225	IR	* 735 909 685	7.7	6.9	79	30	33
315	63	IR	* 735 909 696	9.7	3.0	98	45	28
315	75	IR	* 735 909 697	9.7	3.6	93	45	23
315	90	IR	* 735 909 698	9.7	4.3	94	45	23
315	110	IR	* 735 909 699	9.7	5.3	96	45	23
315	160	IR	* 735 909 702	9.7	4.9	95	45	33
315	200	IR	* 735 909 703	9.7	6.2	97	45	33
315	225	IR	* 735 909 704	9.7	6.9	97	45	33
315	250	IR	* 735 909 705	9.7	7.7	101	41	48

A

Eccentric Reducer, PN 16, PVDF-HP



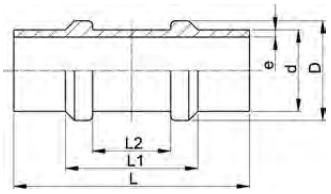
Model:

- Material: PVDF

d - d1 (mm)	FM	Part No.	SP	GP	weight (kg)	e (mm)	e1 (mm)	L (mm)
25 - 20	BCF, IR	735 938 737	1	30	0.020	1.9	1.9	80
32 - 20	BCF, IR	735 938 742	1	25	0.027	2.4	1.9	80
32 - 25	BCF, IR	735 938 741	1	25	0.030	2.4	1.9	80
40 - 20	BCF, IR	735 938 748	1	15	0.051	2.4	1.9	100
40 - 25	BCF, IR	735 938 747	1	15	0.043	2.4	1.9	100
40 - 32	BCF, IR	735 938 746	1	20	0.050	2.4	2.4	100
50 - 32	BCF, IR	735 938 753	1	20	0.068	3.0	2.4	100
50 - 40	BCF, IR	735 938 752	1	15	0.074	3.0	2.4	100
63 - 32	BCF, IR	735 938 760	1	15	0.105	3.0	2.4	100
63 - 40	BCF, IR	735 938 759	1	15	0.106	3.0	2.4	100
63 - 50	BCF, IR	735 938 758	1	15	0.097	3.0	3.0	100

A

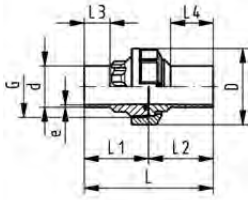
Restraint Fitting, PN 16, PVDF-HP



d (mm)	FM	Part No.	weight (lb)	D (mm)	e (mm)	L (mm)	L1 (mm)	L2 (mm)
20	BCF, IR	**735 918 656**	0.060	28	1.9	100	53	32
25	BCF, IR	**735 918 657**	0.079	33	1.9	100	53	32
32	BCF, IR	**735 918 658**	0.119	40	2.4	100	53	32
40	BCF, IR	**735 918 659**	0.148	48	2.4	100	53	32
50	BCF, IR	**735 918 660**	0.276	58	3.0	100	53	32
63	BCF, IR	**735 918 661**	0.289	71	3.0	105	53	32
75	BCF, IR	**735 918 662**	0.556	87	3.6	125	70	40
90	BCF, IR	**735 918 663**	0.816	105	4.3	127	70	40
110	BCF, IR	**735 918 664**	1.149	127	5.3	127	70	40

A

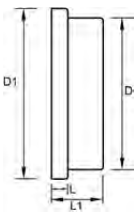
Union, FKM white, PN 16, PVDF-HP



d (mm)	FM	Part No.	weight (lb)	G (R/Rp BS Thread) (inch)	e (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)
20	BCF, IR	**735 528 626**	0.181	1	1.9	43	106	53	53	25	37
25	BCF, IR	**735 528 627**	0.271	1 1/4	1.9	53	112	56	56	25	38
32	BCF, IR	**735 528 628**	0.366	1 1/2	2.4	60	118	59	59	25	40
40	BCF, IR	**735 528 629**	0.580	2	2.4	74	124	62	62	25	41
50	BCF, IR	**735 528 630**	0.820	2 1/4	3.0	82	130	65	65	25	43
63	BCF, IR	**735 528 631**	1.021	2 3/4	3.0	100	136	68	68	25	44
75	BCF, IR	**735 528 637**	1.631	S 107.5 x 3.6	3.6	133	132	66	66	24	34
90	BCF, IR	**735 528 638**	1.759	S 107.5 x 3.6	4.3	133	130	65	65	24	48
110	BCF, IR	**735 528 639**	2.249	S 127.5 x 3.6	5.3	155	130	65	65	25	45

A

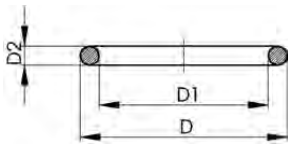
Union Blankoff, PN 10, PVDF-HP
Not for tapping



d (mm)	Part No.	weight (lb)	D (mm)	D1 (mm)	L (mm)	L1 (mm)
20	* **155 482 101**	0.044	28	30	5	13
25	* **155 482 102**	0.044	36	38	6	15
32	* **155 482 103**	0.066	36	38	6	16
40	* **155 482 104**	0.044	42	45	6	17
50	* **155 482 105**	0.088	59	63	7	20
63	* **155 482 106**	0.176	74	78	8	22

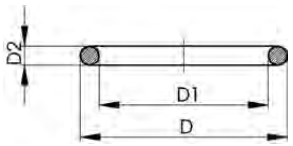
A

O-Ring, FKM white, for SYGEF Plus Unions



d (mm)	FKM Part No.	D (mm)	D1 (mm)	D2 (mm)
20	^ **749 411 005**	20.6	15.5	2.6
25	^ **749 411 006**	27.3	20.2	3.5
32	^ **749 411 120**	33.6	26.6	3.5
40	^ **749 411 062**	41.6	34.5	3.5
50	^ **749 411 172**	51.1	44.0	3.5
63	^ **749 411 054**	63.0	55.0	4.0
75	* **749 411 013**	79.9	69.2	5.3
90	* **749 411 014**	92.6	81.9	5.3
110	* **749 411 015**	117.0	101.0	5.3

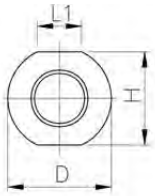
A

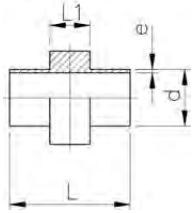


O-Ring, Chemraz® White, for SYGEF Plus HP Unions

d (mm)	Part No.	D (mm)	D1 (mm)	D2 (mm)
20	**150 411 005**	20.6	15	2.6
25	**150 411 006**	27.3	20	3.5
32	**150 411 120**	33.6	26	3.5
40	**150 411 062**	41.6	34	3.5
50	**150 411 172**	51.1	44	3.5
63	**150 411 054**	63.0	55	4.0

B



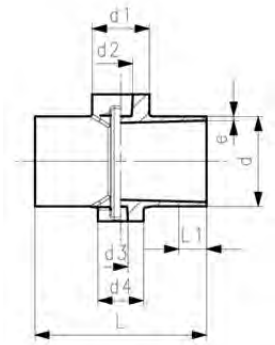


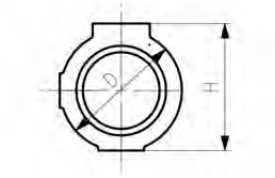
Instrument Installation Fitting, PN 16, PVDF-HP

Add "T" to end of part number and fee to list price for each factory milled thread (max. diameter is 3/4"). See published price list for fee.

d (mm)	FM	Part No.	e (mm)	L (mm)	D (mm)	H (mm)	L1 (mm)
20	BCF, IR	* **735 918 606**	1.9	140	71	58	40
25	BCF, IR	* **735 918 607**	1.9	140	75	63	40
32	BCF, IR	* **735 918 608**	2.4	140	81	70	40
40	BCF, IR	* **735 918 609**	2.4	140	88	78	40
50	BCF, IR	* **735 918 610**	3.0	140	97	88	40
63	BCF, IR	* **155 918 611**	3.0	140	109	101	40
75	BCF, IR	* **155 918 612**	3.6	140	120	113	40
90	BCF, IR	* **155 918 613**	4.3	140	134	128	40
110	BCF, IR	* **155 918 614**	5.3	140	153	148	40

A





Instrument Installation Fitting, PN 16, PVDF-HP

Note:
Threads need to be milled. Smallest tap on d2 side is 3/8" threads. Smallest tap on d3 side is 1/4" threads. Maximum tap sizes given in table below.

d (mm)	FM	Part No.	D (mm)	e (mm)	d1 (mm)	d2 (mm)	d3 (mm)	d4 (mm)	H (mm)	L (mm)	L1 (mm)	Rp/NPT (inch)
63	BCF, IR	**735 918 811**	85	3.0	40	17	10	32	89	120	25	¼ - ¾
75	BCF, IR	**735 918 812**	96	3.6	40	17	10	40	101	130	25	¼ - ¾
90	BCF, IR	**735 918 813**	110	4.3	40	17	10	40	116	130	25	¼ - ¾
110	BCF, IR	**735 918 814**	127	5.3	40	17	10	40	136	130	25	¼ - ¾
160	IR	**735 918 817**	189	7.7	63	17	10	50	191	155	40	¼ - 1
225	IR	*** 735 918 820**	248	10.8	63	17	10	50	256	155	40	¼ - 1

A

Instrument Installation Fitting, PN 10, PVDF-HP

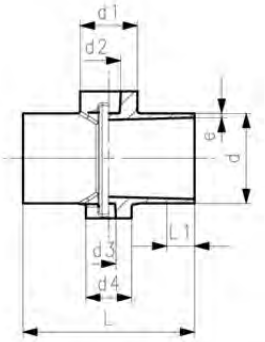
Range of use:

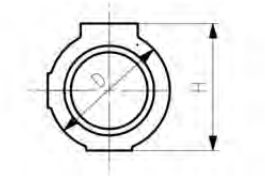
- Compatible with all signet sensors except flow sensors

Note:

Threads need to be milled. Smallest tap on d2 side is 3/8" threads. Smallest tap on d3 side is 1/4" threads. Maximum tap sizes given in table below.

d (mm)	PN (bar)	FM	Part No.	weight (kg)
160	10	IR	**735 918 717**	1.141
225	10	IR	*** 735 918 720**	1.845



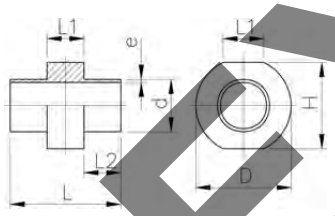


d (mm)	D (mm)	e (mm)	d1 (mm)	d2 (mm)	d3 (mm)	d4 (mm)	H (mm)	L (mm)	L1 (mm)	Rp/NPT (inch)
160	189	4.9	63	17	10	50	191	155	40	¼ - 1
225	248	6.9	63	17	10	50	256	155	40	¼ - 1

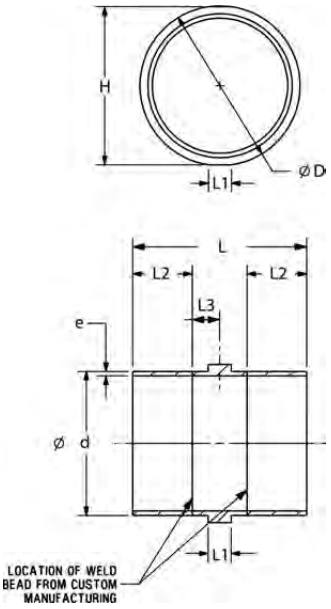
A

Instrument Installation Fitting, PN 10, PVDF-HP

d (mm)	FM	Part No.	D (mm)	e (mm)	H (mm)	L (mm)	L1 (mm)	L2 (mm)
200	IR	*** 735 918 569**	231	6.2	228	110	40	32



B



Instrument Installation Fitting, PN 10, PVDF-HP

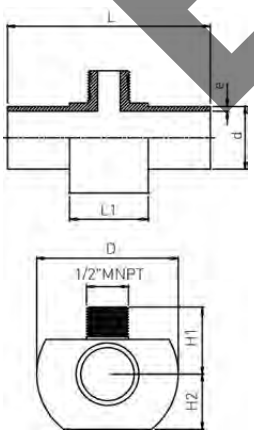
d (mm)	Part No.	D (mm)	e (mm)	H (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
250	* 155 918 571	278	7.7	275	301	40	103	48
315	* 155 918 572	338	9.7	336	301	40	103	50

A

Instrument Installation Fitting, PN 10, PVDF-HP

d (mm)	NPT (inch)	FM	Part No.	e (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
355	½	IR	* 735 918 849	10.9	313	353	100	142
400	½	IR	* 735 918 850	12.3	332	376	100	142
450	½	IR	* 735 918 851	13.8	357	401	100	142

B

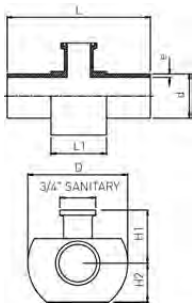


1/2" MNPT Low Profile Adaptor, PN 10, PVDF-HP

IR Plus/BCF Plus Fusion

d (mm)	FM	Part No.	e (mm)	L (mm)	D (mm)	H1 (mm)	H2 (mm)	L1 (mm)
20	BCF, IR	* 735 918 626	1.9	140	71	28	29	40
25	BCF, IR	* 735 918 627	1.9	140	75	30	31	40
32	BCF, IR	* 735 918 628	2.4	140	81	34	35	40
40	BCF, IR	* 735 918 629	2.4	140	88	38	39	40
50	BCF, IR	* 735 918 630	3.0	140	97	43	44	40
63	BCF, IR	* 735 918 631	3.0	140	109	49	50	40
75	BCF, IR	* 735 918 632	3.6	140	120	55	56	40
90	BCF, IR	* 735 918 633	4.3	140	134	63	64	40
110	BCF, IR	* 735 918 634	5.3	140	153	73	74	40

B



3/4" (3A) Sanitary Adaptor, PN 10, PVDF-HP

IR Plus/BCF Plus Fusion
3/4" size sanitary adapter port, i.e. 0.985" flange OD

d (mm)	FM	Part No.	e (mm)	L (mm)	D (mm)	H1 (mm)	H2 (mm)	L1 (mm)
20	BCF, IR	* **735 918 646**	1.9	140	71	28	29	40
25	BCF, IR	* **735 918 647**	1.9	140	75	30	31	40
32	BCF, IR	* **735 918 648**	2.4	140	81	34	35	40
40	BCF, IR	* **735 918 649**	2.4	140	88	38	39	40
50	BCF, IR	* **735 918 650**	3.0	140	97	43	44	40
63	BCF, IR	* **735 918 651**	3.0	140	109	49	50	40
75	BCF, IR	* **735 918 652**	3.6	140	120	55	56	40
90	BCF, IR	* **735 918 653**	4.3	140	134	63	64	40
110	BCF, IR	* **735 918 654**	5.3	140	153	73	74	40

B

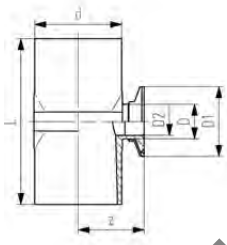
Sanitary Adapter Installation Fitting, PN 16, PVDF-HP

Model:

- Without chamfer, for complete drainability at sanitary connection
- d (mm) = main line
- D (mm) = connector line

Range of use:

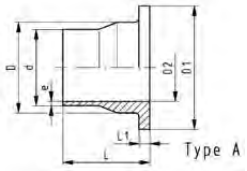
- Pressure gauges
- Sampling valves
- Sanitary adapters

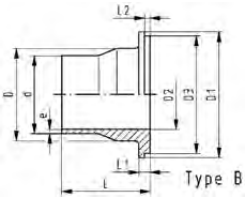


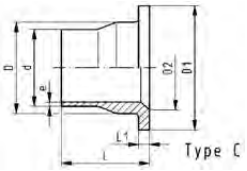
	FM	d (mm)	Part No.	L (mm)	D (mm)	D2 (mm)	D1 (mm)	Z (mm)
*	BCF, IR	20	**735 318 101**	110	20	34.1	50.5	32.7
*	BCF, IR	25	**735 318 202**	110	25	34.1	50.5	35.2
*	BCF, IR	32	**735 318 303**	124	32	34.1	50.5	38.7
*	BCF, IR	40	**735 318 204**	124	25	19.9	50.5	42.7
*	BCF, IR	40	**735 318 304**	124	32	25.6	50.5	42.7
*	BCF, IR	50	**735 318 205**	124	25	19.9	50.5	47.7
*	BCF, IR	50	**735 318 305**	124	32	25.6	50.5	47.7
*	BCF, IR	50	**735 318 505**	124	50	42.2	64.0	47.7
	BCF, IR	63	**735 318 206**	120	25	19.9	50.5	54.2
	BCF, IR	63	**735 318 306**	120	32	25.6	50.5	54.2
*	BCF, IR	63	**735 318 506**	120	50	42.2	64.0	54.2
*	BCF, IR	63	**735 318 606**	138	63	55.1	77.5	54.2
	BCF, IR	75	**735 318 207**	130	25	19.9	50.5	60.2
	BCF, IR	75	**735 318 307**	130	32	25.6	50.5	60.2
	BCF, IR	75	**735 318 507**	130	50	42.2	64.0	60.2
*	BCF, IR	75	**735 318 607**	130	63	55.1	77.5	60.2
	BCF, IR	90	**735 318 208**	130	25	19.9	50.5	67.7
	BCF, IR	90	**735 318 308**	130	32	25.6	50.5	67.7
	BCF, IR	90	**735 318 508**	130	50	42.2	64.0	67.7
	BCF, IR	90	**735 318 608**	138	63	55.1	77.5	67.7
	BCF, IR	110	**735 318 209**	130	25	19.9	50.5	77.7
	BCF, IR	110	**735 318 309**	130	32	25.6	50.5	77.7
	BCF, IR	110	**735 318 509**	130	50	42.2	64.0	77.7
	BCF, IR	110	**735 318 609**	180	63	55.1	77.5	109.0

A

Flange Adapter, PN 16, PVDF-HP





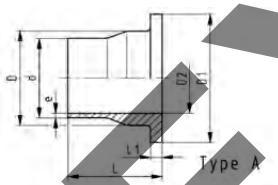


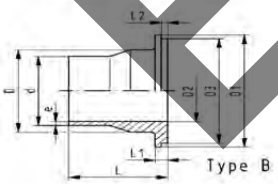
Note:
Size 160 mm with 240 PSI / PN 16 pressure rating is approved for and should only be used for hot UPW. 40 mm fittings are for tool installation only.

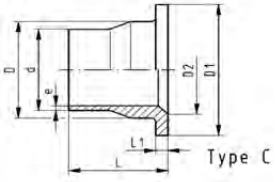
d (mm)	Part No.	weight (kg)	Type	L1 (mm)	D (mm)	D2 (mm)	e (mm)	D1 (mm)	L (mm)
20	**735 798 831**	0.029	A	6	26	15	1.9	45	54
25	**735 798 882**	0.043	A	7	32	20	1.9	54	56
32	**735 798 883**	0.063	A	7	40	26	2.4	63	58
40	**^ 735 798 884**	0.089	A	8	49	34	2.4	73	68
50	**735 798 885**	0.140	A	8	60	43	3.0	82	69
63	**735 798 836**	0.237	A	9	75	56	3.0	102	72
75	**^ 735 798 837**	0.361	A	10	89	66	3.6	122	80
90	**735 798 886**	0.435	A	12	105	78	4.3	133	81
110	**735 798 839**	0.626	C	13	125	100	5.3	158	81
160	**735 798 842**	1.208	C	17	175	151	7.7	212	93
200	**735 798 844**	2.139	C	22	232	207	9.6	268	102
225	*** 735 798 845**	2.210	C	22	235	207	10.8	268	102
250	*** 735 798 846**	3.658	C	25	285	249	11.9	320	122
315	*** 735 798 848**	5.028	C	28	335	300	15.0	370	124

A

Flange Adaptor, PN 10, ANSI Serrated, PVDF-HP

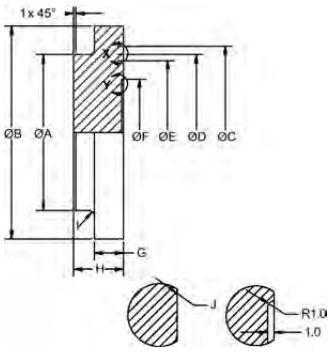






d (mm)	FM	Part No.	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	e (mm)	L (mm)	L1 (mm)	L2 (mm)	Type
90	BCF, IR	**^ 735 798 888**	105	138	78	133	2.8	81	12	4	B
110	BCF, IR	**^ 735 798 889**	125	158	100		3.4	81	13		A
160	IR	**735 798 892**	175	212	151		4.9	93	17		C
200	IR	**^ 735 798 894**	232	268	207		6.2	102	22		C
225	IR	*** 735 798 895**	235	268	207		6.9	102	22		A
250	IR	**^ 735 798 596**	285	320	249		7.7	120	22		C
315	IR	**^ 735 798 598**	335	370	300		9.7	120	22		C

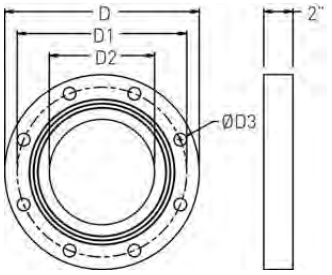
A



Blind Flange, PN 16/PN 10, PVDF-HP

Size	Part No.	weight (lb)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	Rad I (mm)	Rad J (mm)
20	**735 991 362**	0.046	25	43	28	22		16	6	17	1.0	0.4
25	**735 991 363**	0.068	32	54	35	29		20	7	17	1.5	0.4
32	**735 991 364**	0.104	40	63	43	36		26	7	17	1.5	0.4
40	**^ 735 991 365**	0.187	49	73	54	57		33	8	21	2.0	0.4
50	**735 991 366**	0.276	60	79	64	56		41	8	21	2.0	0.4
63	**735 991 367**	0.430	75	99	83	75	69	51	9	21	2.5	0.4
75	**^ 735 991 368**	0.648	89	119	99	91	83	61	10	21	2.5	0.4
90	**735 991 369**	0.961	105	133	115	106	97	74	11	23	3.0	0.4
110	**735 991 370**	1.457	125	158	138	128	118	90	12	24	3.0	0.5
160	**^ 735 991 372**	3.543	175	200	191	181	171	131	17	30	4.0	1.0
200/225	**^ 735 991 373**	7.824	232	268	250	240	230	164	20	30	4.0	1.0
250	*** 735 991 374**	0.002	285	320	290	280	270	230	22	30	1.0	0.5
315	*** 735 991 375**	0.002	335	370	349	339	329		22	34		1.0

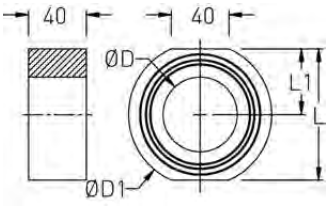
B



Full-Face Flange Spacer, PN 16, PVDF-HP

ANSI (inch)	Part No.	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	# holes
4	*** 735 991 340**	229	190	90	19	8
6	*** 735 991 341**	285	241	131	22	8
8	*** 735 991 342**	340	296	164	22	8
9	*** 735 991 343**	340	296	184	22	8
10	*** 735 991 344**	406	362	204	25	12
12	*** 735 991 345**	483	432	258	25	12

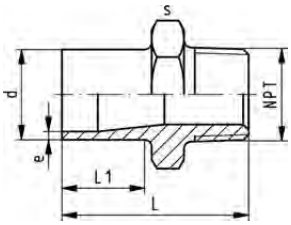
B



Wafer Blank, PN 16, PVDF-HP

d (mm)	Part No.	L (mm)	L1 (mm)	D (mm)	D1 (mm)
50	**735 991 860**	71	35	40	82
63	**735 991 861**	94	47	51	102
75	**735 991 862**	115	57	61	121
90	**735 991 863**	127	63	73	133
110	**735 991 864**	153	76	90	158
160	**735 991 865**	208	104	130	212
200	**735 991 866**	265	132	163	268
225	**735 991 867**	265	132	184	268
250	**735 991 868**	317	158	204	320
315	**735 991 869**	368	184	257	370

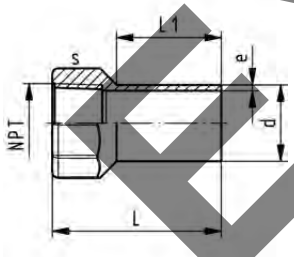
A



Male NPT Adaptor, PN 16, PVDF-HP

d (mm)	NPT (inch)	FM	Part No.	e (mm)	L (mm)	L1 (mm)	s (mm)
20	½	BCF, IR	**735 914 306**	1.9	53	28	32
25	¾	BCF, IR	**735 914 307**	1.9	55	28	36
32	1	BCF, IR	**735 914 308**	2.4	57	28	46
40	1 ¼	BCF, IR	**735 914 309**	2.4	60	28	55
50	1 ½	BCF, IR	**735 914 310**	3.0	63	28	65
63	2	BCF, IR	**735 914 311**	3.0	69	29	75

A



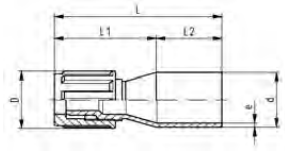
Female NPT Adaptor, PN 16, PVDF-HP

Model:

- With butt fusion spigot and NPT taper female thread
- Avoid stress when installing and large changes in temperature
- Connection to plastic thread only
- Do not apply solvent-based or other sealing compounds which could damage PVDF

	d (mm)	NPT (inch)	FM	Part No.	weight (kg)	e (mm)	L (mm)	s (mm)	L1 (mm)
	20	⅜	BCF, IR	**735 914 785**	0.029	1.9	54	32	30
	20	½	BCF, IR	**735 914 786**	0.027	1.9	54	32	30
	25	¾	BCF, IR	**735 914 787**	0.033	1.9	58	38	30
	32	1	BCF, IR	**735 914 788**	0.066	2.4	63	48	30
	40	1 ¼	BCF, IR	**735 914 789**	0.085	2.4	67	58	30
	50	1 ½	BCF, IR	**735 914 790**	0.108	3.0	67	65	30
*	63	2	BCF, IR	**735 914 791**	0.190	3.0	73	80	30

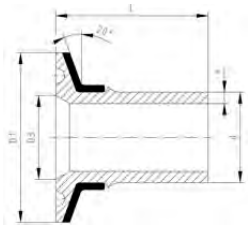
B



Flare Tube Adaptor, PN 10, PVDF-HP

d (mm)	tube size (inch)	FM	Part No.	e (mm)	L (mm)	L1 (mm)	L2 (mm)	D (mm)
20	¼	BCF, IR	* 735 598 430	1.9	75	45	30	21
20	⅜	BCF, IR	* 735 598 431	1.9	76	46	30	23
20	½	BCF, IR	* 735 598 432	1.9	77	47	30	26
20	¾	BCF, IR	* 735 598 433	1.9	78	48	30	34
25	¼	BCF, IR	* 735 598 435	1.9	75	45	30	21
25	⅜	BCF, IR	* 735 598 436	1.9	76	46	30	23
25	½	BCF, IR	* 735 598 437	1.9	77	47	30	26
25	¾	BCF, IR	* 735 598 438	1.9	78	48	30	34
25	1	BCF, IR	* 735 598 439	1.9	87	57	30	46
32	½	BCF, IR	* 735 598 442	2.4	77	47	30	26
32	¾	BCF, IR	* 735 598 443	2.4	78	48	30	34
32	1	BCF, IR	* 735 598 444	2.4	87	57	30	46

A

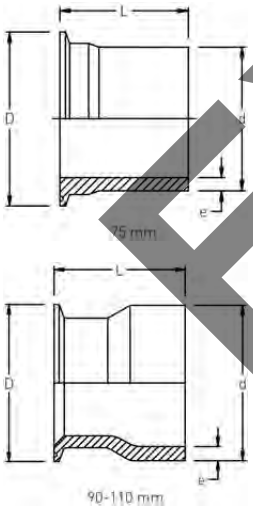


Sanitary Adaptor, PN 16, ASME BPE, PVDF-HP

Supplied with stainless steel backing ring

d (mm)	Size (inch)	FM	Part No.	e (mm)	D1 (mm)	D3 (mm)	L (mm)
20	¾	BCF, IR	735 598 357	1.9	25	16.20	49
25	1	BCF, IR	735 598 359	1.9	51	22.40	55
32	1 ½	BCF, IR	735 598 362	2.4	51	34.90	57
40	1 ½	BCF, IR	735 598 365	2.4	51	35.50	57
50	2	BCF, IR	735 598 367	3.0	64	47.70	68
63	2 ½	BCF, IR	735 598 369	3.0	78	59.90	71

B

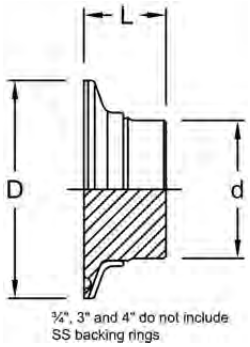


Large Sanitary Adaptor, PN 6, PVDF-HP

Does not use a Sanitary Backing Ring

d (mm)	Tube (3A) (inch)	FM	Part No.	weight (lb)	e (mm)	D (mm)	L (mm)
75	3	BCF, IR	* 735 598 370	0.057	3.6	91	67
90	3	BCF, IR	* 735 598 371	0.472	4.3	91	76
110	4	BCF, IR	* 735 598 372	0.683	5.3	119	76

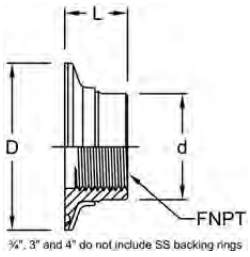
B



Sanitary Blank, PN 16/PN 6, PVDF-HP

Tube (3A) (inch)	PN (bar)	Part No.	D (mm)	d (mm)	L (mm)
3/4	16	* 735 992 390	25	20	13
1 & 1 1/2	16	* 735 992 391	51	32	19
2	16	* 735 992 392	64	50	19
2 1/2	16	* 735 992 393	78	63	19
3	6	* 735 992 394	91	75	19
4	6	* 735 992 395	117	103	25

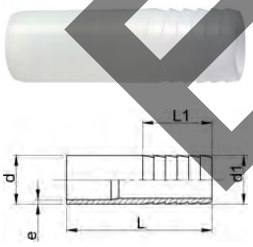
B



Sanitary Instrument Adaptor, PN 16/PN 6, PVDF-HP

Tube (3A) (inch)	FNPT (inch)	PN	Part No.	D (mm)	d (mm)	L (mm)
¾	¼	16	* 735 992 400	25	20	13
1	¼	16	* 735 992 401	51	40	19
1	⅜	16	* 735 992 402	51	40	19
1 ½	¼	16	* 735 992 403	51	40	19
1 ½	½	16	* 735 992 404	51	40	19
1 ½	¾	16	* 735 992 405	51	40	19
2	¼	16	* 735 992 406	64	50	19
2	½	16	* 735 992 407	64	50	19
2	¾	16	* 735 992 408	64	50	19
2	1	16	* 735 992 409	64	50	19
2 ½	¼	16	* 735 992 410	78	63	19
2 ½	½	16	* 735 992 411	78	63	19
2 ½	¾	16	* 735 992 412	78	63	19
2 ½	1	16	* 735 992 413	78	63	19
3	¼	6	* 735 992 414	91	75	19
3	½	6	* 735 992 415	91	75	19
3	¾	6	* 735 992 416	91	75	19
3	1	6	* 735 992 417	91	75	19
4	¼	6	* 735 992 418	117	103	25
4	½	6	* 735 992 419	117	103	25
4	¾	6	* 735 992 420	117	103	25
4	1	6	* 735 992 421	117	103	25

B

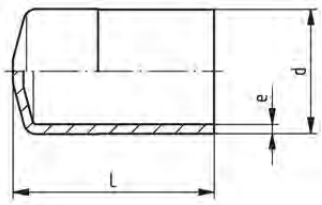


Hose Adaptor, PN 16, PVDF-HP

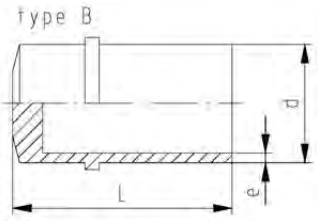
d - d1 (mm)	FM	Part No.	e (mm)	L (mm)	L1 (mm)
20 - 20	BCF, IR	* 735 968 731	1.9	64	27
25 - 25	BCF, IR	* 735 968 732	1.9	75	36
32 - 32	BCF, IR	* 735 968 733	2.4	82	36
40 - 40	BCF, IR	* 735 968 734	2.4	84	42
50 - 50	BCF, IR	* 735 968 735	3.0	90	48
63 - 60	BCF, IR	* 735 968 736	3.0	100	50

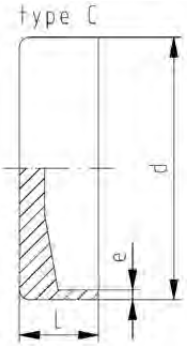
A

Cap, PN 16, PVDF-HP



Type A

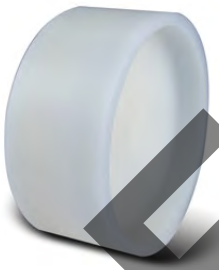


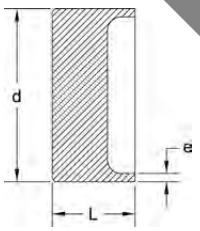


d (mm)	FM	PN (bar)	Part No.	weight (lb)	L (mm)	Type	e (mm)
20	BCF, IR	16	**735 968 106**	0.037	47	A	1.9
25	BCF, IR	16	**735 968 107**	0.026	47	A	1.9
32	BCF, IR	16	**735 968 108**	0.075	52	A	2.4
40	BCF, IR	16	**735 991 654**	0.150	59	B	2.4
50	BCF, IR	16	**735 991 655**	0.229	64	B	3.0
63	BCF, IR	16	**735 991 656**	0.364	69	B	3.0

B

Flush End Cap (Machined), PN 16/PN 10, PVDF-HP

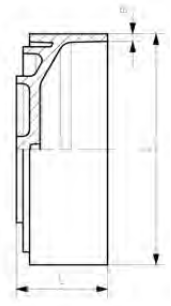




Add "T" to end of part number and fee to list price for each factory milled thread (max. diameter is 3/4"). See published price list for fee.

d (mm)	FM	PN	Part No.	e (mm)	L (mm)
20	IR	16	* **735 992 680**	1.9	30
25	IR	16	* **735 992 681**	1.9	30
32	IR	16	* **735 992 682**	2.4	30
40	IR	16	* **735 992 683**	2.4	30
50	IR	16	* **735 992 684**	3.0	30
63	IR	16	* **735 992 685**	3.0	30
75	IR	16	* **735 992 686**	3.6	30
90	IR	16	* **735 992 687**	4.3	36
110	IR	16	* **735 992 688**	5.3	38
160	IR	10	* **735 992 690**	4.9	42
200	IR	10	* **735 992 691**	6.2	45
225	IR	10	* **735 992 692**	6.9	50

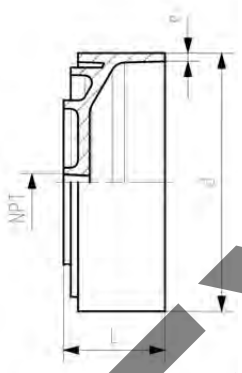
A



Cap, PN 10, PVDF-HP

d (mm)	FM	Part No.	e (mm)	L (mm)
250	IR	* 735 968 546	7.7	114
315	IR	* 735 968 548	9.7	130
355	IR	* 735 968 549	10.9	150
400	IR	* 735 968 550	12.3	150
450	IR	* 735 968 551	13.8	150

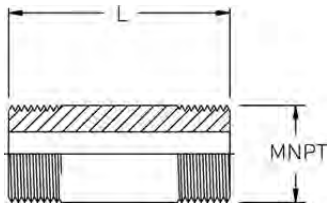
A



Cap, female thread NPT, PN 10, PVDF-HP

d (mm)	NPT (inch)	FM	Part No.	e (mm)	L (mm)
250	½	IR	* 735 968 625	7.7	114
315	½	IR	* 735 968 635	9.7	130

B

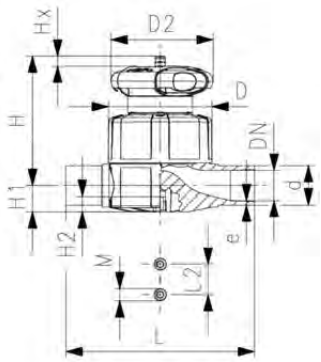


Nipple, PN 10, PVDF-HP

Male NPT (inch)	L (inch)	Part No.
½	2	* 735 992 350
½	3	* 735 992 351
½	4	* 735 992 352
¾	2	* 735 992 353
¾	3	* 735 992 354
¾	4	* 735 992 355
1	2	* 735 992 356
1	3	* 735 992 357
1	4	* 735 992 358
1 ¼	3	* 735 992 359
1 ¼	4	* 735 992 360
1 ½	3	* 735 992 361
1 ½	4	* 735 992 362
2	3	* 735 992 363
2	4	* 735 992 364

Manual Valves

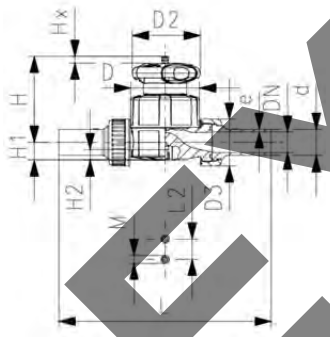
A



Type 515 Diaphragm Valve SYGEF Plus PVDF
Butt fusion spigots metric

d (mm)	PTFE/EPDM Part No.	D (mm)	D2 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L2 (mm)	M	Lift = Hx (mm)	e (mm)	closest inch (inch)
20	**181 515 132**	65	65	73	14	12	124	25	M6	7	1.9	½
25	**181 515 133**	80	65	81	18	12	144	25	M6	10	1.9	¾
32	**181 515 134**	88	87	107	22	12	155	25	M6	13	2.4	1
40	**181 515 135**	101	87	115	26	15	176	45	M8	15	2.4	1 ¼
50	**181 515 136**	117	135	148	32	15	193	45	M8	19	3.0	1 ½
63	**181 515 137**	144	135	166	39	15	223	45	M8	25	3.0	2

A

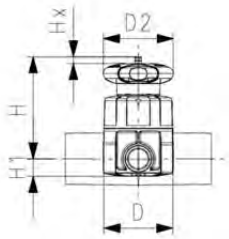


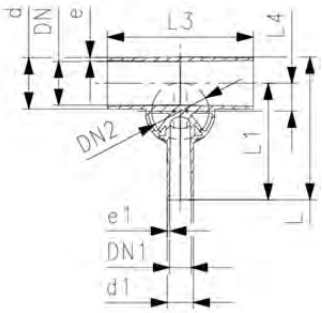
Type 514 Diaphragm Valve SYGEF Plus PVDF
Butt fusion spigots metric

d (mm)	PTFE/EPDM Part No.	PTFE/FKM Part No.	weight (lb)
20	**181 514 132**	* **181 514 152**	0.880
25	**181 514 133**	* **181 514 153**	1.316
32	**181 514 134**	* **181 514 154**	2.449
40	**181 514 135**	* **181 514 155**	2.835
50	**181 514 136**	* **181 514 156**	6.590
63	**181 514 137**	* **181 514 157**	6.975

d (mm)	D (mm)	D2 (mm)	D3 (mm)	L (mm)	L2 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	Lift = Hx (mm)	e (mm)	closest inch (inch)
20	65	65	43	196	25	73	14	12	M6	7	1.9	½
25	80	65	53	221	25	81	18	12	M6	10	1.9	¾
32	88	87	60	234	25	107	22	12	M6	13	2.4	1
40	101	87	74	260	45	115	26	15	M8	15	2.4	1 ¼
50	117	135	82	284	45	148	32	15	M8	19	3.0	1 ½
63	144	135	100	321	45	166	39	15	M8	25	3.0	2

A





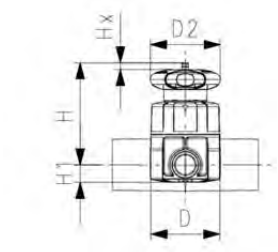
Type 519 Zero Static Diaphragm Valve
SYGEF Plus PVDF
Butt fusion spigots metric

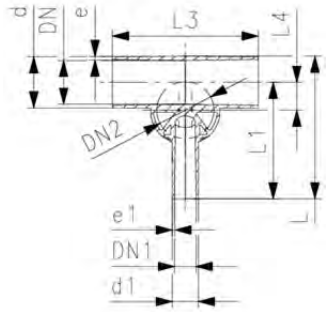
d (mm)	d1 (mm)	Valve Size d (mm)	PN (bar)	PTFE/EPDM Part No.	SP
20	20	20	10	^ 181 519 301	1
25	20	25	10	^ 181 519 303	1
25	25	25	10	^ 181 519 304	1
32	20	25	10	^ 181 519 307	1
32	25	25	10	^ 181 519 308	1
32	32	32	10	^ 181 519 309	1
40	20	32	10	^ 181 519 312	1
40	25	32	10	^ 181 519 313	1
40	32	32	10	^ 181 519 314	1
40	40	32	10	^ 181 519 315	1
50	20	25	10	^ 181 519 318	1
50	25	32	10	^ 181 519 319	1
50	32	32	10	^ 181 519 320	1
50	40	63	10	^ 181 519 321	1
50	50	63	10	^ 181 519 322	1
63	20	25	10	^ 181 519 325	1
63	25	32	10	^ 181 519 326	1
63	32	32	10	^ 181 519 327	1
63	40	63	10	^ 181 519 328	1
63	50	63	10	^ 181 519 329	1
63	63	63	10	^ 181 519 330	1
90	20	32	10	^ 181 519 341	1
90	25	32	10	^ 181 519 342	1
90	32	32	10	^ 181 519 343	1
90	50	63	10	^ 181 519 345	1
90	63	63	10	^ 181 519 346	1
110	20	32	10	^ 181 519 351	1
110	25	32	10	^ 181 519 352	1
110	32	32	10	^ 181 519 353	1
110	50	63	10	^ 181 519 355	1
110	63	63	10	^ 181 519 356	1

d (mm)	DN2 (mm)	DN1 (mm)	D2 (mm)	D (mm)	H (mm)	H1 (mm)	L (mm)	L1 (mm)	L3 (mm)	L4 (mm)	Lift = Hx (mm)	e (mm)	e1 (mm)
20	15	15	65	65	75	14.0	117	96	162	12	7	1.9	1.9
25	20	15	65	80	80	17.5	133	108	162	16	10	1.9	1.9
25	20	20	65	80	80	17.5	133	108	162	16	10	1.9	1.9
32	20	15	65	80	84	21.5	142	120	162	19	10	2.4	1.9
32	20	20	65	80	84	21.5	142	120	162	19	10	2.4	1.9
32	25	25	87	88	107	21.5	145	120	160	19	13	2.4	2.4
40	25	15	87	88	115	21.5	149	128	180	23	13	2.4	1.9
40	25	20	87	88	115	21.5	149	128	180	23	13	2.4	1.9
40	25	25	87	88	115	21.5	149	128	180	23	13	2.4	2.4
40	25	32	87	88	115	21.5	174	153	180	23	13	2.4	2.4
50	20	15	65	80	97	17.5	160	134	180	27	10	3.0	1.9
50	25	20	87	88	120	21.5	160	134	180	28	13	3.0	1.9
50	25	25	87	88	120	21.5	160	134	180	28	13	3.0	2.4
50	50	32	135	144	164	32.0	209	169	209	33	25	3.0	2.4
50	50	40	135	144	164	32.0	209	169	209	33	25	3.0	3.0
63	20	15	65	80	104	17.5	177	144	180	33	10	3.0	1.9
63	25	20	87	88	127	21.5	177	144	180	35	13	3.0	1.9
63	25	25	87	88	127	21.5	177	144	180	35	13	3.0	2.4
63	50	32	135	144	170	39.0	225	192	220	39	25	3.0	2.4
63	50	40	135	144	170	39.0	225	192	220	39	25	3.0	3.0
63	50	50	135	144	170	39.0	225	192	220	39	25	3.0	3.0
90	25	15	87	88	140	21.5	205	159	190	47	13	4.3	1.9
90	25	20	87	88	140	21.5	205	159	190	47	13	4.3	1.9

table continued on the next page

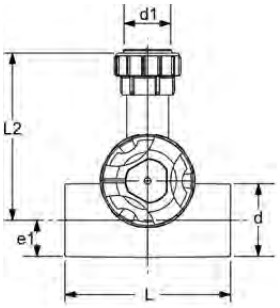
A

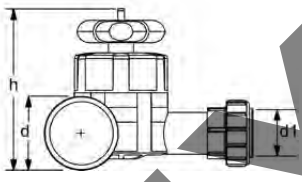




d (mm)	DN2 (mm)	DN1 (mm)	D2 (mm)	D (mm)	H (mm)	H1 (mm)	L (mm)	L1 (mm)	L3 (mm)	L4 (mm)	Lift = Hx (mm)	e (mm)	e1 (mm)
90	25	25	87	88	140	21.5	205	159	190	47	13	4.3	2.4
90	50	40	135	144	184	39.0	254	207	250	51	25	4.3	3.0
90	50	50	135	144	184	39.0	254	207	250	51	25	4.3	3.0
110	25	15	87	88	149	21.5	227	171	190	56	13	5.3	1.9
110	25	20	87	88	149	21.5	227	171	190	56	13	5.3	1.9
110	25	25	87	88	149	21.5	227	171	190	56	13	5.3	2.4
110	50	40	135	144	194	39.0	276	219	250	60	25	5.3	3.0
110	50	50	135	144	194	39.0	276	219	250	60	25	5.3	3.0

A

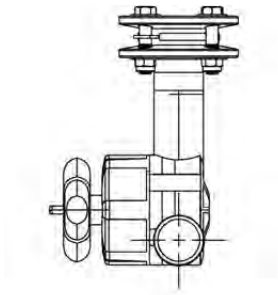


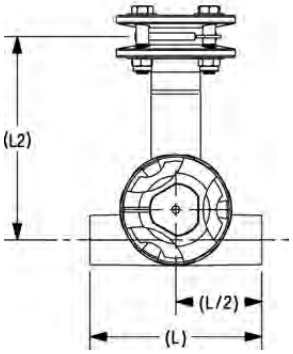


Lateral Valve with Union, PN10 PVDF-HP 5 series

d (mm)	d1 (mm)	Part No.	SP	weight (lb)	PN (bar)	L (mm)	L2 (mm)	e1 (mm)	h (mm)	psi at 73° F (psi)
20	20	^ 735 994 525	1	1.146	10	162	118	10.0	85	150
25	20	^ 735 994 526	1	1.411	10	162	130	12.5	93	150
25	25	^ 735 994 527	1	1.455	10	162	132	12.5	93	150
32	20	* 735 994 529	1	1.543	10	162	142	16.0	100	150
32	25	^ 735 994 528	1	0.220	10	162	144	16.0	100	150
32	32	* 735 994 530	1	2.205	10	160	146	16.0	123	150
50	20	* 735 994 537	1	2.116	10	180	156	25.0	122	150
50	25	* 735 994 538	1	2.690	10	180	158	25.0	145	150
50	32	* 735 994 539	1	2.778	10	180	160	25.0	145	150
50	50	* 735 994 541	1	5.556	10	209	202	25.0	189	150
63	20	* 735 994 543	1	0.220	10	180	166	31.5	136	150
63	25	^ 735 994 544	1	2.910	10	180	168	31.5	159	150
63	32	* 735 994 545	1	2.998	10	180	170	31.5	159	150
63	50	* 735 994 547	1	0.002	10	220	225	31.5	202	150
63	63	* 735 994 548	1	0.002	10	220	227	31.5	202	150
90	20	* 735 994 558	1	3.836	10	190	181	45.0	185	150
90	25	* 735 994 559	1	3.880	10	190	183	45.0	185	150
90	32	* 735 994 560	1	3.616	10	190	185	45.0	185	150
90	50	* 735 994 562	1	8.245	10	250	240	45.0	229	150
90	63	* 735 994 563	1	0.002	10	250	242	45.0	229	150
110	20	* 735 994 566	1	0.002	10	190	193	55.0	204	150
110	25	* 735 994 567	1	4.542	10	190	195	55.0	204	150
110	32	* 735 994 568	1	0.002	10	190	197	55.0	204	150
110	50	* 735 994 570	1	9.039	10	250	252	55.0	249	150
110	63	* 735 994 571	1	0.002	10	250	254	55.0	249	150

A

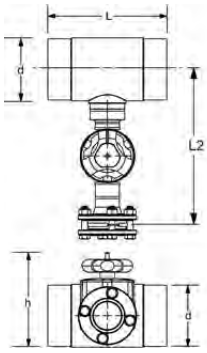




Lateral Valve, PN10 PVDF-HP 5 series Flanged

d (mm)	d1 (mm)	Part No.	SP	PN (bar)	L (mm)	L2 (mm)	psi at 73° F (psi)
63	63	**735 994 948**	1	10	220	261	150
90	63	**735 994 963**	1	10	250	276	150
110	63	**735 994 971**	1	10	250	288	150

A



Lateral Tee Valve 160mm x 63mm

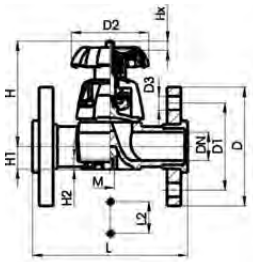
d (mm)	d2 (mm)	Part No.	SP	PN (bar)	L (mm)	L2 (mm)	h (mm)
160	63	**155 994 900**	1	10	310	408	184

A

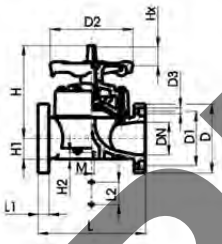
Type 317 Diaphragm Valve SYGEF® Plus PVDF Flanged

d (mm)	PTFE with EPDM supp. diaphragm Part No.	weight (lb)
75	**^ 175 317 568**	12.566
90	**^ 175 317 054**	24.377
110	**^ 175 317 355**	32.959

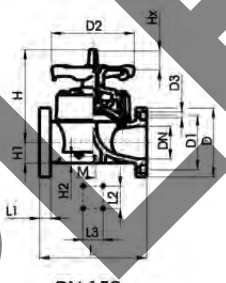
d (mm)	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	M	AL
75	185	140	152	18	201	46	15	290		70	M8	4
90	200	152	270	18	265	57	23	310	35	120	M12	8
110	225	191	270	18	302	68	23	350	35	120	M12	8



DN 15-65



DN 80-100



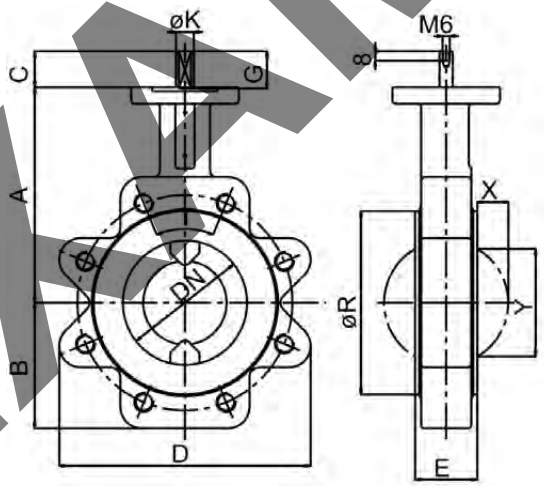
DN 150

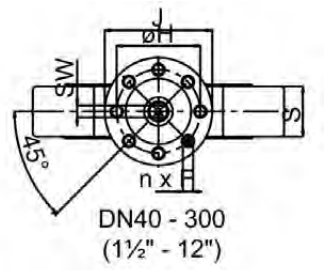
Butterfly Valve - Type 365

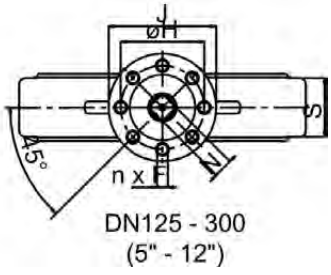
d (inch)	PN (bar)	Lever Op. Part No.	Gear Op. Part No.	SP	weight (lb)
2	10	* 160 365 318			
3	10	* 160 365 320	* 160 365 500	1	17.637
4	10	* 160 365 321	* 160 365 501	1	23.589
6	10	* 160 365 323	* 160 365 503	1	34.833
8/9	10		* 160 365 504	1	63.934
10	10		* 160 365 505	1	77.162
12	10		* 160 365 506	1	123.238
14	10		* 160 365 507	1	144.623

d (inch)	Type	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	n x F	G (mm)	H (mm)	J (mm)	K (mm)	R (mm)	X (mm)	Y (mm)
2	F05	135	65	26	160	43	8 x dia 7	27	50	65	15	95	5	31
3	F07	160	93	29	188	46	8 x dia 9	30	70	90	15	132		69
4	F07	180	105	29	210	52	8 x dia 9	30	70	90	15	153	26	91
6	F07	210	140	46	269	56	8 x dia 9	47	70	90	20	209	48	143
8/9	F12	240	270	65	360	60	8 x dia 13	66	125	150	30	259	71	196
10	F12	275	205	65	435	68	8 x dia 13	66	125	150	30	309	91	243
12	F12	310	250	65	500	78	8 x dia 13	66	125	150	30	364	111	293
14	F12	330	255	25	534	78	8 x dia 28.6	32				412	126	304

d (inch)	N Square	SW (mm)	Weight (lb)
2		10	8
3		10	9
4		10	13
6	16/16		30
8/9	19/19		51
10	22/22		71
12	27/27		110
14	27/27		132

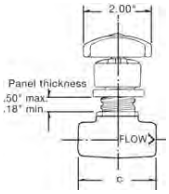






B

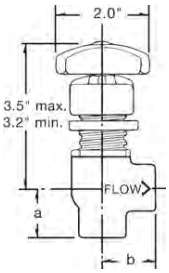
Needle Valve - Type 522 Globe Body, Female NPT



Size (inch)	Part No.	weight (kg)	c (mm)
¼	* 150 900 117	0.120	58
½	* 150 900 122	0.120	65

B

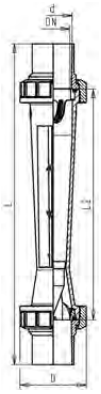
Needle Valve - Type 522 Angle Body, Female NPT



Size (inch)	Part No.	weight (lb)	a (mm)	b (mm)
¼	* 150 900 113	1.411	25	28
½	* 150 900 120	0.265	28	31

Rotameters

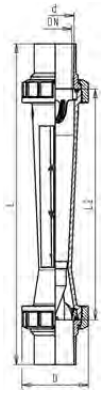
C



Rotameter 335 special version PVDF-HP
Float in PTFE
With fusion spigots IR/BCF

Type	d (mm)	Scale range (l/h)	Scale range (gal/min)	Part No.	SP	D (mm)	L (mm)	L2 (mm)	G (inch)
SK 11	32	100 - 999	0.44 - 4.40	* **198 335 160**	1	60	453	335	1 ½
SK 20	50	300 - 2998	1.32 - 13.20	* **198 335 161**	1	83	466	335	2 ¼
SK 21	50	600 - 5996	2.64 - 26.40	* **198 335 162**	1	83	466	335	2 ¼
SK 30*	63	999 - 7995	4.40 - 35.20	* **198 335 163**	1	103	472	335	2 ¾
SK 31	63	1499 - 14990	6.60 - 66.00	* **198 335 164**	1	103	472	335	2 ¾
SK 40	75	1999 - 19987	8.80 - 88.00	* **198 335 165**	1	122	495	335	3 ½
SK 41*	75	2998 - 29004	13.20 - 127.70	* **198 335 166**	1	122	495	335	3 ½

C



Rotameter 807 special version PVDF-HP
Float in PTFE
With fusion spigots IR/BCF

Type	d (mm)	DN (mm)	Scale range (l/h)	Scale range (gal/min)	Taper tube in Polysulfone, FKM O-Rings Part No.	weight (kg)	D (mm)	L (mm)	L2 (mm)	G (inch)
SK 70	32	25	68 - 204	0.3 - 0.9	* **198 807 209**	0.383	60	318	200	1 ½
SK 71	32	25	90 - 295	0.4 - 1.3	* **198 807 210**	0.387	60	318	200	1 ½
SK 73	32	25	136 - 795	0.6 - 3.5	* **198 807 202**	0.401	60	318	200	1 ½

Section 5

SYGEF® Standard PVDF Piping System

SYGEF® Standard – Product Specification

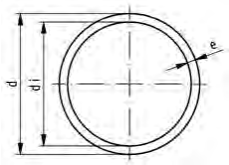
Material	Polyvinylidene Fluoride (PVDF)
Color	opaque
Density	~1.78 g/cm³ (ISO 1183 / ASTM D 792)
Surface tension	30–35 mJ/m²
Linear expansion coefficient	0.12–0.18 mm/mK (DIN 53752)
E-modulus	≥1700 N/mm² (EN ISO 527 / ASTM D 790)
Thermal conductivity	0.19 W/mK (DIN 52612)
Surface resistivity	5×10^{14} Ωcm (IEC 60093)
Dimension	d 20 (½")–d 315 (12") in accordance to ISO 10931
Pressure rating	Pipes/fittings: 20–110 mm PN 16 (232 PSI); 160–315 mm PN 10 (150 PSI) Valves: separate specification
Temperature rating	from –20 °C to 140 °C (–4 °F to 284 °F)
Production	Fittings/valves: injection molded Pipes: extruded and stress relieved (ISO 10931-2) Valves: injection molded (additional available oil free treated and paint compatible / silicon free)
Surface finish	Inner surface Ra ≤ 0.5 µm (20 µin) for injection molded and extruded components
Marking	All components are embossed with a permanent identification during the production process to ensure full traceability. Lot No Material Dimension Pressure Rating
Testing and inspection (ISO 10931)	Inclusions Visual inspection Surface finish Dimension tolerance Pressure testing
Approvals/conformance	DIBt ASME BPE FDA CFR 21 177.2510 USP 25 class VI (physiological non-toxic) FM-4910 listing) UL 723 ASTM E-84 25/50 for building plenums for sizes 20–75 mm
Welding technology	BCF® Plus, bead and crevice free fusion, size d20 (½") – d110 (4") IR Plus®, infrared fusion (DVS 2207-6), size d20 (½") – d315 (12") Butt fusion (DVS 2207-15), size d20 (½") – d315 (12") Socket fusion (DVS 2207-15), size d20 (½") – d63 (2")
Documentation*	Certificate of Conformance with FDA, USP EN 10204 2.2 EN 10204 3.1
Packing**	Multiple components single bagged in specified bag
Labeling	Brand Name Product Description Code Number Material Dimension
Main applications	Uses include delivery of pharmaceutical grade purified water (PW) and DI water, using hot water, steam chemical or ozone sanitization. Due to its excellent chemical resistance it is widely used in chemical distribution systems.

* On request
** Not for socket fusion products

Table of contents		Page
	Pipe	214
	IR Plus/BCF Plus Fusion Fittings	215
	Socket Fusion Fittings	223
	Manual Valves	229
	Miscellaneous	260

Pipe

A



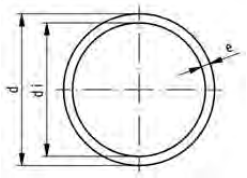
Pipe, PN 16, PVDF-Standard 25/50

Model:

- Material: PVDF
- Supplied in 5m (16.4 foot) length
- Certified for building air plenum according to UL 723 ASTM E-84 25/50, sizes 20-75mm

d (mm)	FM	Part No.	lbs/meter	e (mm)	di (mm)
20	BCF, IR	* 175 484 203	0.463	1.9	16.2
25	BCF, IR	* 175 484 204	0.593	1.9	21.2
32	BCF, IR	* 175 484 205	0.959	2.4	27.2
40	BCF, IR	* 175 484 206	1.241	2.4	35.2
50	BCF, IR	* 175 484 207	1.874	3.0	44.0
63	BCF, IR	* 175 484 208	2.403	3.0	57.0
75	BCF, IR	* 175 484 209	3.417	3.6	67.8

A



Pipe, PN 16, PVDF-Standard

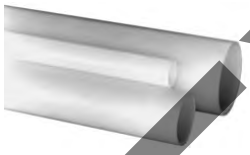
Model:

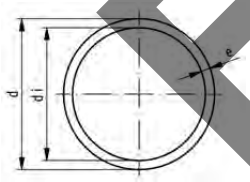
- Material: PVDF
- Supplied in 5m (16.4 foot) length
- Material: PVDF

* on request

	d (mm)	FM	Part No.	lbs/meter	e (mm)	di (mm)
	90	BCF, IR	* 175 480 210	4.916	4.3	81.4
	110	BCF, IR	* 175 480 211	7.341	5.3	99.4
*	250	IR	* 175 481 218		11.9	226.2
*	280	IR	175 481 219		13.4	253.2
*	315	IR	* 175 481 220		15.0	285.0

A





Pipe, PN 10, PVDF-Standard

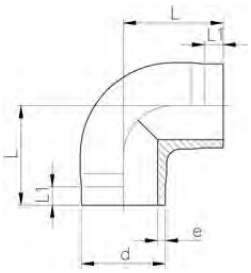
Model:

- Material: PVDF
- Supplied in 5m (16.4 foot) length

d (mm)	PN (bar)	FM	Part No.	lbs/meter	e (mm)	di (mm)
160	10	IR	* 175 480 668	10.009	4.9	150.2
200	10	IR	* 175 480 669	15.851	6.2	187.6
225	10	IR	* 175 480 670	19.731	6.9	211.2
250	10	IR	* 175 480 671	24.471	7.7	234.6
315	10	IR	* 175 480 674	38.801	9.7	295.6

IR Plus/BCF Plus Fusion Fittings

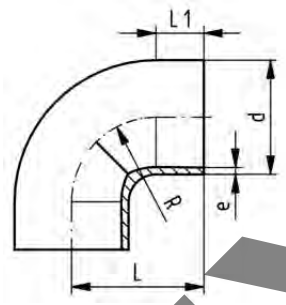
A



90° Elbow, PN 16, PVDF-Standard

d (mm)	FM	Part No.	weight (kg)	e (mm)	L (mm)	L1 (mm)
20	BCF, IR	**735 108 606**	0.017	1.9	38	25
25	BCF, IR	**735 108 607**	0.023	1.9	42	26
32	BCF, IR	**735 108 608**	0.040	2.4	46	26
40	BCF, IR	**^ 735 108 609**	0.060	2.4	51	28
50	BCF, IR	**735 108 610**	0.105	3.0	58	28
63	BCF, IR	**735 108 611**	0.198	3.0	66	28

A

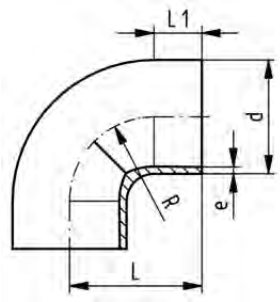


90° Elbow, PN 16, PVDF-Standard

d (mm)	FM	Part No.	weight (kg)	e (mm)	L (mm)	L1 (mm)	R (mm)
75	BCF, IR	**^ 735 018 712**	0.243	3.6	75	23	62
90	BCF, IR	**735 018 713**	0.423	4.3	90	23	77
110	BCF, IR	**735 018 714**	0.705	5.3	110	23	98
250	IR	**^ 735 018 746**	6.536	11.9	254	48	232
280	IR	**735 018 747**	9.182	13.4	283	48	262
315	IR	**^ 735 018 748**	13.031	15.0	321	48	297

A

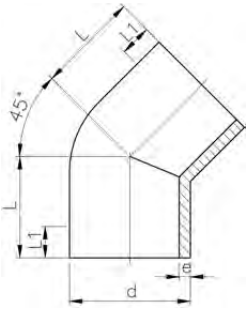
90° Elbow Sweep Radius, PN 10, PVDF-Standard



d (mm)	FM	Part No.	weight (kg)	e (mm)	L (mm)	L1 (mm)	R (mm)
160	IR	**735 018 517**	1.540	4.9	160	33	141
200	IR	**735 018 519**	2.018	6.2	200	33	181
225	IR	*** 735 018 520**	3.952	6.9	220	33	200
250	IR	**735 018 521**	4.304	7.7	254	48	232
280	IR	**735 018 522**	6.370	8.6	283	48	262
315	IR	**735 018 523**	9.032	9.7	321	48	297

A

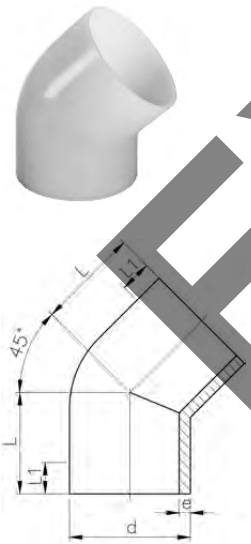
45° Elbow, PN 16, PVDF-Standard



d (mm)	FM	Part No.	weight (kg)	e (mm)	L (mm)	L1 (mm)	R (mm)
20	BCF, IR	**735 158 606**	0.014	1.9	32	25	
25	BCF, IR	**735 158 607**	0.019	1.9	34	26	
32	BCF, IR	**735 158 608**	0.033	2.4	36	26	
40	BCF, IR	**^ 735 158 609**	0.042	2.4	39	28	
50	BCF, IR	**735 158 610**	0.084	3.0	42	30	
63	BCF, IR	**735 158 611**	0.121	3.0	47	31	
75	BCF, IR	**^ 735 158 612**	0.160	3.6	49	32	
90	BCF, IR	**735 158 613**	0.271	4.3	57	37	
110	BCF, IR	**735 158 614**	0.499	5.3	70	46	

A

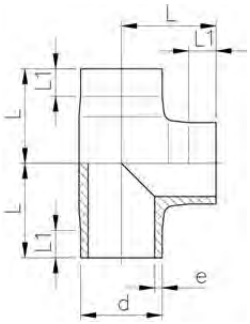
45° Elbow, PN 10, PVDF-Standard



d (mm)	FM	Part No.	weight (kg)	e (mm)	L (mm)	L1 (mm)
160	IR	*** 735 158 517**	0.986	4.9	100	62
200	IR	*** 735 158 519**	1.928	6.2	124	77
225	IR	*** 735 158 520**	2.732	6.9	140	88
250	IR	**735 158 521**	2.402	7.7	120	47
315	IR	**735 158 523**	4.923	9.7	147	47

A

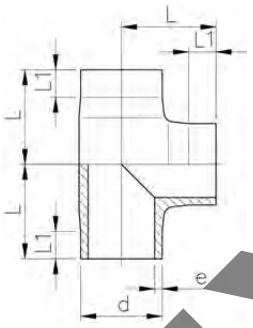
Tee, PN 16, PVDF-Standard



d (mm)	FM	Part No.	weight (kg)	e (mm)	L (mm)	L1 (mm)
20	BCF, IR	**735 208 606**	0.023	1.9	38	25
25	BCF, IR	**735 208 607**	0.032	1.9	42	27
32	BCF, IR	**735 208 608**	0.056	2.4	46	27
40	BCF, IR	**^ 735 208 609**	0.083	2.4	51	28
50	BCF, IR	**735 208 610**	0.156	3.0	58	28
63	BCF, IR	**735 208 611**	0.270	3.0	66	28
75	BCF, IR	**^ 735 208 612**	0.336	3.6	75	32
90	BCF, IR	**735 208 613**	0.587	4.3	90	39
110	BCF, IR	**735 208 614**	1.054	5.3	110	48

A

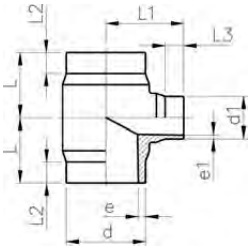
Tee, PN 10, PVDF-Standard



d (mm)	FM	Part No.	weight (kg)	e (mm)	L (mm)	L1 (mm)
160	IR	*** 735 208 517**	2.250	4.9	160	71
200	IR	*** 735 208 519**	4.297	6.2	200	80
225	IR	*** 735 208 520**	6.900	6.9	220	86
250	IR	**735 208 521**	6.939	7.7	223	70
315	IR	**735 208 523**	13.882	9.7	274	74

B

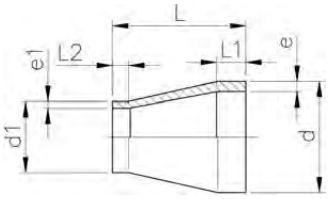
Reducer Tee, PN 10, PVDF-Standard



d - d1 (mm)	FM	Part No.	weight (kg)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
160 - 90	IR	**^ 735 208 562**	2.300	4.9	4.3	155	130	60	25
160 - 110	IR	**^ 735 208 561**	2.300	4.9	5.3	155	130	60	25
225 - 90	IR	**^ 735 208 570**	4.400	6.9	4.3	155	160	60	25
225 - 110	IR	**^ 735 208 569**	4.286	6.9	5.3	155	160	60	25
225 - 160	IR	**735 208 568**	4.239	6.9	4.9	155	170	60	35

A

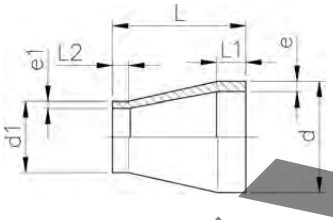
Reducer, PN 16, PVDF-Standard



d - d1 (mm)	FM	Part No.	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)
25 - 20	BCF, IR	**735 908 637**	1.9	1.9	50	22	22
32 - 20	BCF, IR	**735 908 642**	2.4	1.9	50	22	22
32 - 25	BCF, IR	**735 908 641**	2.4	1.9	50	22	22
40 - 20	BCF, IR	**^ 735 908 648**	2.4	1.9	58	22	24
40 - 25	BCF, IR	**^ 735 908 647**	2.4	1.9	55	22	24
40 - 32	BCF, IR	**^ 735 908 646**	2.4	2.4	55	22	24
50 - 25	BCF, IR	**735 908 654**	3.0	1.9	60	22	25
50 - 32	BCF, IR	**735 908 653**	3.0	2.4	60	22	25
50 - 40	BCF, IR	**^ 735 908 652**	3.0	2.4	60	22	25
63 - 32	BCF, IR	**735 908 660**	3.0	2.4	65	22	25
63 - 40	BCF, IR	**^ 735 908 659**	3.0	2.4	65	22	25
63 - 50	BCF, IR	**735 908 658**	3.0	3.0	65	22	25
75 - 40	BCF, IR	**^ 735 908 666**	3.6	2.4	68	24	25
75 - 50	BCF, IR	**^ 735 908 665**	3.6	3.0	65	24	25
75 - 63	BCF, IR	**^ 735 908 664**	3.6	3.0	65	24	25
90 - 63	BCF, IR	**735 908 671**	4.3	3.0	75	25	30
90 - 75	BCF, IR	**^ 735 908 670**	4.3	3.6	75	25	35
110 - 63	BCF, IR	**735 908 678**	5.3	3.0	90	30	30
110 - 75	BCF, IR	**^ 735 908 677**	5.3	3.6	90	30	35
110 - 90	BCF, IR	**735 908 676**	5.3	4.3	90	30	35

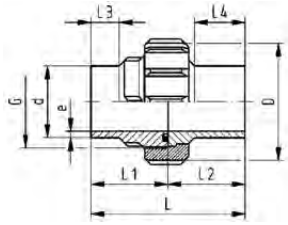
A

Reducer, PN 10, PVDF-Standard



d - d1 (mm)	FM	PN (bar)	SDR	Part No.	weight (kg)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	L2 (mm)
160 - 110	IR	10	33 - 21	**735 908 590**	0.573	4.9	5.3	120	40	40
200 - 160	IR	10	33 - 33	**735 908 592**	0.830	6.2	4.9	145	50	40
225 - 110	IR	10	33 - 21	*** 735 908 595**	0.940	6.9	5.3	160	55	35
225 - 160	IR	10	33 - 33	*** 735 908 596**	1.140	6.9	4.9	160	55	40
225 - 200	IR	10	33 - 33	*** 735 908 597**	1.200	6.9	6.2	160	55	50

A



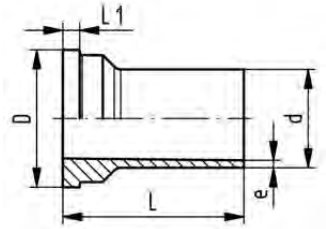
Union (FKM black), PN 16, PVDF-Standard

Model:

- d75, d90 and d100 with buttress-shaped thread

d (mm)	Part No.	weight (kg)	D (mm)	e (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	G (R/Rp BS Thread) (inch)
20	**735 528 606**	0.074	43	1.9	106	53	53	25	37	1
25	**735 528 607**	0.110	53	1.9	112	56	56	25	38	1 1/4
32	**735 528 608**	0.153	60	2.4	118	59	59	25	40	1 1/2
40	**^ 735 528 609**	0.220	74	2.4	124	62	62	25	41	2
50	**735 528 610**	0.293	82	3.0	130	65	65	25	43	2 1/4
63	**735 528 611**	0.449	100	3.0	136	68	68	25	44	2 3/4
75	**^ 735 528 612**	0.740	133	3.6	132	66	66	24	34	S107.5x3.6
90	**735 528 613**	0.773	133	4.3	130	65	65	24	48	S107.5x3.6
110	**735 528 614**	1.054	155	5.3	130	65	65	25	45	S127.5x3.6

A



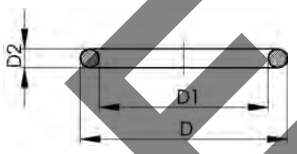
Union End, PN 16, PVDF-Standard

Model:

- Suitable for SYGEF Standard Union Butt Fusion

d (mm)	FM	Part No.	weight (kg)	D (mm)	e (mm)	L (mm)	L1 (mm)
20	BCF, IR	**735 608 606**	0.020	30	1.9	53	5
25	BCF, IR	**735 608 607**	0.030	39	1.9	56	5
32	BCF, IR	**735 608 608**	0.044	45	2.4	59	6
40	BCF, IR	**735 608 609**	0.069	57	2.4	62	6
50	BCF, IR	**735 608 610**	0.083	63	3.0	65	7
63	BCF, IR	**735 608 611**	0.130	78	3.0	68	8
75	BCF, IR	*** 735 608 612**	0.209	101	3.6	66	9
90	BCF, IR	*** 735 608 613**	0.187	101	4.3	65	9
110	BCF, IR	*** 735 608 614**	0.263	121	5.3	65	10

B



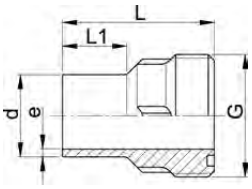
O-Ring for PROGEF, SYGEF Standard IR/BCF and Socket Fusion Unions

Model:

- For unions and adaptor unions
- Hardness approx. 65° Shore
- EPDM minimum temperature -40°F
- FKM minimum temperature -15°F
- * for unions PVC-U, PVC-C and ABS: 21 51 01, 21 51 11, 21 53 03, 21 53 08, 21 55 04, 21 55 13, 21 55 18, 23 51 01 and 29 51 01 only

	d (mm)	DN (mm)	EPDM Part No.	weight (kg)	FKM Part No.	weight (kg)	D (mm)	D1 (mm)	D2 (mm)	closest inch (inch)
	20	15	**^ 748 410 006**	0.002	**^ 749 410 006**	0.002	27	20	3.53	½
	25	20	**^ 748 410 007**	0.002	**^ 749 410 007**	0.002	35	28	3.53	¾
	32	25	**748 410 008**	0.003	**749 410 008**	0.002	40	33	3.53	1
	40	32	**748 410 009**	0.003	**749 410 009**	0.007	51	41	5.34	1 ¼
	50	40	**748 410 010**	0.004	**749 410 010**	0.060	58	47	5.34	1 ½
	63	50	**748 410 011**	0.005	**749 410 011**	0.003	70	60	5.34	2
	75	65	*** 748 410 014**	0.007	*** 749 410 014**	0.012	93	82	5.34	2 ½
	90	80	*** 748 410 015**	0.008	*** 749 410 015**	0.015	112	101	5.34	3
	110	100	*** 748 410 016**	0.016	*** 749 410 016**	0.031	134	120	6.99	4

A



Union Bushing, PN 16, PVDF-Standard

Model:

- Suitable for SYGEF Standard Union Butt Fusion
- d75, d90 and d100 with buttress-shaped thread

d (mm)	FM	Part No.	weight (kg)	G (R/Rp BS Thread) (inch)	e (mm)	L (mm)	L1 (mm)
20	BCF, IR	* **735 648 606**	0.025	1	1.9	53	25
25	BCF, IR	* **735 648 607**	0.039	1 1/4	1.9	56	25
32	BCF, IR	* **735 648 608**	0.055	1 1/2	2.4	59	25
40	BCF, IR	* **735 648 609**	0.081	2	2.4	62	25
50	BCF, IR	* **735 648 610**	0.110	2 1/4	3.0	65	25
63	BCF, IR	* **735 648 611**	0.158	2 3/4	3.0	68	25
75	BCF, IR	* **735 648 612**	0.277	S 107.5 x 3.6	3.6	66	24
90	BCF, IR	* **735 648 613**	0.275	S 107.5 x 3.6	4.3	65	24
110	BCF, IR	* **735 648 614**	0.343	S 127.5 x 3.6	5.3	65	25

B

Union Nut, PN 16, PVDF-Standard

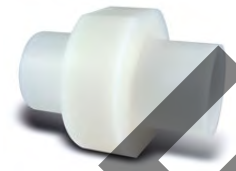
- d75, d90 and d110 with buttress shaped thread

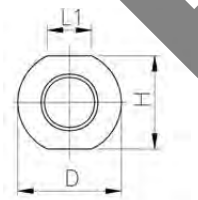
Note:

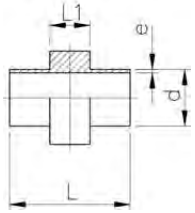
For dimensions d75-110 please see instructions for installation

Socket Fusion d (mm)	Butt Fusion d (mm)	Part No.	weight (kg)	D (mm)	G (R/Rp BS Thread) (inch)	G (inch)	L (mm)
20	20	**735 690 406**	0.021	43	1	1	22
25	25	**735 690 407**	0.030	53	1 1/4	1 ¼	24
32	32	**735 690 408**	0.035	60	1 1/2	1 ½	26
40	40	**735 690 409**	0.065	74	2	2	29
50	50	**735 690 410**	0.093	82	2 1/4	2 ¼	33
63	63	**735 690 411**	0.144	100	2 3/4	2 ¾	35
	75 - 90	* **735 690 422**	0.289	133			40
	110	* **735 690 423**	0.403	155			42

B





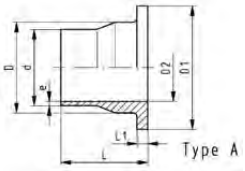


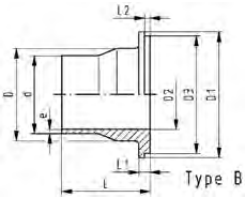
Instrument Installation Fitting, PN 16, PVDF Standard

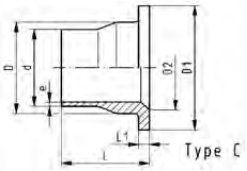
Add "T" to end of part number and fee to list price for each factory milled thread (max. diameter is 3/4"). See published price list for fee.

d (mm)	FM	Part No.	weight (kg)	e (mm)	L (mm)	D (mm)	H (mm)	L1 (mm)
20	BCF, IR	* **735 918 706**	0.170	1.9	140	71	58	40
25	BCF, IR	* **735 918 707**	0.200	1.9	140	75	63	40
32	BCF, IR	* **735 918 708**	0.360	2.4	140	81	70	40
40	BCF, IR	* **735 918 709**	0.390	2.4	140	88	78	40
50	BCF, IR	* **735 918 710**	0.410	3.0	140	97	88	40
63	BCF, IR	* **155 918 711**	0.430	3.0	140	109	101	40
75	BCF, IR	* **155 918 712**	0.450	3.6	140	120	113	40
90	BCF, IR	* **155 918 713**	0.470	4.3	140	134	128	40
110	BCF, IR	* **155 918 714**	0.550	5.3	140	153	148	40

A



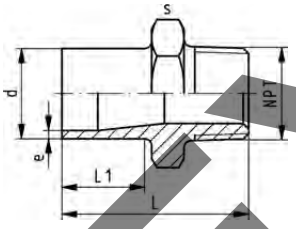




Flange Adaptor, PN 16/PN 10, ANSI Serrated, PVDF-Standard

d (mm)	FM	PN	Part No.	weight (lb)	e (mm)	D (mm)	D1 (mm)	D2 (mm)	L (mm)	L1 (mm)	Type
20	BCF, IR	16	**735 798 806**	0.064	1.9	26	45	15	54	6	A
25	BCF, IR	16	**735 798 857**	0.095	1.9	32	54	20	56	7	A
32	BCF, IR	16	**735 798 858**	0.139	2.4	40	63	26	58	7	A
40	BCF, IR	16	**^ 735 798 859**	0.196	2.4	49	73	34	68	8	A
50	BCF, IR	16	**735 798 860**	0.309	3.0	60	82	43	69	8	A
63	BCF, IR	16	**735 798 811**	0.474	3.0	75	102	56	72	9	A
75	BCF, IR	16	**^ 735 798 812**	0.717	3.6	89	122	66	80	10	A
90	BCF, IR	16	**735 798 861**	0.858	4.3	105	133	78	81	12	A
110	BCF, IR	16	**735 798 814**	1.263	5.3	125	158	100	81	13	C
160	IR	10	**735 798 867**	2.143	4.9	175	212	151	93	17	C
200	IR	10	**735 798 869**	3.708	6.2	232	268	207	102	22	C
225	IR	10	*** 735 798 870**	3.719	6.9	235	268	207	102	22	A

A



Male NPT Adaptor, PN 16, PVDF-Standard

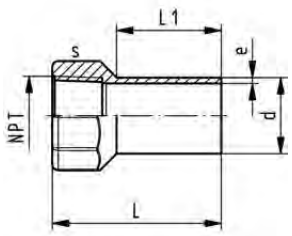
Model:

- With butt fusion spigot and NPT tapered male thread
- Avoid stress when installing and large changes in temperature
- Connection to plastic thread only
- Do not apply solvent-based or other sealing compounds which could damage PVDF

d (mm)	NPT (inch)	FM	Part No.	weight (kg)	e (mm)	L (mm)	s (mm)	L1 (mm)
20	⅜	BCF, IR	**735 914 555**	0.023	1.9	50	32	26
20	½	BCF, IR	**735 914 556**	0.030	1.9	53	32	26
25	¾	BCF, IR	**735 914 557**	0.032	1.9	55	36	26
32	1	BCF, IR	**735 914 558**	0.052	2.4	57	46	26
40	1 ¼	BCF, IR	**^ 735 914 559**	0.075	2.4	60	55	26
50	1 ½	BCF, IR	**735 914 560**	0.122	3.0	63	65	26
63	2	BCF, IR	**735 914 561**	0.176	3.0	69	75	27

A

Female NPT Adaptor, PN 16, PVDF-Standard



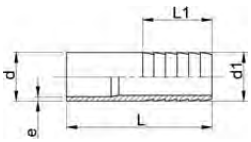
Model:

- With butt fusion spigot and NPT taper female thread
- Avoid stress when installing and large changes in temperature
- Connection to plastic thread only
- Do not apply solvent-based or other sealing compounds which could damage PVDF

	d (mm)	NPT (inch)	FM	Part No.	weight (kg)	e (mm)	L (mm)	s (mm)	L1 (mm)
	20	⅜	BCF, IR	**735 914 585**	0.029	1.9	54	32	30
	20	½	BCF, IR	**735 914 586**	0.027	1.9	54	32	30
	25	¾	BCF, IR	**735 914 587**	0.033	1.9	58	38	30
	32	1	BCF, IR	**735 914 588**	0.066	2.4	63	48	30
	40	1 ¼	BCF, IR	**735 914 589**	0.085	2.4	67	58	30
	50	1 ½	BCF, IR	**735 914 590**	0.108	3.0	67	65	30
*	63	2	BCF, IR	**735 914 591**	0.190	3.0	73	80	30

A

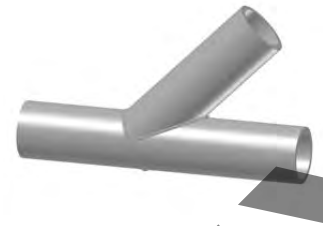
Hose Adapter, PN 16, PVDF-Standard

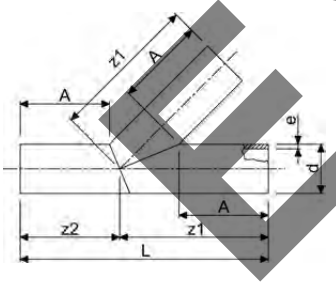


d - d1 (mm)	FM	Part No.	weight (kg)	e (mm)	L (mm)	L1 (mm)
20 - 20	BCF, IR	* **735 968 606**	0.015	1.9	64	27
25 - 25	BCF, IR	* **735 968 607**	0.027	1.9	75	36
32 - 32	BCF, IR	* **735 968 608**	0.042	2.4	82	36
40 - 40	BCF, IR	^ **735 968 609**	0.063	2.4	84	42
50 - 50	BCF, IR	* **735 968 610**	0.084	3.0	90	48
63 - 60	BCF, IR	* **735 968 611**	0.118	3.0	100	50

B

45° Wye, PVDF-Standard

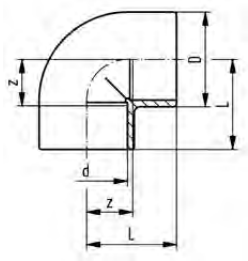




d (mm)	Part No.	e (mm)	A (inch)	z1 (inch)	z2 (inch)	L (inch)	closest inch (inch)
50	* **155 345 050**	3.0	5.91	8.28	6.31	14.59	1 ½
63	* **155 345 063**	3.0	5.91	8.90	6.42	15.32	2
75	* **155 345 075**	3.6	5.91	9.47	6.52	15.99	2 ½
90	* **155 345 090**	4.3	7.87	12.15	8.61	20.76	3
110	* **155 345 110**	5.3	7.87	13.10	8.77	21.87	4
160	* **155 345 160**	4.9	7.87	15.48	9.18	24.66	6
200	* **155 345 200**	6.2	9.84	19.35	11.47	30.82	8
225	* **155 345 225**	6.9	9.84	20.54	11.68	32.21	9
250	* **155 345 250**	7.7	11.81	23.70	13.86	37.56	10
315	* **155 345 315**	9.7	13.78	28.74	16.38	45.12	12

Socket Fusion Fittings

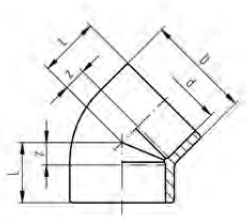
A



90° Elbow, PN 16, PVDF-Standard, Socket Fusion

d (mm)	Part No.	D (mm)	L (mm)	z (mm)
16	**735 100 105**	26	25	12
20	**735 100 106**	27	28	14
25	**735 100 107**	32	32	16
32	**735 100 108**	40	38	20
40	**735 100 109**	49	44	24
50	**735 100 110**	60	51	28
63	**735 100 111**	75	62	35

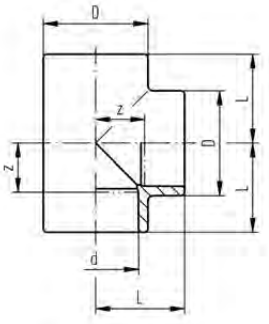
A



45° Elbow, PN 16, PVDF-Standard, Socket Fusion

d (mm)	Part No.	weight (kg)	D (mm)	L (mm)	z (mm)
16	**735 150 105**	0.017	23	20	7
20	**735 150 106**	0.020	27	21	7
25	**735 150 107**	0.032	32	24	8
32	**735 150 108**	0.050	40	28	10
40	**735 150 109**	0.081	49	33	13
50	**735 150 110**	0.119	60	36	13
63	**735 150 111**	0.211	75	43	16

A



Tee, PN 16, PVDF-Standard, Socket Fusion

d (mm)	Part No.	weight (kg)	D (mm)	L (mm)	z (mm)
16	**735 200 105**	0.039	26	25	12
20	**735 200 106**	0.034	27	28	14
25	**735 200 107**	0.052	32	32	16
32	**735 200 108**	0.092	40	38	20
40	**735 200 109**	0.136	49	44	24
50	**735 200 110**	0.210	60	51	28
63	**735 200 111**	0.371	75	62	35

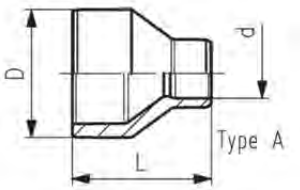
A

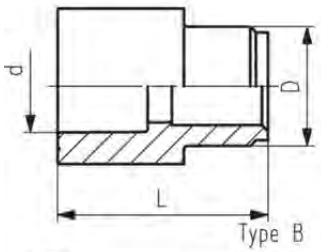
Reducer Bushing, PN 16, PVDF-Standard, Socket Fusion

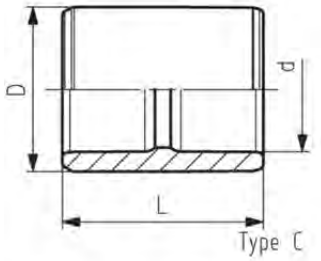
Attention:

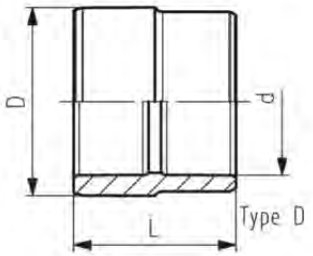
- Z dimension (distance between fused pipe ends) depends on use of reducer. See diagrams below.

D-d (mm)	Part No.	weight (kg)	L (mm)	Type
20 - 16	**735 910 334**	0.017	35	B
25 - 20	**735 910 337**	0.016	37	A
32 - 20	**735 910 342**	0.023	43	A
32 - 25	**735 910 107**	0.023	39	C
40 - 20	**735 910 348**	0.034	48	A
40 - 25	**735 910 347**	0.035	48	A
40 - 32	**735 910 108**	0.038	43	C
50 - 20	**735 910 355**	0.059	54	A
50 - 25	**735 910 354**	0.059	54	A
50 - 32	**735 910 353**	0.061	54	A
50 - 40	**735 910 109**	0.062	48	D
63 - 20	**735 910 362**	0.102	64	A
63 - 25	**735 910 361**	0.105	64	A
63 - 32	**735 910 360**	0.108	64	A
63 - 40	**735 910 359**	0.118	64	A
63 - 50	**735 910 110**	0.102	54	D







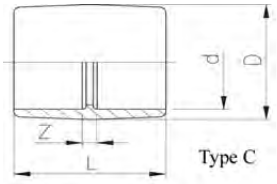


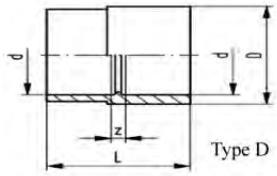
overview about functionality

			main function				additional functions									
			reduction spigot - socket				reduction socket - socket				reduction spigot - spigot				reduction socket - spigot			
Code	PN	L	spigot D	-	socket d	L	Z	socket D	-	socket d	L	Z	spigot D	-	spigot d	L	Z	socket D	-	spigot d	L	Z
735 910 334	16	35	20	-	16	35	22															
735 910 337	16	37	25	-	20	37	23															
735 910 342	16	43	32	-	20	43	29	25	-	20	43	13										
735 910 107	16	39	32	-	25	39	23															
735 910 348	16	48	40	-	20	48	34	32	-	20	48	16										
735 910 347	16	48	40	-	25	48	32	32	-	25	48	14	40	-	32	48	48					
735 910 108	16	43	40	-	32	43	25															
735 910 355	16	54	50	-	20	54	40	40	-	20	54	20										
735 910 354	16	54	50	-	25	54	38	40	-	25	54	18	50	-	32	54	54	40	-	32	54	34
735 910 353	16	54	50	-	32	54	36	40	-	32	54	16	50	-	40	54	54					
735 910 109	16	48	50	-	40	48	28															
735 910 362	16	64	63	-	20	64	50	50	-	20	64	27										
735 910 361	16	64	63	-	25	64	48	50	-	25	64	25	63	-	32	64	64	50	-	32	64	41
735 910 360	16	64	63	-	32	64	46	50	-	32	64	23	63	-	40	64	64	50	-	40	64	41
735 910 359	16	64	63	-	40	64	44	50	-	40	64	21	63	-	50	64	64					
735 910 110	16	54	63	-	50	54	31															

please note: illustration of the functions not inevitably conform to respective type!

A





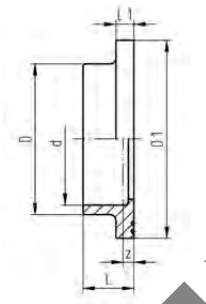
Coupling, PN 16, PVDF-Standard, Socket Fusion

Model:

- Sizes d25 - d50 can be used as straight coupling or reducing bushing, as indicated

d (mm)	D-d (mm)	PN (bar)	Part No.	SP	weight (kg)	Type	D (mm)	L (mm)	z (mm)
16	-	16	**735 910 105**	10	0.020	C	26	33	7
20	-	16	**735 910 106**	2	0.013	C	27	35	7
25	32 - 25	16	**735 910 107**	2	0.023	C	32	39	7
32	40 - 32	16	**735 910 108**	2	0.038	C	40	43	7
40	50 - 40	16	**735 910 109**	2	0.062	D	50	48	8
50	63 - 50	16	**735 910 110**	2	0.102	D	63	54	8
63	-	16	**735 910 111**	2	0.146	C	75	62	8

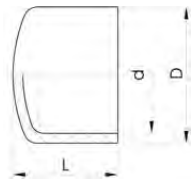
A



Flange Adaptor, PN 16, ANSI Serrated, PVDF-Standard, Socket Fusion

d (mm)	Part No.	weight (lb)	D (mm)	D1 (mm)	L (mm)	L1 (mm)	z (mm)
20	**735 790 206**	0.042	27	45	19	6	3
25	**735 790 257**	0.082	33	54	21	7	3
32	**735 790 258**	0.112	41	63	23	7	3
40	**735 790 259**	0.161	50	73	25	8	3
50	**735 790 260**	0.209	61	82	28	8	3
63	**735 790 211**	0.311	76	102	32	9	3

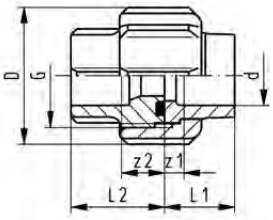
A



Cap, PN 16, PVDF-Standard, Socket Fusion

d (mm)	Part No.	weight (kg)	D (mm)	L (mm)
16	**735 960 105**	0.013	25	24
20	**735 960 106**	0.010	27	23
25	**735 960 107**	0.017	32	26
32	**735 960 108**	0.029	40	30
40	**735 960 109**	0.045	49	34
50	**735 960 110**	0.074	60	39
63	**735 960 111**	0.126	75	46

A



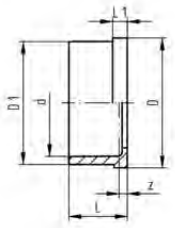
Union (FKM black), PN 16, PVDF-Standard, Socket Fusion

Model:

- With fusion socket metric
- Joining face: with O-ring groove
- Supplied with FKM O-Ring part# 749410005 - 011, respectively
- Please see installation instructions

d (mm)	Part No.	weight (kg)	D (mm)	G(R/Rp BS Thread) (inch)	G (inch)	L1 (mm)	L2 (mm)	z1 (mm)	z (mm)
16	**735 510 105**	0.025	35	¾	¾	18	24	5	11
20	**735 510 106**	0.057	43	1	1	19	26	5	12
25	**735 510 107**	0.090	53	1 ¼	1 ¼	21	28	5	12
32	**735 510 108**	0.118	60	1 ½	1 ½	23	30	5	12
40	**735 510 109**	0.195	74	2	2	25	34	5	14
50	**735 510 110**	0.244	82	2 ¼	2 ¼	28	39	5	16
63	**735 510 111**	0.403	100	2 ¾	2 ¾	32	47	5	20

A



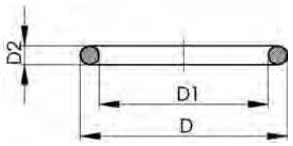
Union End, PN 16, PVDF-Standard, Socket Fusion

Model:

- Suitable for SYGEF Standard Union Socket Fusion

d (mm)	Part No.	D (mm)	D1 (mm)	L (mm)	L1 (mm)	z (mm)
16	**735 600 105**	24	22	18	4	5
20	**735 600 106**	30	28	19	5	5
25	**735 600 107**	39	36	21	5	5
32	**735 600 108**	45	42	23	6	5
40	**735 600 109**	57	53	25	6	5
50	**735 600 110**	63	59	28	7	5
63	**735 600 111**	78	74	32	7	5

B



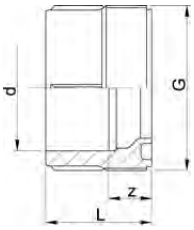
O-Ring for PROGEF, SYGEF Standard IR/BCF and Socket Fusion Unions

Model:

- For unions and adaptor unions
- Hardness approx. 65° Shore
- EPDM minimum temperature -40°F
- FKM minimum temperature -15°F
- * for unions PVC-U, PVC-C and ABS: 21 51 01, 21 51 11, 21 53 03, 21 53 08, 21 55 04, 21 55 13, 21 55 18, 23 51 01 and 29 51 01 only

d (mm)	DN (mm)	EPDM Part No.	weight (kg)	FKM Part No.	weight (kg)	D (mm)	D1 (mm)	D2 (mm)	closest inch (inch)
16	10	**748 410 005**	0.004	**749 410 005**	0.002	21	16	2.62	⅜
20	15	**^ 748 410 006**	0.002	**^ 749 410 006**	0.002	27	20	3.53	½
25	20	**^ 748 410 007**	0.002	**^ 749 410 007**	0.002	35	28	3.53	¾
32	25	**748 410 008**	0.003	**749 410 008**	0.002	40	33	3.53	1
40	32	**748 410 009**	0.003	**749 410 009**	0.007	51	41	5.34	1 ¼
50	40	**748 410 010**	0.004	**749 410 010**	0.060	58	47	5.34	1 ½
63	50	**748 410 011**	0.005	**749 410 011**	0.003	70	60	5.34	2

A



Union Bushing, PN 16, PVDF-Standard, Socket Fusion

Model:

- Suitable for SYGEF Standard Union Socket Fusion

d (mm)	PN (bar)	Part No.	SP	weight (kg)	G (R/Rp BS Thread) (inch)	G(R/Rp BS Thread) (inch)	G (inch)	L (mm)	z (mm)
16	16	*** 735 640 105**	10	0.011	3/4	¾	¾	24	11
20	16	*** 735 640 106**	4	0.019	1	1	1	26	12
25	16	*** 735 640 107**	4	0.027	1 1/4	1 ¼	1 ¼	28	12
32	16	*** 735 640 108**	4	0.040	1 1/2	1 ½	1 ½	30	12
40	16	*** 735 640 109**	4	0.068	2	2	2	34	14
50	16	*** 735 640 110**	2	0.090	2 1/4	2 ¼	2 ¼	39	16
63	16	*** 735 640 111**	2	0.159	2 3/4	2 ¾	2 ¾	47	20

B

Union Nut, PN 16, PVDF-Standard

Model:

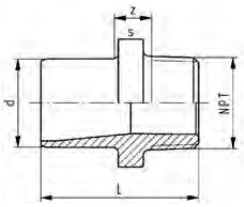
- Material: PVDF
- d75, d90 and d110 with buttress shaped thread

Note:

For dimensions d75-110 please see instructions for installation

Socket Fusion d (mm)	Butt Fusion d (mm)	Part No.	weight (kg)	D (mm)	G (R/Rp BS Thread) (inch)	G (inch)	L (mm)
16	16	**735 690 405**	0.011	35	3/4	¾	21
20	20	**735 690 406**	0.021	43	1	1	22
25	25	**735 690 407**	0.030	53	1 1/4	1 ¼	24
32	32	**735 690 408**	0.035	60	1 1/2	1 ½	26
40	40	**735 690 409**	0.065	74	2	2	29
50	50	**735 690 410**	0.093	82	2 1/4	2 ¼	33
63	63	**735 690 411**	0.144	100	2 3/4	2 ¾	35
	75 - 90	*** 735 690 422**	0.289	133			40
	110	*** 735 690 423**	0.403	155			42

A



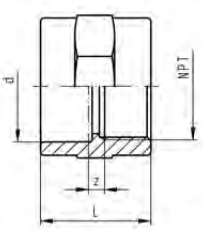
Male NPT Adapter, PN 16, PVDF-Standard, Socket Fusion

Model:

- Material: PVDF
- With socket fusion spigot and taper male thread
- Connection to plastic thread only
- Do not apply solvent-based or other sealing compounds which could damage PVDF
- Avoid stress when installing and large changes in temperature

d (mm)	NPT (inch)	Part No.	weight (kg)	L (mm)	s (mm)	z (mm)
16	⅜	**735 914 505**	0.014	35	27	12
20	½	**735 914 506**	0.025	53	32	25
25	¾	**735 914 507**	0.033	55	36	24
32	1	**735 914 508**	0.053	57	46	22
40	1 ¼	**735 914 509**	0.080	60	55	21
50	1 ½	**735 914 510**	0.113	63	65	19
63	2	**735 914 511**	0.160	69	75	18

A



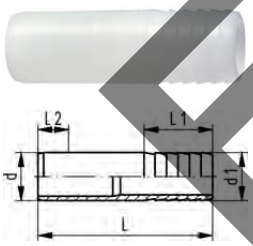
Female NPT Adapter, PN 16 PVDF-Standard, Socket Fusion

Model:

- Material: PVDF
- With socket fusion end and taper female thread
- Connection to plastic thread only
- Do not apply solvent-based or other sealing compounds which could damage PVDF
- Avoid stress when installing and large changes in temperature

d (mm)	NPT (inch)	Part No.	weight (kg)	L (mm)	s (mm)	z (mm)
16	⅜	**735 914 205**	0.016	29	27	3
20	½	**735 914 206**	0.030	34	32	5
25	¾	**735 914 207**	0.036	38	36	6
32	1	**735 914 208**	0.067	43	46	7
40	1 ¼	**735 914 209**	0.100	47	55	7
50	1 ½	**735 914 210**	0.140	54	65	9
63	2	**735 914 211**	0.220	62	80	9

A



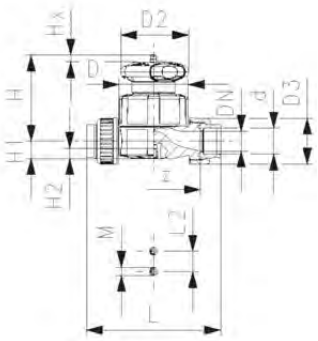
Hose Adapter, PN 16, PVDF-Standard, Socket Fusion

Model:

- Material: PVDF
- With socket fusion spigot (metric) and parallel hose connection

d - d1 (mm)	Part No.	weight (kg)	L (mm)	L1 (mm)	L2 (mm)
20 - 20	* **735 960 406**	0.018	78	27	14
25 - 25	* **735 960 407**	0.028	91	36	16
32 - 32	* **735 960 408**	0.050	100	36	18
40 - 40	^ **735 960 409**	0.078	104	42	20
63 - 60	* **735 960 411**	0.126	100	50	27

A



Type 514 Diaphragm Valve SYGEF Standard PVDF
Fusion sockets metric

Model:

- Material: PVDF
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- For easy installation and removal
- Short overall length

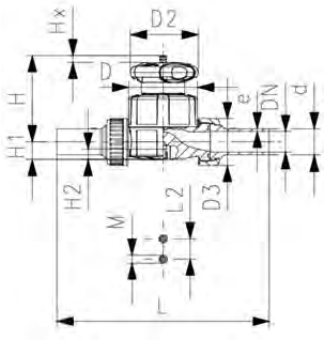
Option:

- Self adjusting multifunctional module with integrated limit switches

d (mm)	PTFE/EPDM Part No.	weight (lb)
20	**185 514 032**	0.789
25	**185 514 033**	1.204
32	**185 514 034**	2.136
40	**185 514 035**	3.710
50	**185 514 036**	6.464
63	**185 514 037**	6.603

d (mm)	D (mm)	D2 (mm)	D3 (mm)	L (mm)	L2 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	z (mm)	Lift = Hx (mm)	closest inch (inch)
20	65	65	43	128	25	73	14	12	M6	100	7	½
25	80	65	53	150	25	81	18	12	M6	118	10	¾
32	88	87	60	162	25	107	22	12	M6	126	13	1
40	101	87	74	184	45	115	26	15	M8	144	15	1 ¼
50	117	135	82	210	45	148	32	15	M8	164	19	1 ½
63	144	135	100	248	45	166	39	15	M8	194	25	2

A



Type 514 Diaphragm Valve SYGEF Standard PVDF
Butt fusion spigots metric

Model:

- Material: PVDF
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- For easy installation and removal
- Short overall length

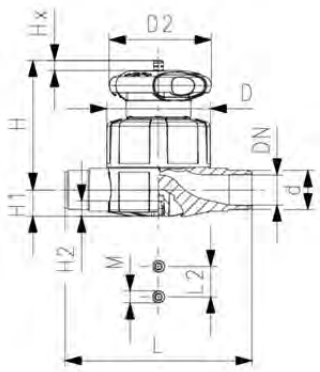
Option:

- Individual configuration of the valve (see diagram)
- Self adjusting multifunctional module with integrated limit switches

d (mm)	PTFE/EPDM Part No.	weight (lb)
20	**185 514 132**	0.840
25	**185 514 133**	1.224
32	**185 514 134**	2.310
40	**185 514 135**	3.089
50	**185 514 136**	4.489
63	**185 514 137**	7.485

d (mm)	D (mm)	D2 (mm)	D3 (mm)	L (mm)	L2 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	Lift = Hx (mm)	e (mm)	closest inch (inch)
20	65	65	43	196	25	73	14	12	M6	7	1.9	½
25	80	65	53	221	25	81	18	12	M6	10	1.9	¾
32	88	87	60	234	25	107	22	12	M6	13	2.4	1
40	101	87	74	260	45	115	26	15	M8	15	2.4	1 ¼
50	117	135	82	284	45	148	32	15	M8	19	3.0	1 ½
63	144	135	100	321	45	166	39	15	M8	25	3.0	2

A



Type 515 Diaphragm Valve SYGEF Standard PVDF
Socket fusion spigot metric

Model:

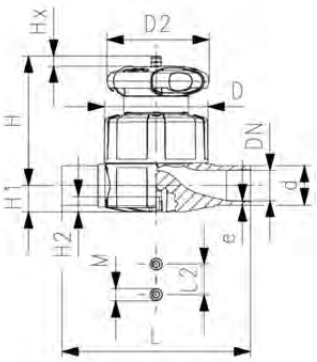
- Material: PVDF
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- EPDM version is PN 10 pressure rated. PTFE/EPDM version is PN 6 pressure rated.

Option:

- Individual configuration of the valve (see diagram)
- Self adjusting multifunctional module with integrated limit switches

d (mm)	PTFE/EPDM Part No.	D (mm)	D2 (mm)	L (mm)	L2 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	Lift = Hx (mm)	closest inch (inch)
20	**185 515 032**	65	65	124	25	73	14	12	M6	7	½
25	**185 515 033**	80	65	144	25	81	18	12	M6	10	¾
32	**185 515 034**	88	87	154	25	107	22	12	M6	13	1
40	**185 515 035**	101	87	174	45	115	26	15	M8	15	1 ¼
50	**185 515 036**	117	135	194	45	148	32	15	M8	19	1 ½
63	**185 515 037**	144	135	223	45	166	39	15	M8	25	2

A



Type 515 Diaphragm Valve SYGEF Standard PVDF
Butt fusion spigots metric

Model:

- Material: PVDF
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- EPDM version is PN 10 pressure rated. PTFE/EPDM version is PN 6 pressure rated.

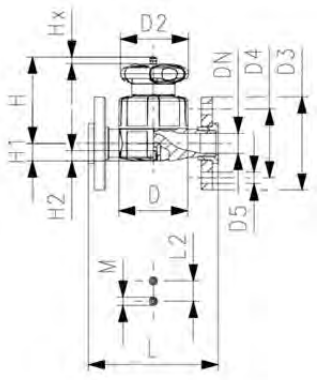
Option:

- Individual configuration of the valve (see diagram)
- Self adjusting multifunctional module with integrated limit switches

d (mm)	PTFE/EPDM Part No.	weight (lb)
20	**185 515 132**	0.617
25	**185 515 133**	1.133
32	**185 515 134**	1.493
40	**185 515 135**	2.077
50	**185 515 136**	5.494
63	**185 515 137**	5.434

d (mm)	D (mm)	D2 (mm)	L (mm)	L2 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	Lift = Hx (mm)	e (mm)	closest inch (inch)
20	65	65	124	25	73	14	12	M6	7	1.9	½
25	80	65	144	25	81	18	12	M6	10	1.9	¾
32	88	87	155	25	107	22	12	M6	13	2.4	1
40	101	87	176	45	115	26	15	M8	15	2.4	1 ¼
50	117	135	193	45	148	32	15	M8	19	3.0	1 ½
63	144	135	223	45	166	39	15	M8	25	3.0	2

A



Type 517 Diaphragm Valve SYGEF Standard PVDF
ANSI Flanged

Model:

- Material: PVDF
- Double flow rate compared to predecessor
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism
- Joining faces flat/serrated
- Joining face serrated
- EPDM version is PN 10 pressure rated. PTFE/EPDM version is PN 6 pressure rated.
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759

Option:

- Individual configuration of the valve (see diagram)
- Self adjusting multifunctional module with integrated limit switches

Size (inch)	PTFE/EPDM Part No.	D (mm)	D2 (mm)	D3 (mm)	D4 (mm)	D5 (mm)	L (mm)	L2 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	Lift = Hx (mm)
½	**185 517 732**	65	65	95	60	16	130	25	73	14	12	M6	7
¾	**185 517 733**	80	65	105	70	16	150	25	81	18	12	M6	10
1	**185 517 734**	88	87	115	79	16	160	25	107	22	12	M6	13
1 ¼	**185 517 735**	101	87	140	89	16	180	45	115	26	15	M8	15
1 ½	**185 517 736**	117	135	150	98	16	200	45	148	32	15	M8	19
2	**185 517 737**	144	135	165	121	19	230	45	166	39	15	M8	25

A

Type 317 Diaphragm Valve
SYGEF Standard PVDF
Flanged

Model:

- Material: PVDF
- Overall length according to EN 558
- Diaphrag, PTFE with EPDM backing diaphragm (FDA compliant)

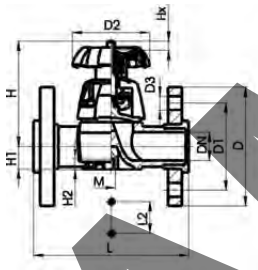
Option:

- Handwheel with built-in locking mechanism (standard version is nonlockable)

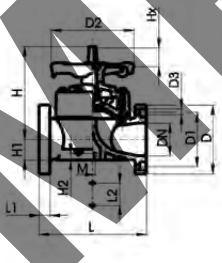
*** 3# and 6 # fixed flanges metric and Inch ANSI B16.5**

d (mm)	Size (inch)	PTFE with EPDM supp. diaphragm Part No.	weight (lb)
75	2 ½	**175 317 538**	12.606
90	3	**175 317 009**	23.722
110	4	**175 317 340**	33.964
160	6	**175 317 012**	69.446

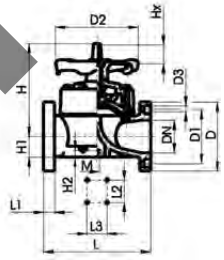
d (mm)	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	Lift = Hx (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	M	AL
75	185	140	152	18	201	46	15	30	290		70		M8	4
90	200	160	270	18	265	57	23	40	310	35	120		M12	8
110	225	191	270	19	304	69	23	50	350	35	120		M12	8
160	285	240	400	22	437	108	23	70	480	26	100	200	M12	8



DN 15-65



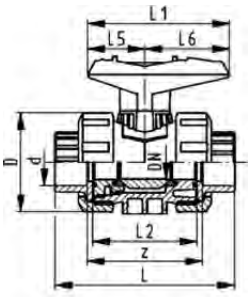
DN 80-100

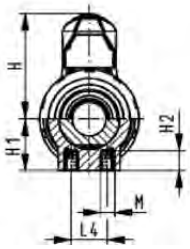


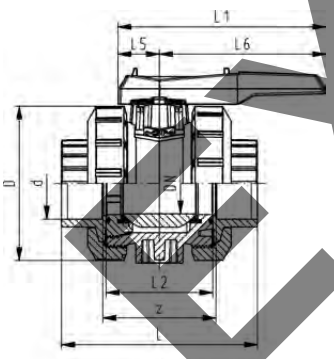
DN 150

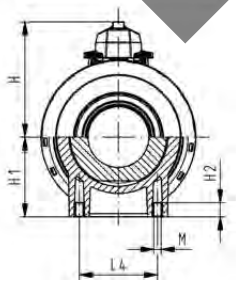
A

DN10/15 - 50









Type 546 Ball Valve SYGEF Standard PVDF
With mounting inserts
With fusion sockets metric

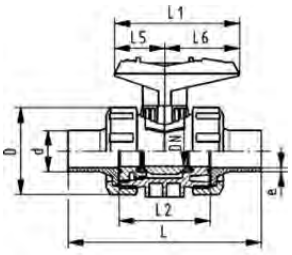
Model:

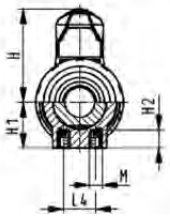
- Valve end and union nut are **not compatible** with Type 346 (DN10/15-50) and Type 370 (DN65-100)

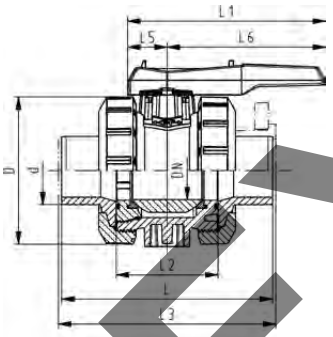
d (mm)	FKM Part No.	weight (lb)
16	**175 546 411**	0.430
20	**175 546 412**	0.434
25	**175 546 413**	0.666
32	**175 546 414**	0.950
40	**175 546 415**	1.676
50	**175 546 416**	2.229
63	**175 546 417**	4.092
75	**175 546 418**	13.889
90	**175 546 419**	20.944
110	**175 546 420**	33.069

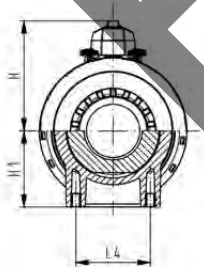
d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	z (mm)	closest inch (inch)
16	50	79	27	12	93	77	56	25	32	45	M6	67	⅜
20	50	57	27	12	95	77	56	25	32	45	M6	66	½
25	58	67	30	12	109	97	65	25	39	58	M6	77	¾
32	68	73	36	12	119	97	71	25	39	58	M6	83	1
40	84	90	44	15	135	128	85	45	54	74	M8	99	1 ¼
50	97	97	51	15	147	128	89	45	54	74	M8	105	1 ½
63	124	116	64	15	168	152	101	45	66	87	M8	117	2
75	166	149	85	15	233	270	136	70	64	206	M8	167	2 ½
90	200	161	105	15	254	270	141	70	64	206	M8	180	3
110	238	178	123	22	301	320	164	120	64	256	M12	215	4

A









Type 546 Ball Valve Standard PVDF
With mounting inserts
With butt fusion spigots metric

Model:

- Material: PVDF
- For easy installation and removal
- Ball seals PTFE
- Integrated stainless steel mounting inserts
- Valve end and union nut are **not compatible** with Type 346 (DN10/15-50) and Type 370 (DN65-100)

Option:

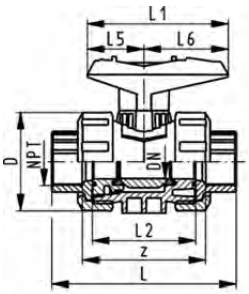
- Individual configuration of the valve (see diagram)
- Multifunctional module with integrated limit switches
- Pneumatic or electric actuators from GF

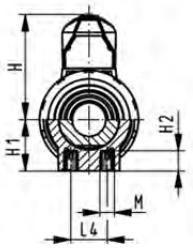
d (mm)	FKM Part No.	weight (lb)
20	**175 546 272**	0.443
25	**175 546 273**	0.664
32	**175 546 274**	0.966
40	**175 546 275**	1.720
50	**175 546 276**	2.447
63	**175 546 277**	4.317
75	**175 546 278**	16.755
90	**175 546 279**	16.440
110	**175 546 280**	38.360

d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	e (mm)	closest inch (inch)
20	50	57	27	12	130	77	56	25	32	45	M6	1.9	½
25	58	67	30	12	143	97	65	25	39	58	M6	1.9	¾
32	68	73	36	12	150	97	71	25	39	58	M6	2.4	1
40	84	90	44	15	171	128	85	45	54	74	M8	2.4	1 ¼
50	97	97	51	15	191	128	89	45	54	74	M8	3.0	1 ½
63	124	116	64	15	220	152	101	45	66	87	M8	3.0	2
75	166	149	85	15	266	270	136	70	64	206	M8	3.6	2 ½
90	200	161	105	15	264	270	141	70	64	206	M8	4.3	3
110	238	178	123	22	301	320	164	120	64	256	M12	5.3	4

A

DN10/15 - 50



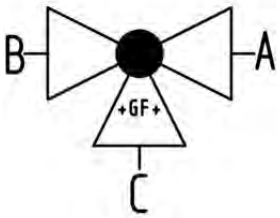


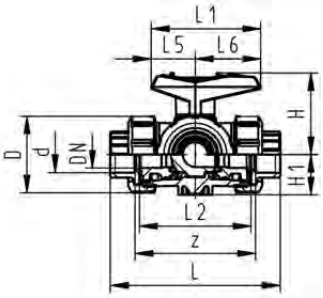
Type 546 Ball Valve Standard PVDF
With mounting inserts
With threaded sockets NPT

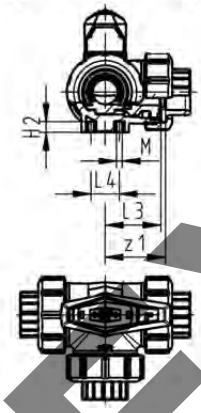
NPT (inch)	FKM Part No.	weight (lb)
⅜	**175 546 331**	0.452
½	**175 546 332**	0.452
¾	**175 546 333**	0.717
1	**175 546 334**	1.080
1 ¼	**175 546 335**	1.808
1 ½	**175 546 336**	2.502
2	**175 546 337**	4.740

NPT (inch)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	z (mm)
⅜	50	57	27	12	96	77	56	25	32	45	M6	69
½	50	57	27	12	99	77	56	25	32	45	M6	64
¾	58	67	30	12	111	97	65	25	39	58	M6	76
1	68	73	36	12	127	97	71	25	39	58	M6	83
1 ¼	84	90	44	15	146	128	85	45	54	74	M8	101
1 ½	97	97	51	15	157	128	89	45	54	74	M8	111
2	124	116	64	15	183	152	101	45	66	87	M8	135

A





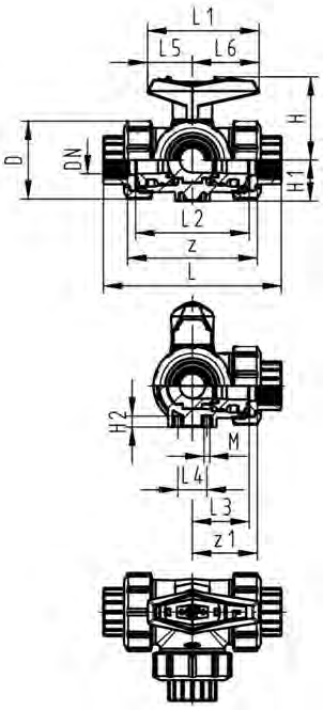


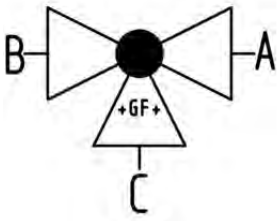
Type 543 3-Way Ball Valve
Horizontal/L-port, Standard PVDF
With fusion sockets metric

d (mm)	FKM Part No.	weight (lb)
16	**175 543 011**	0.619
20	**175 543 012**	0.639
25	**175 543 013**	1.016
32	**175 543 014**	1.442
40	**175 543 015**	2.643
50	**175 543 016**	3.631
63	**175 543 017**	7.114

d (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	z (mm)	z1 (mm)	closest inch (inch)
16	50	110	77	72	36	25	32	45	57	28	8	6	82	41	⅜
20	50	112	77	72	36	25	32	45	57	28	8	6	82	41	½
25	58	129	97	85	43	25	39	58	67	32	8	6	97	49	¾
32	68	146	97	98	49	25	39	58	73	36	8	6	110	55	1
40	84	170	128	118	59	45	54	74	90	45	9	8	132	66	1 ¼
50	97	193	128	135	68	45	54	74	97	51	9	8	151	76	1 ½
63	124	244	152	176	88	45	66	87	116	65	9	8	188	94	2

A



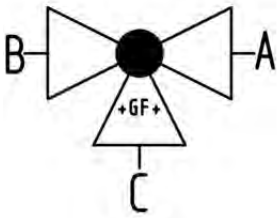


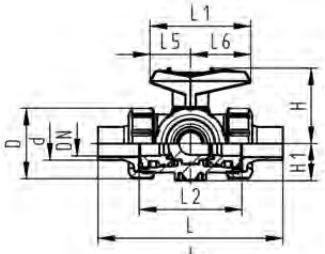
Type 543 3-Way Ball Valve
Horizontal/L-port, Standard PVDF
With threaded sockets NPT

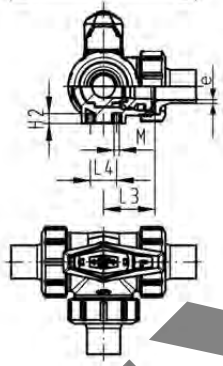
NPT (inch)	FKM Part No.	weight (lb)
⅜	**175 543 071**	0.688
½	**175 543 072**	0.705
¾	**175 543 073**	1.016
1	**175 543 074**	1.552
1 ¼	**175 543 075**	2.643
1 ½	**175 543 076**	3.920
2	**175 543 077**	7.632

NPT (inch)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	z (mm)	z1 (mm)
⅜	50	112	77	72	36	25	32	45	57	28	8	6	86	43
½	50	114	77	72	36	25	32	45	57	28	8	6	80	40
¾	58	131	97	85	43	25	39	58	67	32	8	6	95	48
1	68	154	97	98	49	25	39	58	73	36	8	6	110	55
1 ¼	84	180	128	118	59	45	54	74	90	45	9	8	132	66
1 ½	97	203	128	135	68	45	54	74	97	51	9	8	157	79
2	124	258	152	176	88	45	66	87	116	65	9	8	210	105

A





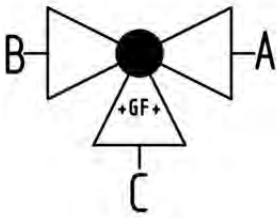


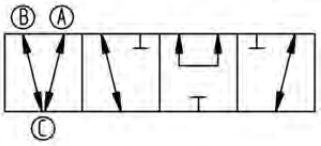
Type 543 3-Way Ball Valve
Horizontal/L-port, Standard PVDF
With butt fusion spigots IR-Plus metric

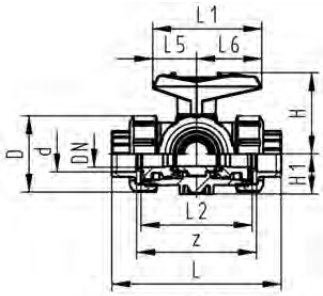
d (mm)	FKM Part No.	weight (lb)
20	**175 543 052**	0.732
25	**175 543 053**	1.058
32	**175 543 054**	1.620
40	**175 543 055**	2.703
50	**175 543 056**	4.098
63	**175 543 057**	7.430

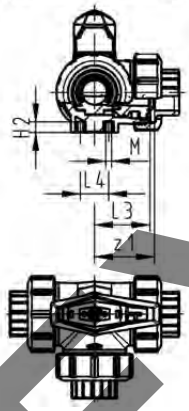
d (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	e (mm)	closest inch (inch)
20	50	146	77	72	36	25	32	45	57	28	8	6	1.9	½
25	58	163	97	85	43	25	39	58	67	32	8	6	1.9	¾
32	68	178	97	98	49	25	39	58	73	36	8	6	2.4	1
40	84	204	128	118	59	45	54	74	90	45	9	8	2.4	1 ¼
50	97	237	128	135	68	45	54	74	97	51	9	8	3.0	1 ½
63	124	296	152	176	88	45	66	87	116	65	9	8	3.0	2

A









Type 543 3-Way Ball Valve
Horizontal/T-port, SYGEF Standard
With fusion sockets metric

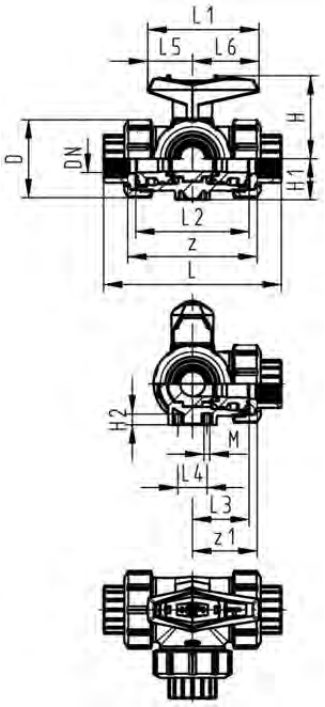
d (mm)	FKM Part No.	weight (lb)
16	**175 543 111**	0.624
20	**175 543 112**	0.635
25	**175 543 113**	0.919
32	**175 543 114**	1.420
40	**175 543 115**	2.612
50	**175 543 116**	3.556
63	**175 543 117**	7.507

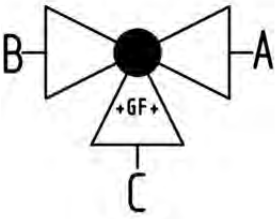
d (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	z (mm)	z1 (mm)	closest inch (inch)
16	50	110	77	72	36	25	32	45	57	28	8	6	82	41	⅜
20	50	112	77	72	36	25	32	45	57	28	8	6	82	41	½
25	58	129	97	85	43	25	39	58	67	32	8	6	97	49	¾
32	68	146	97	98	49	25	39	58	73	36	8	6	110	55	1
40	84	170	128	118	59	45	54	74	90	45	9	8	132	66	1 ¼
50	97	193	128	135	68	45	54	74	97	51	9	8	151	76	1 ½
63	124	244	152	176	88	45	66	87	116	65	9	8	188	94	2

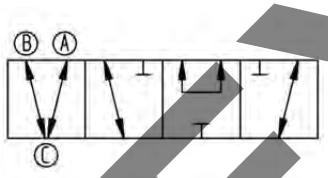
A

Type 543 3-Way Ball Valve
Horizontal/T-port, SYGEF Standard
With threaded sockets NPT

NPT (inch)	FKM Part No.
⅜	**175 543 171**
½	**175 543 172**
¾	**175 543 173**
1	**175 543 174**
1 ¼	**175 543 175**
1 ½	**175 543 176**
2	**175 543 177**

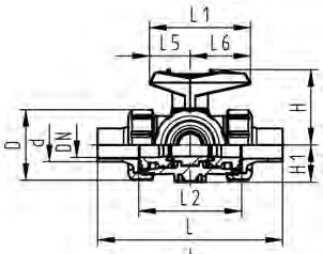


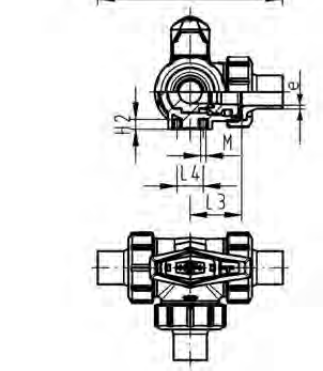


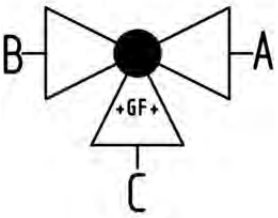


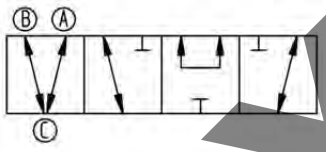
NPT (inch)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	z (mm)	z1 (mm)
⅜	50	57	28	8	112	77	72	36	25	32	45	6	86	43
½	50	57	28	8	114	77	72	36	25	32	45	6	80	40
¾	58	67	32	8	131	97	85	43	25	39	58	6	95	48
1	68	73	36	8	154	97	98	49	25	39	58	6	110	55
1 ¼	84	90	45	9	180	128	118	59	45	54	74	6	132	66
1 ½	97	97	51	9	203	128	135	68	45	54	74	6	157	79
2	124	116	65	9	258	152	176	88	45	66	87	6	210	105

A







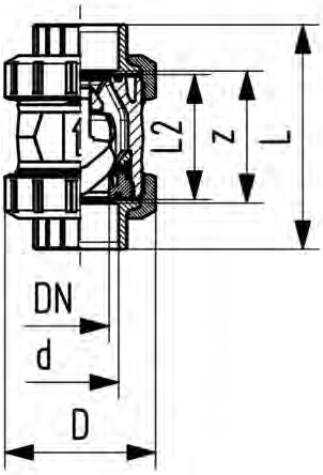


Type 543 3-Way Ball Valve
Horizontal/T-port, Standard PVDF
With butt fusion spigots IR-Plus metric

d (mm)	FKM Part No.	weight (lb)
20	**175 543 152**	0.708
25	**175 543 153**	1.054
32	**175 543 154**	1.444
40	**175 543 155**	2.672
50	**175 543 156**	4.039
63	**175 543 157**	7.862

d (mm)	D (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	e (mm)	closest inch (inch)
20	50	146	77	72	36	25	32	45	57	28	8	6	1.9	½
25	58	163	97	85	43	25	39	58	67	32	8	6	1.9	¾
32	68	178	97	98	49	25	39	58	73	36	8	6	2.4	1
40	84	204	128	118	59	45	54	74	90	45	9	8	2.4	1 ¼
50	97	237	128	135	68	45	54	74	97	51	9	8	3.0	1 ½
63	124	296	152	176	88	45	66	87	116	65	9	8	3.0	2

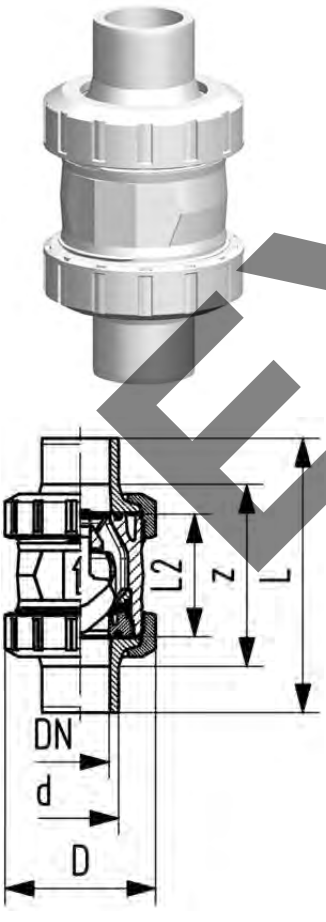
A



Check valve type 561 SYGEF Standard
With fusion sockets metric

d (mm)	FKM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	z (mm)	closest inch (inch)
16	^ 175 561 011	0.353	50	93	56	67	⅜
20	^ 175 561 012	0.353	50	95	56	66	½
25	^ 175 561 013	0.750	58	109	65	77	¾
32	^ 175 561 014	0.794	68	119	71	83	1
40	^ 175 561 015	1.477	84	135	85	99	1 ¼
50	^ 175 561 016	2.183	97	147	89	105	1 ½
63	^ 175 561 017	3.902	124	168	101	117	2
75	^ 175 561 018	8.003	166	233	136	167	2 ½
90	^ 175 561 019	12.787	200	254	141	180	3
110	^ 175 561 020	20.834	238	301	164	215	4

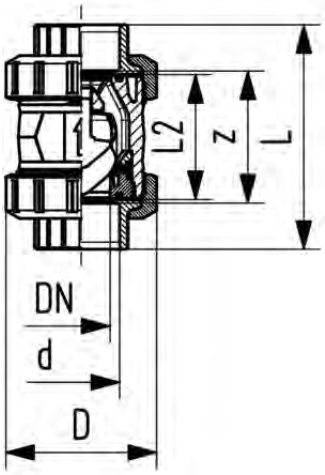
A



Check valve type 561 SYGEF Standard
With butt fusion spigots IR-Plus metric

d (mm)	FKM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	e (mm)	closest inch (inch)
20	^ 175 561 092	0.353	50	130	56	1.9	½
25	^ 175 561 093	0.772	58	143	65	1.9	¾
32	^ 175 561 094	0.838	68	150	71	2.4	1
40	^ 175 561 095	1.455	84	171	85	2.4	1 ¼
50	^ 175 561 096	2.205	97	191	89	3.0	1 ½
63	^ 175 561 097	3.946	124	220	101	3.0	2

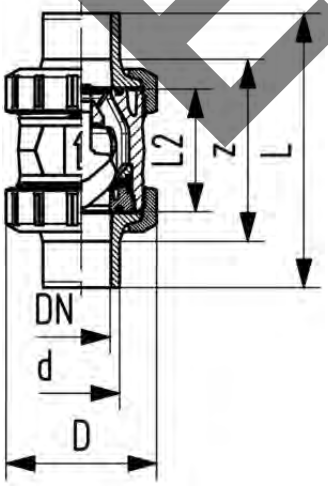
A



Check valve type 561
SYGEF Standard silicone free
With fusion sockets metric

d (mm)	FKM Part No.	D (mm)	L (mm)	L2 (mm)	z (mm)	closest inch (inch)
16	^ 175 561 211	50	93	56	67	⅜
20	^ 175 561 212	50	95	56	66	½
25	^ 175 561 213	58	109	65	77	¾
32	^ 175 561 214	68	119	71	83	1
40	^ 175 561 215	84	135	85	99	1 ¼
50	^ 175 561 216	97	147	89	105	1 ½
63	^ 175 561 217	124	168	101	117	2
75	^ 175 561 218	166	235	136	167	2 ½
90	^ 175 561 219	200	255	141	180	3
110	^ 175 561 220	238	305	164	215	4

A



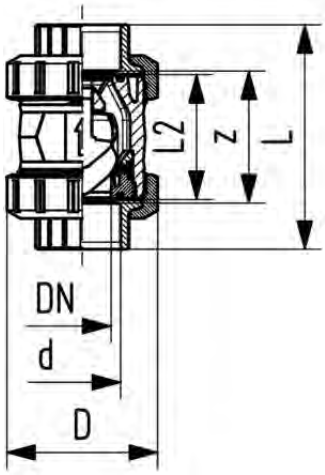
Check valve type 561
SYGEF Standard silicone free
With butt fusion spigots IR-Plus metric

d (mm)	FKM Part No.	D (mm)	L (mm)	L2 (mm)	e (mm)	closest inch (inch)
20	^ 175 561 272	50	130	56	1.9	½
25	^ 175 561 273	58	143	65	1.9	¾
32	^ 175 561 274	68	150	71	2.4	1
40	^ 175 561 275	84	171	85	2.4	1 ¼
50	^ 175 561 276	97	191	89	3.0	1 ½
63	^ 175 561 277	124	220	101	3.0	2
75	^ 175 561 278	166	290	136	3.6	2 ½
90	^ 175 561 279	200	310	141	4.3	3
110	^ 175 561 280	238	350	164	5.3	4

A

Check valve type 562 SYGEF Standard
With fusion sockets metric

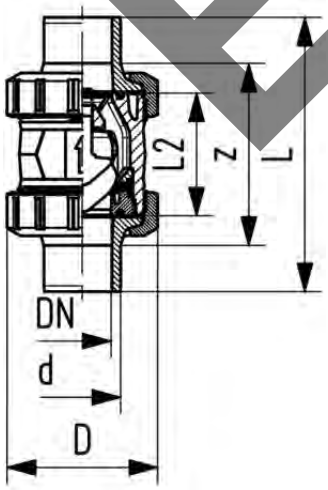
d (mm)	FKM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	z (mm)	closest inch (inch)
16	^ 175 562 011	0.353	50	93	56	67	⅜
20	^ 175 562 012	0.353	50	95	56	66	½
25	^ 175 562 013	0.750	58	109	65	77	¾
32	^ 175 562 014	0.794	68	119	71	83	1
40	^ 175 562 015	1.477	84	135	85	99	1 ¼
50	^ 175 562 016	2.183	97	147	89	105	1 ½
63	^ 175 562 017	3.902	124	168	101	117	2



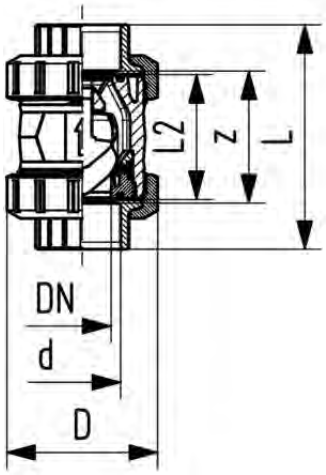
A

Check valve type 562 SYGEF Standard
With butt fusion spigots IR-Plus metric

d (mm)	FKM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	e (mm)	closest inch (inch)
20	^ 175 562 092	0.353	50	130	56	1.9	½
25	^ 175 562 093	0.772	58	143	65	1.9	¾
32	^ 175 562 094	0.838	68	150	71	2.4	1
40	^ 175 562 095	1.455	84	171	85	2.4	1 ¼
50	^ 175 562 096	2.205	97	191	89	3.0	1 ½
63	^ 175 562 097	3.946	124	220	101	3.0	2



A



Check valve type 562 SYGEF Standard
silicone free
With fusion sockets metric

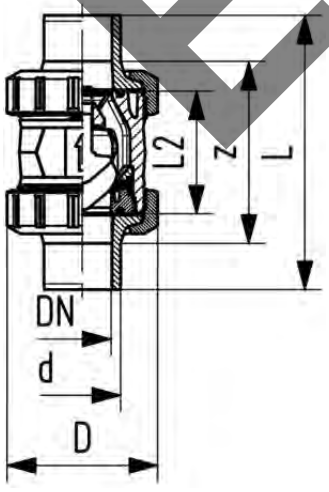
Model:

- Material: PVDF / silicone free cleaned
- For horizontal or vertical installation
- Sealing at a minimum water column of1m
- Spring loaded, spring made of stainless steel (1.4310)
- Spring available in other materials, see spare parts
- Designed for easy installation and removal
- Vibration free even at high flow velocity
- Flow-optimized return cone, double guided
- Compact installation length, same as ball valve type 546

Warning: please make sure the diameter is not reduced through welding beads (Danger of turbulences)

d (mm)	FKM Part No.	weight (kg)	D (mm)	L (mm)	L2 (mm)	z (mm)	closest inch (inch)
16	^ 175 562 211	0.160	50	93	56	67	⅜
20	^ 175 562 212	0.160	50	95	56	66	½
25	^ 175 562 213	0.340	58	109	65	77	¾
32	^ 175 562 214	0.360	68	119	71	83	1
40	^ 175 562 215	0.670	84	135	85	99	1 ¼
50	^ 175 562 216	0.990	97	147	89	105	1 ½
63	^ 175 562 217	1.770	124	168	101	117	2
75	^ 175 562 218	3.630	166	235	136	167	2 ½
90	^ 175 562 219	5.800	200	255	141	180	3
110	^ 175 562 220	9.450	238	305	164	215	4

A



Check valve type 562 SYGEF Standard
silicone free
With butt fusion spigots IR-Plus metric

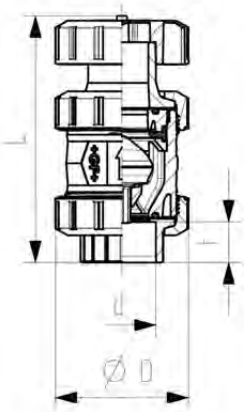
Model:

- Material: PVDF / silicone free cleaned
- For horizontal or vertical installation
- Sealing at a minimum water column of1m
- Spring loaded, spring made of stainless steel (1.4310)
- Spring available in other materials, see spare parts
- Designed for easy installation and removal
- Vibration free even at high flow velocity
- Flow-optimized return cone, double guided
- Compact installation length, same as ball valve type 546

Warning: please make sure the diameter is not reduced through welding beads (Danger of turbulences)

d (mm)	FKM Part No.	weight (kg)	D (mm)	L (mm)	L2 (mm)	e (mm)	closest inch (inch)
20	^ 175 562 272	0.160	50	130	56	1.9	½
25	^ 175 562 273	0.350	58	143	65	1.9	¾
32	^ 175 562 274	0.380	68	150	71	2.4	1
40	^ 175 562 275	0.660	84	171	85	2.4	1 ¼
50	^ 175 562 276	1.000	97	191	89	3.0	1 ½
63	^ 175 562 277	1.790	124	220	101	3.0	2
75	^ 175 562 278	3.680	166	290	136	3.6	2 ½
90	^ 175 562 279	5.760	200	310	141	4.3	3
110	^ 175 562 280	9.270	238	350	164	5.3	4

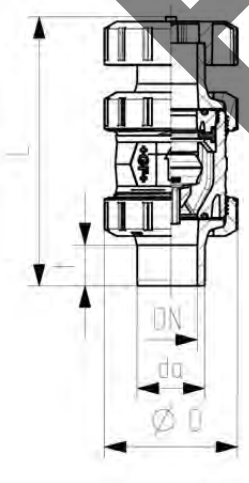
A



Type 591 SYGEF Standard
Ventilating and bleed valve
With fusion sockets metric

d (mm)	FKM Part No.	weight (kg)	D (mm)	L (mm)	t (mm)	closest inch (inch)
16	^ 175 591 011	0.177	50	126	14	⅜
20	^ 175 591 012	0.177	50	127	15	½
25	^ 175 591 013	0.363	58	142	16	¾
32	^ 175 591 014	0.394	68	153	18	1
40	^ 175 591 015	0.722	84	171	19	1 ¼
50	^ 175 591 016	1.059	97	190	21	1 ½
63	^ 175 591 017	1.876	124	219	26	2
75	* 175 591 018	3.630	166	256	33	2 ½
90	* 175 591 019	5.800	200	275	37	3
110	* 175 591 020	9.450	238	318	43	4

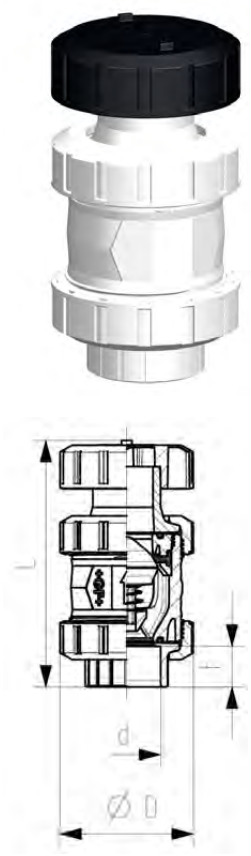
A



Type 591 SYGEF Standard
Ventilating and bleed valve
With socket fusion spigots metric

d (mm)	FKM Part No.	weight (lb)	D (mm)	L (mm)	t (mm)	closest inch (inch)
16	^ 175 591 031	0.390	50	135	13	⅜
20	^ 175 591 032	0.412	50	140	14	½
25	^ 175 591 033	0.866	58	157	16	¾
32	^ 175 591 034	0.957	68	168	18	1
40	^ 175 591 035	1.592	84	189	20	1 ¼
50	^ 175 591 036	2.423	97	211	23	1 ½
63	^ 175 591 037	4.268	124	245	27	2

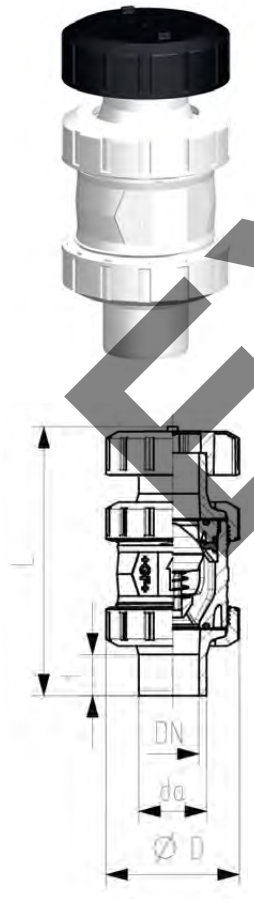
A



Ventilating valve type 595
SYGEF Standard
With fusion sockets metric

d (mm)	FKM Part No.	weight (lb)	D (mm)	L (mm)	t (mm)	closest inch (inch)
16	^ 175 595 011	0.390	50	126	14	⅜
20	^ 175 595 012	0.390	50	127	15	½
25	^ 175 595 013	0.800	58	142	16	¾
32	^ 175 595 014	0.869	68	153	18	1
40	^ 175 595 015	1.592	84	171	19	1 ¼
50	^ 175 595 016	2.335	97	190	21	1 ½
63	^ 175 595 017	4.136	124	219	26	2
75	* 175 595 018	8.003	166	256	33	2 ½
90	* 175 595 019	12.787	200	275	37	3
110	* 175 595 020	20.834	238	318	43	4

A



Ventilating valve type 595
SYGEF Standard
With socket fusion spigots metric

d (mm)	FKM Part No.	weight (lb)	D (mm)	L (mm)	t (mm)	closest inch (inch)
16	^ 175 595 031	0.390	50	135	13	⅜
20	^ 175 595 032	0.412	50	140	14	½
25	^ 175 595 033	0.866	58	157	16	¾
32	^ 175 595 034	0.957	68	168	18	1
40	^ 175 595 035	1.592	84	189	20	1 ¼
50	^ 175 595 036	2.423	97	211	23	1 ½
63	^ 175 595 037	4.268	124	245	27	2

A

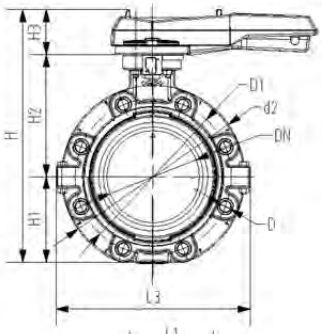
SYGEF Standard
Lugstyle butterfly valve 578 ANSI
Hand lever with ratchet settings

Model:

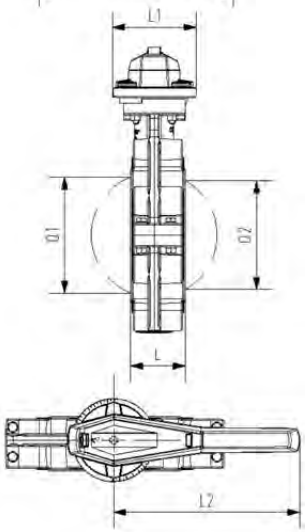
- Housing material: PP-GF30 with 316SS lug inserts
- Overall length according to EN 558, ISO 5752 (DN50 - 200 line 25, DN250 - 300 line 10)
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759
- We recommend for the dimensions DN250 and DN300 only 6 bar maximum system pressure for the hand lever version

Option:

- Optional accessory: Integrated position feedback with limit switches (sold separately)

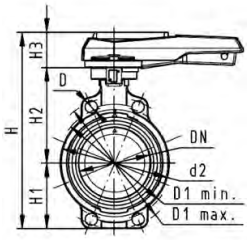


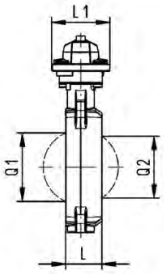
d (mm)	Size (inch)	DN (mm)	PN (bar)	Cv-value (l/min)	FKM Part No.	SP	weight (kg)
63	2	50	10	1470	**175 578 102**	1	1.800
75	2 ½	65	10	2200	**175 578 103**	1	1.895
90	3	80	10	3000	**175 578 104**	1	2.251
110	4	100	10	6500	**175 578 105**	1	3.146
140	5	125	10	11500	**175 578 106**	1	4.660
160	6	150	10	16600	**175 578 107**	1	6.430
225	8	200	10	39600	**175 578 108**	1	8.625
280	10	300	10	55200	**175 578 109**	1	19.528
315	12	250	10	80000	**175 578 110**	1	26.106

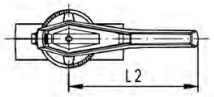


d (mm)	Size (inch)	d2 (mm)	D	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Q1 (mm)	Q2 (mm)
63	2	160	UNC 5/8	120.6	265	77	134	54	45	106	205	165	40	
75	2 ½	180	UNC 5/8	139.7	277	83	140	54	46	106	205	182	54	35
90	3	195	UNC 5/8	152.4	289	89	146	54	49	106	205	210	67	50
110	4	226	UNC 5/8	190.5	328	106	167	55	56	106	255	240	88	74
140	5	258	UNC 3/4	215.9	357	121	181	55	64	106	255	272	113	97
160	6	284	UNC 3/4	241.3	377	133	189	55	72	106	255	300	139	123
225	8	341	UNC 3/4	298.4	436	159	210	67	73	140	408	360	178	169
280	10	412	UNC 7/8	362.0	536	205	264	67	114	140	408	440	210	207
315	12	482	UNC 7/8	431.8	586	234	285	67	115	140	408	510	256	253

A





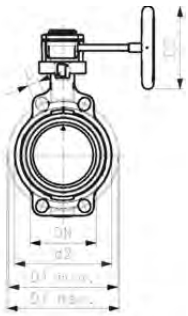


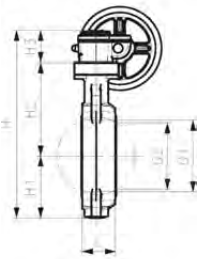
Type 567 Butterfly Valve SYGEF® Standard PVDF
Hand lever with ratchet settings

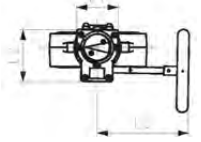
d (mm)	Size (inch)	FKM Part No.	PTFE/FKM Part No.	weight (kg)
63	2	**175 567 002**	* **175 567 202**	1.080
75	2 ½	**175 567 003**	* **175 567 203**	1.192
90	3	**175 567 004**	* **175 567 204**	1.992
110	4	**175 567 005**	* **175 567 205**	2.072
140	5	**175 567 006**	* **175 567 206**	2.667
160	6	**175 567 007**	* **175 567 207**	3.887
225	8	**175 567 008**	* **175 567 208**	7.242
315	12	**175 567 010**	* **175 567 210**	19.513

d (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	d2 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	Q1 (mm)	Q2 (mm)
63	19	120	125	104	264	77	134	54	45	106	205	40	
75	19	140	145	115	277	83	140	54	46	106	205	54	35
90	19	150	160	131	289	89	146	54	49	106	205	67	50
110	19	175	191	161	325	104	167	55	56	106	255	88	74
140	23	210	216	187	352	117	181	55	64	106	255	113	97
160	24	241	241	215	373	130	189	55	72	106	255	139	123
225	23	290	295	267	435	158	210	67	73	140	408	178	169
315	25	400	432	379	598	228	285	85	113	149	408	256	253

A







Type 567 Butterfly Valve SYGEF® Standard PVDF
Reduction gear with handwheel

d (mm)	Size (inch)	FKM Part No.	PTFE/FKM Part No.	weight (lb)
63	2	**175 567 022**	* **175 567 222**	6.874
75	2 ½	**175 567 023**	* **175 567 223**	7.121
90	3	**175 567 024**	* **175 567 224**	7.791
110	4	**175 567 025**	* **175 567 225**	8.955
140	5	**175 567 026**	* **175 567 226**	10.267
160	6	**175 567 027**	* **175 567 227**	12.957
225	8	**175 567 028**	* **175 567 228**	17.218
315	12	**175 567 030**	* **175 567 230**	79.366

d (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	d2 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Q1 (mm)
63	19	120	125	104	160	273	77	134	62	45	78	112	179	40
75	19	140	145	115	160	285	83	140	62	46	78	112	179	54
90	19	150	160	131	160	297	89	146	62	49	78	112	179	67
110	19	175	191	160	160	333	104	167	62	56	78	112	179	88
140	23	210	216	187	160	360	117	181	62	64	78	112	179	113
160	24	241	241	215	160	381	130	189	62	72	78	112	179	139
225	23	290	295	267	160	430	158	210	62	73	78	112	179	178
315	25	400	432	379	200	605	228	285	69	113	97	130	198	256

d (mm)	Q2 (mm)
63	
75	35
90	50
110	74
140	97
160	123
225	169
315	253

A

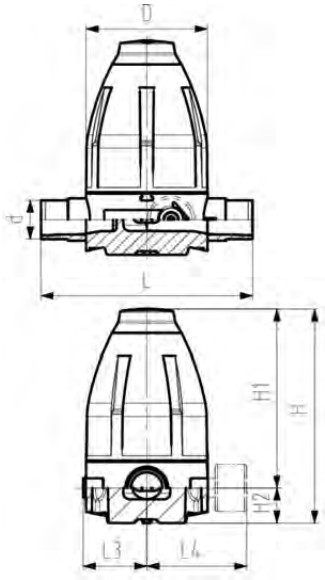
Type 582 Pressure Reducing Valve SYGEF Standard PVDF Butt fusion spigots metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings FKM Part No.	weight (kg)
20	15	10	**185 582 012**	0.700
25	20	10	**185 582 013**	1.550
32	25	10	**185 582 014**	1.560
40	32	10	**185 582 015**	4.370
50	40	10	**185 582 016**	4.400
63	50	10	**185 582 017**	4.520



d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L3 (mm)	M	closest inch (inch)
20	79	132	111	21	14	150	42	M6	½
25	100	177	148	29	14	190	53	M6	¾
32	100	177	148	29	14	190	53	M6	1
40	147	251	207	44	21	240	76	M8	1 ¼
50	147	251	207	44	21	240	76	M8	1 ½
63	147	251	207	44	21	260	76	M8	2

A

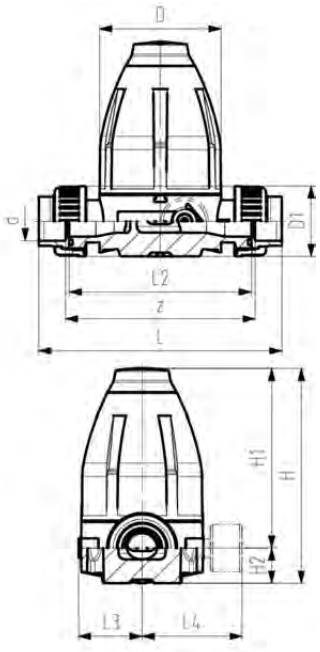
Type 582 Pressure Reducing Valve SYEGEF Standard PVDF Unions with fusion sockets metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings FKM Part No.	weight (kg)
20	15	10	**185 582 112**	0.780
25	20	10	**185 582 113**	1.650
32	25	10	**185 582 114**	1.700
40	32	10	**185 582 115**	4.530
50	40	10	**185 582 116**	4.750
63	50	10	**185 582 117**	5.050



d (mm)	D (mm)	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L2 (mm)	L3 (mm)	M	z (mm)	closest inch (inch)
20	79	43	132	111	21	12	158	120	42	M6	130	½
25	100	53	177	148	29	14	192	150	53	M6	160	¾
32	100	60	177	148	29	14	196	150	53	M6	160	1
40	147	74	251	207	44	21	255	205	76	M8	215	1 ¼
50	147	82	251	207	44	21	261	205	76	M8	215	1 ½
63	147	100	251	207	44	21	269	205	76	M8	215	2

A

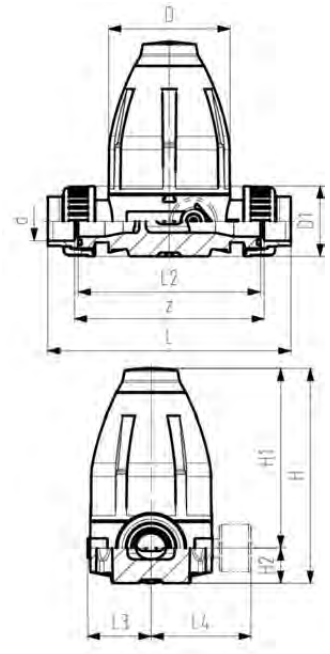
Type 582 Pressure Reducing Valve SYGEF Standard PVDF Unions with butt fusion spigots metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings FKM Part No.	weight (kg)
20	15	10	**185 582 512**	0.830
25	20	10	**185 582 513**	1.710
32	25	10	**185 582 514**	1.760
40	32	10	**185 582 515**	4.750
50	40	10	**185 582 516**	4.840
63	50	10	**185 582 517**	5.140



d (mm)	D (mm)	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L2 (mm)	L3 (mm)	M	closest inch (inch)
20	79	43	132	111	21	12	226	120	42	M6	½
25	100	53	177	148	29	14	262	150	53	M6	¾
32	100	60	177	148	29	14	268	150	53	M6	1
40	147	74	251	207	44	21	329	205	76	M8	1 ¼
50	147	82	251	207	44	21	335	205	76	M8	1 ½
63	147	100	251	207	44	21	341	205	76	M8	2

A

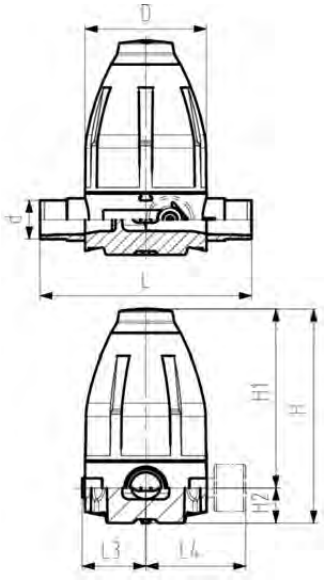
Type 586 Pressure Retaining Valve SYGEF Standard PVDF Butt fusion spigots metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings FKM Part No.	weight (kg)
20	15	10	**185 586 012**	0.700
25	20	10	**185 586 013**	1.570
32	25	10	**185 586 014**	1.580
40	32	10	**185 586 015**	4.410
50	40	10	**185 586 016**	4.430
63	50	10	**185 586 017**	4.550



d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L3 (mm)	M	closest inch (inch)
20	79	132	111	21	14	150	42	M6	½
25	100	177	148	29	14	190	53	M6	¾
32	100	177	148	29	14	190	53	M6	1
40	147	251	207	44	21	240	76	M8	1 ¼
50	147	251	207	44	21	240	76	M8	1 ½
63	147	251	207	44	21	260	76	M8	2

A

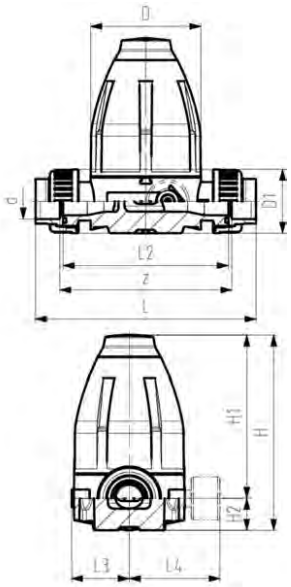
Type 586 Pressure Retaining Valve SYGEF Standard PVDF Unions with fusion sockets metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings FKM Part No.	weight (kg)
20	15	10	**185 586 112**	0.780
25	20	10	**185 586 113**	1.670
32	25	10	**185 586 114**	1.720
40	32	10	**185 586 115**	4.700
50	40	10	**185 586 116**	4.790
63	50	10	**185 586 117**	5.090



d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L2 (mm)	L3 (mm)	M	z (mm)	closest inch (inch)
20	79	132	111	21	12	158	120	42	M6	130	½
25	100	177	148	29	14	192	150	53	M6	160	¾
32	100	177	148	29	14	196	150	53	M6	160	1
40	147	251	207	44	21	255	205	76	M8	215	1 ¼
50	147	251	207	44	21	261	205	76	M8	215	1 ½
63	147	251	207	44	21	269	205	76	M8	215	2

A

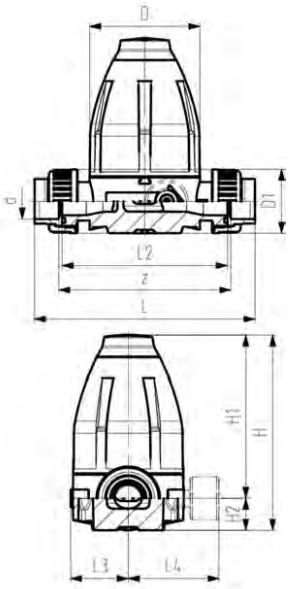
Type 586 Pressure Retaining Valve SYGEF Standard PVDF Unions with butt fusion spigots metric Without manometer

Model:

- Diaphragm PTFE/EPDM
- Integrated stainless steel mounting inserts
- 0.5-9.0 bar (7-130 psi)

0.3-3.0 bar (4-44 psi) on request
Manometer on request

d (mm)	DN (mm)	PN (bar)	O-rings FKM Part No.	weight (kg)
20	15	10	**185 586 512**	0.820
25	20	10	**185 586 513**	1.710
32	25	10	**185 586 514**	1.760
40	32	10	**185 586 515**	4.740
50	40	10	**185 586 516**	4.830
63	50	10	**185 586 517**	5.130

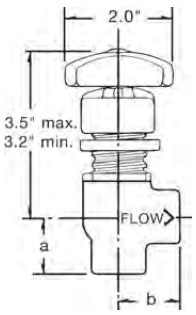


d (mm)	D (mm)	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L2 (mm)	L3 (mm)	M	z (mm)	closest inch (inch)
20	79	43	132	111	21	12	226	120	42	M6	130	½
25	100	53	177	148	29	14	262	150	53	M6	160	¾
32	100	60	177	148	29	14	268	150	53	M6	160	1
40	147	74	251	207	44	21	329	205	76	M8	215	1 ¼
50	147	82	251	207	44	21	335	205	76	M8	215	1 ½
63	147	100	251	207	44	21	341	205	76	M8	215	2

B

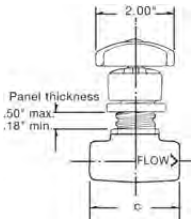
Needle Valve - Type 522
Angle Body, Female NPT

Size	PN (bar)	Part No.	SP	weight (lb)	a (mm)	b (mm)
¼	10	**155 522 579**	1	0.309	25	28
½	10	**155 522 581**	1	0.309	28	31



B

Needle Valve - Type 522
Globe Body, Female NPT



Size	PN (bar)	Part No.	SP	weight (lb)	c (mm)
¼	10	**155 522 554**	1	0.309	58
½	10	**155 522 556**	1	0.309	65

Miscellaneous

B

T523, Low Profile Gauge Isolator Without Gauge

Size	Part No.	weight (lb)
1/4" x 1/4" FNPT	* 155 523 533	0.540
1/4" X 1/2" FNPT	* 155 523 535	0.562

B

T523, Low Profile Gauge Isolator With Gauge, Scale 0-160 PSI

Size	Part No.	weight (lb)
1/4" x 1/4" FNPT	* 155 523 537	1.393
1/4" x 1/2" FNPT	* 155 523 539	0.705

A

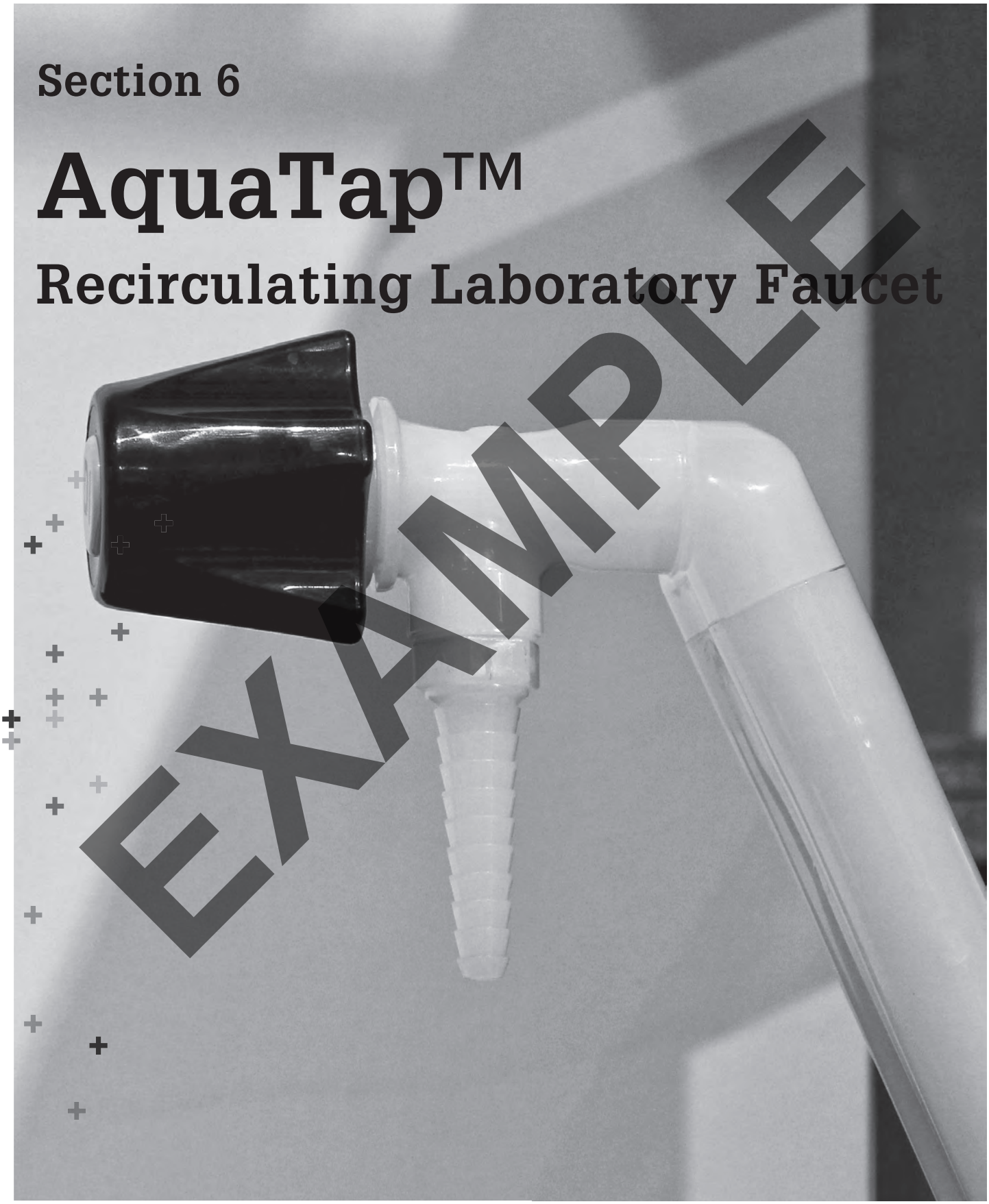
Pure Fluid Dispenser

Size	Part No.	weight (lb)
3/8" NPT	* 155 524 580	1.190

Section 6

AquaTap™

Recirculating Laboratory Faucet

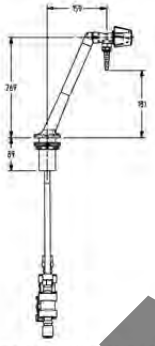


B

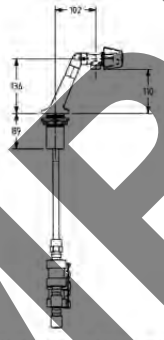
Type 530 AquaTap Recirculating Laboratory Faucet
Made of SYGEF PVDF with 5/8" PFA Tubing and Flare Connections

- The faucet is made from high purity PVDF
- Mounting hole diameter 2" - 2 1/8"
- Must buy Inline Flow Diverters (IFDs) along with faucet for proper flow and performance
- Includes two isolation ball valves, Type 546 PP-H d20mm, that connect to flared tubing
- Can substitute PVDF Type 546 ball valves for additional fee

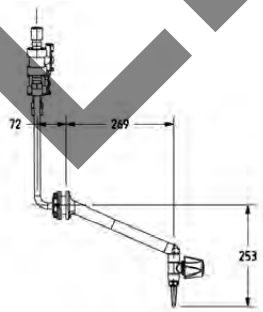
Description	Part No.
Deck Mount Hose Barb	* 175 530 101
Wall Mount to Ceiling Hose Barb	* 175 530 102
Wall Mount to Floor Hose Barb	* 175 530 103
Deck Mount Dual Head	* 175 530 104
Deck Mount Short Version Female 3/8" NPT	* 175 530 105
Wall Mount Short to Ceiling	* 175 530 106
Wall Mount with Hose Barb to Floor Short	* 175 530 107
Wall Mount with Hose Barb to Mounting Elevation	* 175 530 118



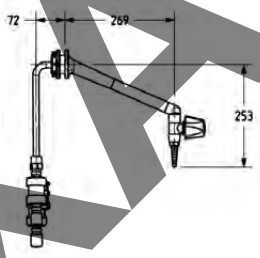
Deck mount with hose barb



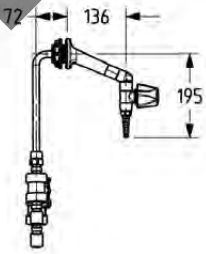
Short deck mount with loose hose barb



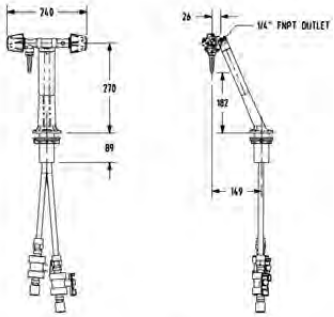
Wall mount to ceiling



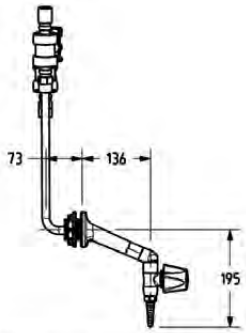
Wall mount to floor



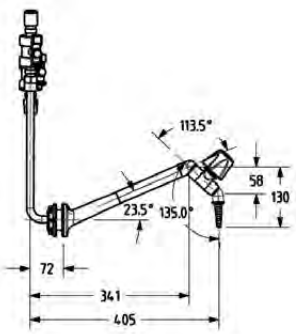
Wall mount to floor short



Deck mount dual head



Wall mount to ceiling short



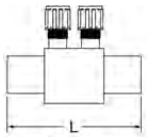
Wall mount with hose barb at mounting level

B

PROGEF Standard PP Inline Flow Diverter IR Plus Fusion

- Shipped with nuts and tube blankoffs
- Other dimension available upon request
- Inline Flow Diverter is designed for use with GF AquaTap Faucet and is not sold separately

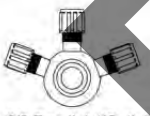
d (mm)	L (mm)	Ports 1/1 Part No.	Ports 2/2 Part No.	Ports 3/3 Part No.
25	180	* 167 530 123		
32	180	* 167 530 124	* 167 530 144	* 167 530 164
40	180	* 167 530 125	* 167 530 145	* 167 530 165
50	180	* 167 530 126	* 167 530 146	* 167 530 166
63	180	* 167 530 127	* 167 530 147	* 167 530 167
75	180	* 167 530 128	* 167 530 148	* 167 530 168



Inline Flow Diverter with IR Butt/BCF Plus connection


1/1 Port (Inlet/Outlet)


2/2 Port (Inlet/Outlet)

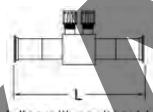

3/3 Port (Inlet/Outlet)

B

PROGEF Standard PP Inline Flow Diverter Sanitary Tri-Clamp

- Shipped with nuts and tube blankoffs
- Inline Flow Diverter is designed for use with GF AquaTap Faucet and is not sold separately

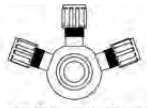
Sanitary (inch)	L (mm)	Ports 1/1 Part No.	Ports 2/2 Part No.	Ports 3/3 Part No.
1 1/2	294	* 167 530 225	* 167 530 245	* 167 530 265
2	316	* 167 530 226	* 167 530 246	* 167 530 266
2 1/2	314	* 167 530 227	* 167 530 247	* 167 530 267



Inline with sanitary tri-clamp connections flow diverter


1/1 Port (Inlet/Outlet)


2/2 Port (Inlet/Outlet)

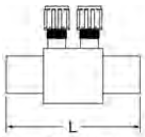

3/3 Port (Inlet/Outlet)

B

PROGEF Natural PP Inline Flow Diverter IR Plus / BCF Plus Fusion

- Shipped with nuts and tube blankoffs
- Other dimension available upon request
- Inline Flow Diverter is designed for use with GF AquaTap Faucet and is not sold separately

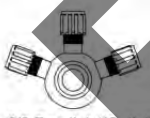
d (mm)	L (mm)	Ports 1/1 Part No.	Ports 2/2 Part No.	Ports 3/3 Part No.
25	180	* 168 530 123		
32	180	* 168 530 124	* 168 530 144	* 168 530 164
40	180	* 168 530 125	* 168 530 145	* 168 530 165
50	180	* 168 530 126	* 168 530 146	* 168 530 166
63	180	* 168 530 127	* 168 530 147	* 168 530 167
75	180	* 168 530 128	* 168 530 148	* 168 530 168



Inline Flow Diverter with IR Butt/BCF Plus connection


1/1 Port (Inlet/Outlet)


2/2 Port (Inlet/Outlet)

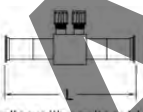

3/3 Port (Inlet/Outlet)

B

PROGEF Natural PP Inline Flow Diverter Sanitary Tri-Clamp

- Shipped with nuts and tube blankoffs
- Inline Flow Diverter is designed for use with GF AquaTap Faucet and is not sold separately

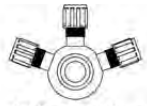
Sanitary (inch)	L (mm)	Ports 1/1 Part No.	Ports 2/2 Part No.	Ports 3/3 Part No.
1 1/2	294	* 168 530 225	* 168 530 245	* 168 530 265
2	316	* 168 530 226	* 168 530 246	* 168 530 266
2 1/2	314	* 168 530 227	* 168 530 247	* 168 530 267



Inline with sanitary tri-clamp connections flow diverter


1/1 Port (Inlet/Outlet)


2/2 Port (Inlet/Outlet)

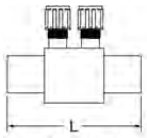

3/3 Port (Inlet/Outlet)

B

PPro-Seal Natural PP Inline Flow Diverter Electrofusion

- With electrofusion ends for joining to PPro-Seal pipe (not shown in image)
- Shipped with nuts and tube blankoffs
- Other dimension available upon request
- Inline Flow Diverter is designed for use with GF AquaTap Faucet and is not sold separately

Size (inch)	L (inch)	Ports 1/1 Part No.	Ports 2/2 Part No.	Ports 3/3 Part No.
¾	9	**150 530 611**		
1	9	**150 530 612**	**150 530 615**	**150 530 618**
1 ½	10	**150 530 613**	**150 530 616**	**150 530 619**
2	10	**150 530 614**	**150 530 617**	**150 530 620**



Inline Flow Diverter with IR Butt/BCF Plus connection


1/1 Port (Inlet/Outlet)


2/2 Port (Inlet/Outlet)

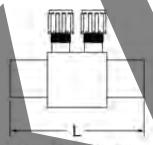

3/3 Port (Inlet/Outlet)

B

SYGEF PVDF Inline Flow Diverter IR Plus / BCF Plus Fusion

- Shipped with nuts and tube blankoffs
- Other dimension available upon request
- Inline Flow Diverter is designed for use with GF AquaTap Faucet and is not sold separately

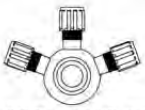
d (mm)	L (mm)	Ports 1/1 Part No.	Ports 2/2 Part No.	Ports 3/3 Part No.
25	180	*** 175 530 123**		
32	180	*** 175 530 124**	*** 175 530 144**	*** 175 530 164**
40	180	*** 175 530 125**	*** 175 530 145**	*** 175 530 165**
50	180	*** 175 530 126**	*** 175 530 146**	*** 175 530 166**
63	180	*** 175 530 127**	*** 175 530 147**	*** 175 530 167**
75	180	*** 175 530 128**	*** 175 530 148**	*** 175 530 168**



Inline Flow Diverter with IR Butt/BCF Plus connection


1/1 Port (Inlet/Outlet)


2/2 Port (Inlet/Outlet)

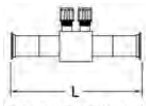

3/3 Port (Inlet/Outlet)

B

SYGEF PVDF Inline Flow Diverter Sanitary Tri-Clamp

- Shipped with nuts and tube blankoffs
- Inline Flow Diverter is designed for use with GF AquaTap Faucet and is not sold separately

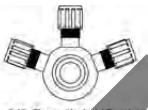
Sanitary (inch)	L (mm)	Ports 1/1 Part No.	Ports 2/2 Part No.	Ports 3/3 Part No.
1 ½	294	* 175 530 225	* 175 530 245	* 175 530 265
2	316	* 175 530 226	* 175 530 246	* 175 530 266
2 ½	314	* 175 530 227	* 175 530 247	* 175 530 267



Inline with sanitary tri-clamp connections flow diverter

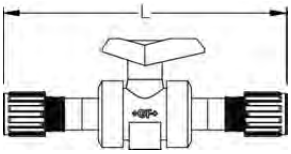

1/1 Port (Inlet/Outlet)


2/2 Port (Inlet/Outlet)


3/3 Port (Inlet/Outlet)

B

Isolation Ball Valve, Flare Adapter

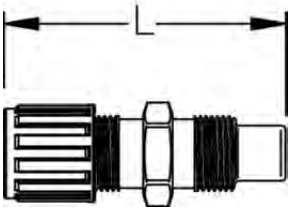


- Type 546 ball valve, 20mm size, with 5/8" flare adapter ends for connection to AquaTap tubing

PVDF Part No.	PP Part No.	Size (mm)	L (mm)
* 175 530 032	* 157 546 510	5/8" Flare Adapters	214

B

Straight Coupler, Flare Adapter



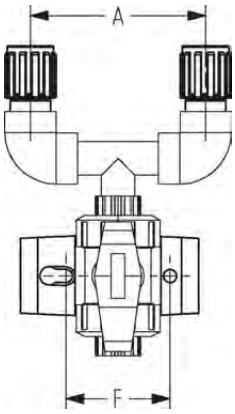
Size	L (mm)	PVDF Part No.	weight (lb)
5/8" Flare Adapters	75	* 175 530 011	0.093

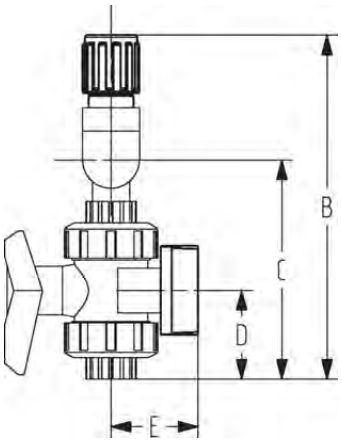
B

Point of Use (POU) Tee Valve

- Must buy Inline Flow Diverters (IFDs) along with faucet for proper flow and performance

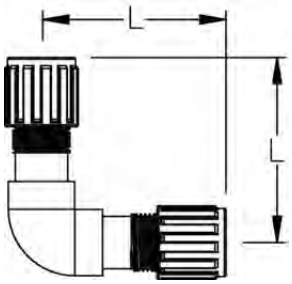
EPDM Part No.	FKM Part No.	Size	A (inch)	B (inch)	C (inch)	D (inch)	E (inch)	F (inch)
* 157 320 001	* 157 321 001	1/2" FNPT x 5/8" Tube Flare	104.2	184.2	117.3	47.6	46.6	70.0





B

90° Elbow, Flare Adapter



Size	L (mm)	PVDF Part No.
5/8" Flare Adapters	67	* 175 530 012

B

5/8" Compression Fittings

Description	PVDF Part No.	Natural PP Part No.
5/8" Tube x 5/8" Tube Straight Coupler	* 175 530 013	* 168 530 013
5/8" Tube x 5/8" Tube 90 Elbow	* 175 530 014	* 168 530 014
5/8" Tube x 1/2" Tube MNPT Tee	* 175 530 015	* 168 530 015
5/8" Tube x 1/2" Tube NPT Male Adapter	* 175 530 016	* 168 530 016
5/8" Tube x 1/2" Tube NPT Female Adapter	* 175 530 017	* 168 530 017

B

Flexible 5/8" Tubing

- PFA comes in 25 ft. bundles.
- PE comes in 100 ft. bundles.

Description	Material	Part No.
5/8" dia x 0.65 wall Tubing (Plain)	PFA	* 178 530 001
5/8" dia x 0.65 wall Tubing (Plain)	PE	* 193 530 001

B

Accessories

Description	Part No.
90 Bend Tube Protector	* 150 530 002
Tube Clip	* 150 530 003
5/8" Flare Nut	* 175 530 010
5/8" Tube Blankoff	* 193 530 010
Faucet Isolation Clamp	* 150 530 001
ADA Handle	* 150 530 202
Aerator Outlet	* 150 530 204
Barb Outlet	* 150 530 203
3/4" Sanitary Adapter Outlet (0.985" flange connection)	150 530 205

B

Rebuild Kit

- Includes stem and replacement seals, for flow control needle valve in AquaTap faucet head

Description	Part No.
Valve Stem Rebuild Kit (Black Handle Faucet)	* 150 530 512
Valve Stem Rebuild Kit (Blue Handle Faucet, previous generation)	150 530 511

D

AQUATAP Installation Tools

Tool Box not sold separately

Number	Description	Part No.
1-7	Complete Tool Box Kit (Includes Items 1-7)	* 799 530 200
2	Heater Plate Protector	* 799 530 001
3	5/8" Flare - Heater Bushing	* 799 530 155
4	Flare Mandrel	* 799 530 156
5	Tubing Hex Jaw Pliers	* 799 530 157
6	Tube Cutter	* 799 530 158

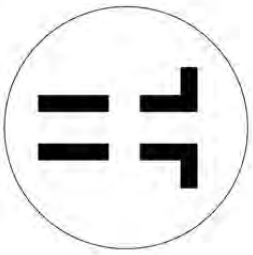
Section 7

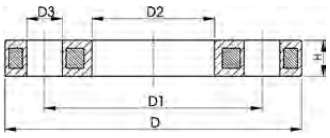
Accessories

Table of contents		Page
	Flange Rings	274
	Gaskets	277
	Pipe and Valve Support	278
	Clamps	284

Flange Rings

B





Backing flange PP-Steel For butt fusion systems Inch/ANSI

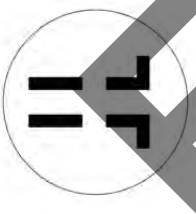
Model:

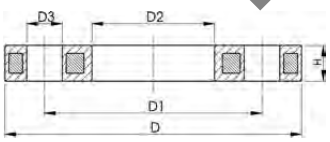
- UV-resistant.
- **Bolt circle class 150**

AL: number of holes

	d (inch)	d (mm)	DN (mm)	PN (bar)	Part No.	weight (kg)	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	H (mm)	AL	SC
	1/2	20	15	16	**727 701 206**	0.213	95	60	28	16	12	4	M12
	3/4	25	20	16	**727 701 207**	0.260	105	70	34	16	12	4	M12
	1	32	25	16	**727 701 208**	0.416	115	79	42	16	16	4	M12
	1 1/4	40	32	16	**727 701 209**	0.730	140	89	51	16	16	4	M16
	1 1/2	50	40	16	**727 701 210**	0.809	150	98	62	16	18	4	M16
	2	63	50	16	**727 701 211**	0.866	165	121	78	19	18	4	M16
	2 1/2	75	65	16	**727 701 212**	1.117	185	140	92	19	18	4	M16
	3	90	80	16	**727 701 213**	1.492	200	152	110	19	20	4	M16
	4	110	100	16	**727 701 214**	1.695	229	190	133	19	20	8	M16
*	6	160	150	16	**727 700 717**	3.491	285	241	178	22	26	8	M20
*	8	200	200	16	**727 700 719**	5.600	340	297	235	22	29	8	M20
*	8	225	200	16	**727 700 720**	5.533	340	297	238	22	29	8	M20
	10	250/280	250	10	* **727 701 321**	6.000	406	362	293	25	30	12	M24
	12	315	300	10	**727 701 322**	11.800	483	432	338	25	34	12	M24
	14	355	350	10	* **727 701 323**	17.900	540	476	376	29	42	12	M27
	16	400	400	10	* **727 701 324**	24.500	597	539	429	29	44	16	M27
	20	450/500	500	10	* **727 701 325**	33.600	712	635	540	32	53	20	M30

B





Backing flange PP-Steel For socket fusion systems Inch/ANSI

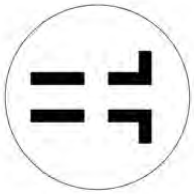
AL: number of holes

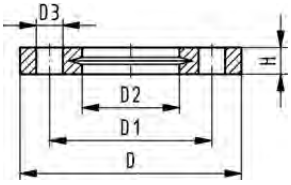
Model:

- **Bolt circle class 150**
- UV-resistant.

d (inch)	d (mm)	DN (mm)	PN (bar)	Part No.	weight (kg)	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	H (mm)	AL	SC
½	20	15	16	**727 701 206**	0.213	95	60	28	16	12	4	M12
¾	25	20	16	**727 701 207**	0.260	105	70	34	16	12	4	M12
1	32	25	16	**727 701 208**	0.416	115	79	42	16	16	4	M12
1 ¼	40	32	16	**727 701 209**	0.730	140	89	51	16	16	4	M16
1 ½	50	40	16	**727 701 210**	0.809	150	98	62	16	18	4	M16
2	63	50	16	**727 701 211**	0.866	165	121	78	19	18	4	M16
2 ½	75	65	16	**727 701 212**	1.117	185	140	92	19	18	4	M16
3	90	80	16	**727 701 213**	1.492	200	152	110	19	20	4	M16
4	110	100	16	**727 701 214**	1.695	229	190	133	19	20	8	M16
6	160	150	16	**727 700 817**	3.167	285	241	190	22	26	8	M20
8	200	200	16	**727 700 819**	6.143	340	297	226	22	29	8	M20
8	225	200	16	**727 700 820**	4.448	340	297	250	22	29	8	M20

B





V-Flange Ring
For Butt Fusion Systems

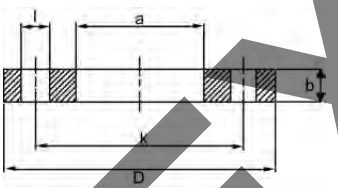
Model:

- Full-plastic flange PP-GF (30% glass-fiber reinforced), with V-groove which applies force evenly on collar
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759
- **Bolt circle class 150**
- UV-resistant

AL: number of holes
All sizes suitable for butt fusion. Sizes 20-75mm also for socket fusion.
Combined version, metric-ANSI

Size (inch)	d (mm)	Part No.	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	H (mm)	AL	SC
½	20	**727 701 406**	95	60	28	16	16	4	M12
¾	25	**727 701 407**	105	70	34	16	17	4	M12
1	32	**727 701 408**	115	79	42	16	18	4	M12
1 ¼	40	**727 701 409**	140	89	51	16	20	4	M16
1 ½	50	**727 701 410**	150	98	62	16	22	4	M16
2	63	**727 701 411**	165	121	78	19	24	4	M16
2 ½	75	**727 701 412**	185	140	92	19	26	4	M16
3	90	**727 701 513**	200	152	108	19	27	4	M16
4	110	**727 701 514**	229	190	128	19	28	8	M16
6	160	**727 700 517**	285	240	178	22	32	8	M20
8	200	**727 700 519**	340	295	235	22	34	8	M20
8	225	**727 700 520**	340	295	238	22	34	8	M20
10	250	***727 701 521**	406	362	288	26	38	12	M20
12	315	**727 701 523**	483	432	338	26	42	12	M20

B

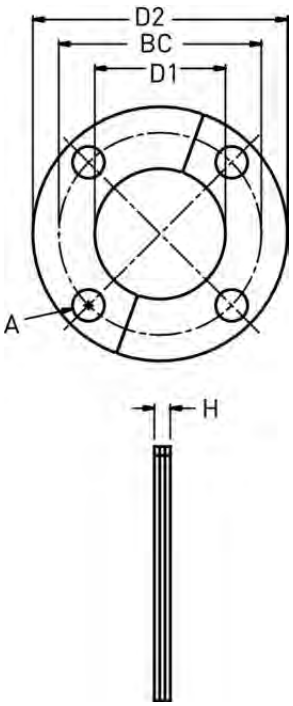


PVDF Coated Steel for Butt Fusion Systems
Inch/ANSI

Material: PVDF blue coated steel
Bolt holes drilled in accordance with ANSI B16.5, Class 150 pattern

d (mm)	Size (inch)	Part No.	D (inch)	a (inch)	k (inch)	b (inch)	l (inch)	Bolt Holes
20	½	***155 701 806**	3.50	1.10	2.36	0.28	0.63	4
25	¾	***155 701 807**	3.86	1.34	2.76	0.28	0.63	4
32	1	***155 701 808**	4.25	1.65	3.11	0.28	0.63	4
40	1 ¼	***155 701 809**	4.61	2.01	3.50	0.32	0.63	4
50	1 ½	***155 701 810**	5.00	2.44	3.86	0.32	0.63	4
63	2	***155 701 811**	5.98	3.07	4.76	0.39	0.75	4
75	2 ½	***155 701 812**	7.01	3.62	5.51	0.39	0.75	4
90	3	***155 701 813**	7.48	4.33	5.98	0.39	0.75	4
110	4	***155 703 814**	9.02	5.24	7.48	0.39	0.75	8
160	6	***155 701 917**	10.98	7.05	9.48	0.50	0.88	8
200	8	***155 701 919**	13.50	9.30	11.73	0.63	0.88	8
225	9	***155 701 920**	13.50	9.42	11.73	0.63	0.88	8
250	10	***155 701 921**	16.00	11.35	14.25	0.88	0.88	12
315	12	***155 701 923**	19.00	13.31	17.00	1.00	1.00	12
355	14	***155 701 924**	21.00	14.80	18.75	1.00	1.00	12
400	16	***155 701 925**	23.50	16.93	21.25	1.13	1.13	16

B



Flange Backing Ring, Two-Piece Corrosion Resistant 316 SS

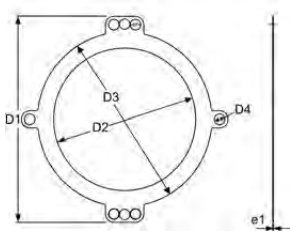
The split ring design allows a flange ring to be added after a flange adapter has been joined to the pipe for retrofit purposes. Ring is made from high grade 316 SS, with excellent corrosion resistance properties.

d (mm)	Size (inch)	Part No.	weight (lb)	D1 (mm)	D2 (mm)	H (mm)	B.C (mm)	A (mm)	Bolt Holes
20	½	* 150 701 806	0.860	28	89	10	60	16	4
25	¾	* 150 701 807	1.301	34	98	10	70	16	4
32	1	* 150 701 808	0.002	42	108	10	79	16	4
40	1 ¼	* 150 701 809	0.002	51	117	10	89	16	4
50	1 ½	* 150 701 810	1.598	62	127	10	98	16	4
63	2	* 150 701 811	0.002	78	152	10	121	19	4
75	2 ½	* 150 701 812	3.031	92	178	10	140	19	4
90	3	* 150 701 813	0.002	110	190	10	152	19	4
110	4	* 150 701 814	0.002	133	229	10	190	19	8
160	6	* 150 701 817	0.002	179	279	19	241	22	8
200	8	* 150 701 819	17.600	236	343	19	298	22	8
225	9	* 150 701 820	17.200	239	343	19	298	22	8
250	10	* 150 701 821	35.300	288	406	29	362	22	12
315	12	* 150 701 823	51.000	338	483	29	432	25	12

Gaskets

B

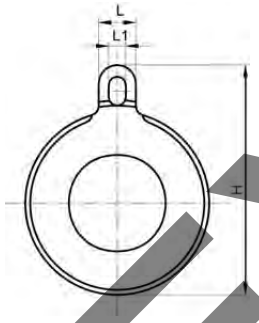
SYGEF Plus 355-450 ePTFE Gasket ANSI



d (mm)	Pipe Size (inch)	Part No.	weight (lb)	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)	e1 (mm)
355	14	* 155 400 674	0.661	524	329	430	48	3.2
400	16	* 155 400 675	0.882	587	396	482	51	3.2
450	18	* 155 400 676	1.102	625	432	530	51	3.2

B

SYGEF HP Gasket



Model:

- For Use with Steel Flange Rings
- * Non-Returnable/Non-Cancelable

d (mm)	Pipe Size (inch)	Part No.	weight (lb)	H (inch)	L (inch)	L1 (inch)
25	3/4	* 731 400 753	0.044	2.99	0.79	0.51
32	1	* 731 400 755	0.053	3.58	0.98	0.63
40	1 1/4	* 731 400 757	0.079	3.98	0.98	0.63
50	1 1/2	* 731 400 759	0.084	4.33	0.98	0.63
63	2	* 731 400 760	0.132	5.04	0.98	0.63
75	2 1/2	* 731 400 761	0.179	5.83	0.98	0.63
90	3	* 731 400 763	0.132	6.34	0.98	0.63
110	4	* 731 400 764	0.220	7.44	0.98	0.63
160	6	* 731 400 667	0.309	9.61	1.18	0.79
200/225	8/9	* 731 400 670	0.441	11.81	1.18	0.79
250	10	* 731 400 671	0.683	14.17	1.38	0.87
315	12	* 731 400 672	0.650	16.50	1.38	0.87

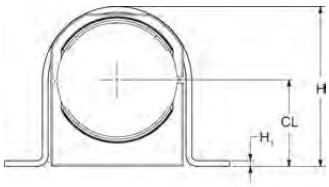
A

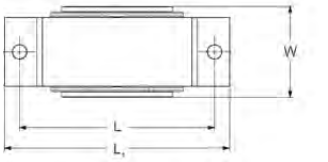
Sanitary Gasket

- Silicone material
- Gaskets are high purity cleaned and double bagged. Suitable for SYGEF PVDF and PROGEF PP high purity and standard sanitary connections.

Size (mm)	Tube (3A) (inch)	Part No.
20	¾	* 747 460 005
25	1	* 155 223 768
32/40	1 ½	* 747 460 008
50	2	* 155 223 771
63	2 ½	* 155 223 772

B





Stress Less Pipe Support - Metric

First pipe support system especially designed to eliminate stress transfer to pipe due to thermal expansion or seismic events. Has engineered, designed gap of 3mm between support insert and pipe OD. Excessive force can never be exerted on the pipe regardless of tightening of bolts.

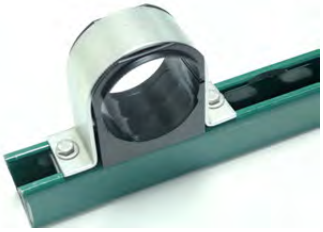
- For metric size pipe 20mm – 225mm
- Includes steel hoop and plastic support insert
- Support insert is HDPE, black, UV resistant
- Hoop is trivalent gold chromium-coated galvanized steel, compliant with ASTM B633 Type VI
- Mounts to any flat surface or standard strut support
- Mounting holes in bracket for bolts size "SC" (not included)
- Sold in pack quantities SP

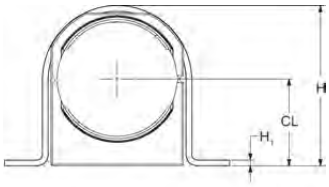
Part No.	SP	Size (mm)	CL (mm)	t (mm)	H (mm)	L (mm)	L1 (mm)	w (mm)	SC
155 484 500	10	20	16	3	41	66	83	50	1/4"
155 484 501	10	25	19	3	47	71	88	50	1/4"
155 484 502	10	32	22	3	56	78	91	50	1/4"
155 484 503	10	40	26	3	58	86	102	50	1/4"
155 484 504	10	50	30	3	69	94	111	50	1/4"
155 484 505	10	63	37	3	89	107	124	50	1/4"
155 484 506	10	75	60	3	108	119	135	50	1/4"
155 484 507	10	90	60	3	113	134	151	50	1/4"
155 484 508	5	110	70	3	136	159	175	50	3/8"
155 484 509	5	160	100	5	193	213	229	50	3/8"
155 484 510	5	225	140	5	262	272	288	50	3/8"

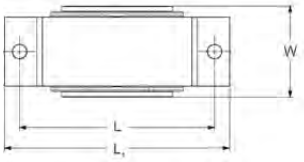
Stress Less Pipe Support - IPS

First pipe support system especially designed to eliminate stress transfer to pipe due to thermal expansion or seismic events. Has engineered, designed gap of 3mm between support insert and pipe OD. Excessive force can never be exerted on the pipe regardless of tightening of bolts.

- For IPS size pipe 1/2" - 8"
- Includes steel hoop and plastic support insert
- Support insert is HDPE, gray, UV resistant
- Hoop is trivalent gold chromium-coated galvanized steel, compliant with ASTM B633 Type VI
- Mounts to any flat surface or standard strut support
- Mounting holes in bracket for bolts size "SC" (not included)
- Sold in pack quantities SP

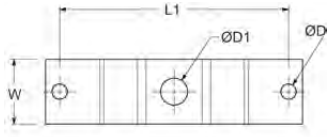


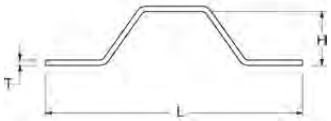




Part No.	SP	Size (inch)	CL (inch)	t (inch)	H (inch)	L (inch)	L1 (inch)	W (inch)	SC
155 484 520	10	½	0.63	0.12	1.61	2.60	3.27	1.97	1/4"
155 484 521	10	¾	0.75	0.12	1.85	2.80	3.46	1.97	1/4"
155 484 522	10	1	0.87	0.12	2.20	3.07	3.58	1.97	1/4"
155 484 523	10	1 ¼	1.02	0.12	2.28	3.39	4.02	1.97	1/4"
155 484 524	10	1 ½	1.18	0.12	2.72	3.70	4.37	1.97	1/4"
155 484 525	10	2	1.46	0.12	3.50	4.21	4.88	1.97	1/4"
155 484 526	10	2 ½	2.36	0.12	4.25	4.69	5.31	1.97	1/4"
155 484 527	10	3	2.36	0.12	4.45	5.28	5.94	1.97	1/4"
155 484 528	5	4	2.76	0.12	5.35	6.26	6.89	1.97	3/8"
155 484 529	5	6	3.94	0.19	7.60	8.39	9.02	1.97	3/8"
155 484 530	5	8	5.51	0.19	10.31	10.71	11.34	1.97	3/8"

B





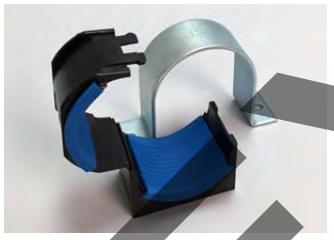
Stress Less Pipe Support - Clevis Hanger Kit

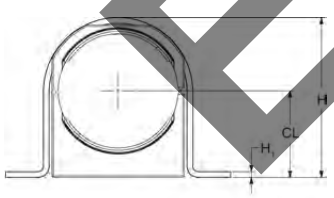
First pipe support system especially designed to eliminate stress transfer to pipe due to thermal expansion or seismic events. Has engineered, designed gap of 3mm between support insert and pipe OD. Excessive force can never be exerted on the pipe regardless of tightening of bolts.

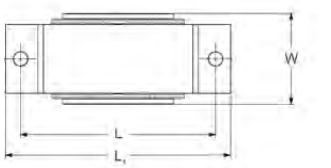
- Clevis Hanger Kit includes 1 hanging bracket, 2 socket cap screws, 4 washers, 2 hex nuts
- For use with metric or IPS Stress Less Pipe Supports
- Does not include pipe support insert or bracket
- Bracket is trivalent gold chromium-coated galvanized steel, compliant with ASTM B633 Type VI
- Hardware is stainless steel
- SC = bolt size
- Top hole D1 (see sketch) is not tapped
- Sold in pack quantities SP

Part No.	SP	Size	L (mm)	L1 (mm)	H (mm)	T (mm)	w (mm)	D1 (mm)	D (mm)	SC
155 484 540	5	20mm (1/2")	83	66	32	3	38	12.7	8	1/4"
155 484 541	5	25mm (3/4")	88	71	32	3	38	12.7	8	1/4"
155 484 542	5	32mm (1")	95	78	32	3	38	12.7	8	1/4"
155 484 543	5	40mm (1-1/4")	103	86	32	3	38	12.7	8	1/4"
155 484 544	5	50mm (1-1/2")	111	94	32	3	38	12.7	8	1/4"
155 484 545	5	63mm (2")	124	107	32	3	38	12.7	8	1/4"
155 484 546	5	75mm (2-1/2")	136	119	32	3	38	12.7	8	1/4"
155 484 547	5	90mm (3")	151	134	32	3	38	12.7	8	1/4"
155 484 548	5	110mm (4")	176	159	32	3	38	12.7	10	3/8"
155 484 549	5	160mm (6")	230	213	32	5	38	12.7	10	3/8"
155 484 550	5	225mm (8")	288	272	32	5	38	12.7	10	3/8"

B





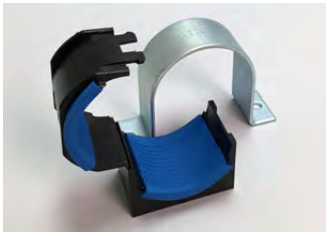


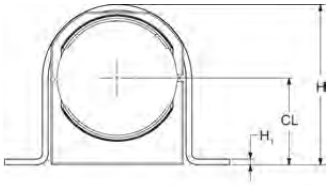
Stress Less Pipe Support - Vertical Metric

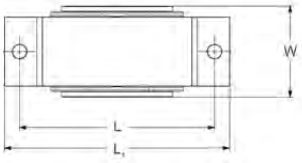
- For use as a vertical pipe support. Includes elastomeric insert strips in support to provide friction and snug fit against pipe.
- Bracket provides strength for support during seismic or excessive loading events.
- For metric size pipe 20mm – 225mm
- Includes steel hoop and plastic support insert
- Support insert is HDPE, black, UV resistant
- Hoop is trivalent gold chromium-coated galvanized steel, compliant with ASTM B633 Type VI
- Mounts to any flat surface or standard strut support
- Mounting holes in bracket for bolts size "SC" (not included)
- Sold in pack quantities SP

Part No.	SP	Size (mm)	CL (mm)	t (mm)	H (mm)	L (mm)	L1 (mm)	w (mm)	SC
155 484 560	10	20	16	3	41	66	83	50	1/4"
155 484 561	10	25	19	3	47	71	88	50	1/4"
155 484 562	10	32	22	3	56	78	91	50	1/4"
155 484 563	10	40	26	3	58	86	102	50	1/4"
155 484 564	10	50	30	3	69	94	111	50	1/4"
155 484 565	10	63	37	3	89	107	124	50	1/4"
155 484 566	10	75	60	3	108	119	135	50	1/4"
155 484 567	10	90	60	3	113	134	151	50	1/4"
155 484 568	5	110	70	3	136	159	175	50	3/8"
155 484 569	5	160	100	5	193	213	229	50	3/8"
155 484 570	5	225	140	5	262	272	288	50	3/8"

B





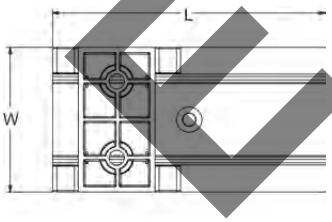


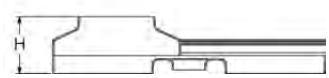
Stress Less Pipe Support - Vertical IPS

- For use as a vertical pipe support. Includes elastomeric insert strips in support to provide friction and snug fit against pipe.
- Bracket provides strength for support during seismic or excessive loading events.
- For IPS size pipe 1/2" - 8"
- Includes steel hoop and plastic support insert
- Support insert is HDPE, gray, UV resistant
- Hoop is trivalent gold chromium-coated galvanized steel, compliant with ASTM B633 Type VI
- Mounts to any flat surface or standard strut support
- Mounting holes in bracket for bolts size "SC" (not included)
- Sold in pack quantities SP

Part No.	SP	Size (inch)	CL (inch)	t (inch)	H (inch)	L (inch)	L1 (inch)	W (inch)	SC
155 484 580	10	½	0.63	0.12	1.61	2.60	3.27	1.97	1/4"
155 484 581	10	¾	0.75	0.12	1.85	2.80	3.46	1.97	1/4"
155 484 582	10	1	0.87	0.12	2.20	3.07	3.58	1.97	1/4"
155 484 583	10	1 ¼	1.02	0.12	2.28	3.39	4.02	1.97	1/4"
155 484 584	10	1 ½	1.18	0.12	2.72	3.70	4.37	1.97	1/4"
155 484 585	10	2	1.46	0.12	3.50	4.21	4.88	1.97	1/4"
155 484 586	10	2 ½	2.36	0.12	4.25	4.69	5.31	1.97	1/4"
155 484 587	10	3	2.36	0.12	4.45	5.28	5.94	1.97	1/4"
155 484 588	5	4	2.76	0.12	5.35	6.26	6.89	1.97	3/8"
155 484 589	5	6	3.94	0.19	7.60	8.39	9.02	1.97	3/8"
155 484 590	5	8	5.51	0.19	10.31	10.71	11.34	1.97	3/8"

B



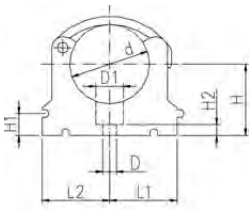


Stress Less Valve Support

- Designed to properly support GF valves when the connected piping moves, due to thermal expansion and contraction. Smooth linear movement with very low friction. Helps ensure the full design life of piping systems by eliminating stress points.
- For GF metric and IPS valves with integrated support bases. Types 546, 523, 543 horizontal and 5-series diaphragm valves. Manual and actuated.
- Sizes 3/8" – 2" (16mm – 63mm)
- Can be mounted on any flat surface or strut support (shown in image, valve not included)
- Valve support includes base made of PP glass reinforced, and upper slider made of PP. Both are black and UV resistant
- Supplied with 2 stainless steel hex socket screws for mounting valve to upper slider component

Part No.	Size	H (mm)	w (mm)	L (mm)
155 484 120	16-32mm (3/8 - 1")	43	52	160
155 484 121	40-63mm (1-1/4 - 2")	33	85	160

Pipe Bracket Type 061, PP metric



Model:

- Material: Clip and safety clip PP black, UV resistant, bolts galvanized
- d16 - d63: Height designed for Ball Valve Type 546 and 543
- **Minimum order quantity: standard packagings SP**

d (inch)	d (mm)	Part No.
	16	* 167 061 035
	20	* 167 061 036
	25	* 167 061 037
	32	* 167 061 038
	40	* 167 061 039
	50	* 167 061 040
	63	* 167 061 041
2 ½	75	* 167 061 012
3	90	* 167 061 013
4	110	* 167 061 014
	160	* 167 061 017

H1 (mm)	H3 (mm)	closest inch (inch)	D1 (mm)	HoH +/- 2mm (mm)	L1 (mm)	D (mm)	H (mm)	L2 (mm)	H2 (mm)	SC
10	16	⅜	11	17.0	14	6	27	17	6	M5
10	16	½	11	21.4	17	6	27	19	6	M5
10	16	¾	11	26.9	19	6	30	22	6	M5
10	16	1	11	36.7	24	6	36	27	6	M5
10	22	1 ¼	14	44.4	34	7	44	34	7	M6
10	22	1 ½	14	52.3	37	7	51	37	7	M6
10	25	2	17	66.7	45	9	64	45	10	M8
10	25	2 ½	17		52	9	58	52	10	M8
10	28	3	17		65	9	65	65	10	M8
10	28	4	17		79	9	75	79	10	M8
10	32	6	17		109	9	108	109	10	M8

B

Spacer Type 061, PP

Model:

- For pipe clips Type 061/061H, PP black, UV resistant
- **Minimum order quantity: standard packagings SP**

Inch (inch)	d (mm)	Part No.	HoH +/- 2mm (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	H1 (mm)	H2 (mm)	SC
⅜	16	* 167 061 155	17.0	6	14	17	20	10	16	M4
½	20	* 167 061 156	21.4	6	17	19	20	10	16	M4
¾	25	* 167 061 157	26.9	6	19	22	20	10	16	M4
1	32	* 167 061 158	36.7	6	24	27	20	10	16	M4
1 ¼	40	* 167 061 159	44.4	7	34	34	20	10	22	M4
1 ½	50	* 167 061 160	52.3	7	37	37	20	10	22	M4
2	63	* 167 061 161	66.7	9	45	45	20	10	25	M4
2 ½	75	* 167 061 162	81.2	9	52	52	20	10	25	M4
3	90	* 167 061 163	100.0	9	65	65	20	10	28	M4
4	110	* 167 061 164	127.3	9	79	79	20	10	28	M4
6	160	* 167 061 167	185.1	9	109	109	20	10	32	M4

B

Pipe Clips Type 060, PP metric

Model:

- Material: Clip and safety clip PP black, UV resistant, bolts galvanized
- **Minimum order quantity: standard packaging SP or gross packaging GP**
- Accidental opening of the safety clip is not possible
- Clip and safety clip are not assembled in the packaging
- Pipes with flanges can be installed directly

d (inch)	d (mm)	Part No.	closest inch (inch)	D (mm)	L (mm)	L1 (mm)	H (mm)	H1 (mm)	H2 (mm)	SC
3	90	* 167 060 038	3	9	89	71	105	15	33	M8
	110	* 167 060 039	4	9	94	80	115	15	33	M8
	160	* 167 060 042	6	11	131	107	148	20	35	M10
	200	* 167 060 019	8	13	152	120	175	25	39	M12
	225	* 167 060 020	8	13	165	132	175	25	39	M12
	250	* 167 060 021	9	13	183	143	200	25	39	M12
	315	* 167 060 023	12	13	219	172	225	25	39	M12
	355	* 167 060 024	14	17	275	209	258	30	50	M16
	400	* 167 060 025	16	17	300	228	288	30	50	M16

Clamps

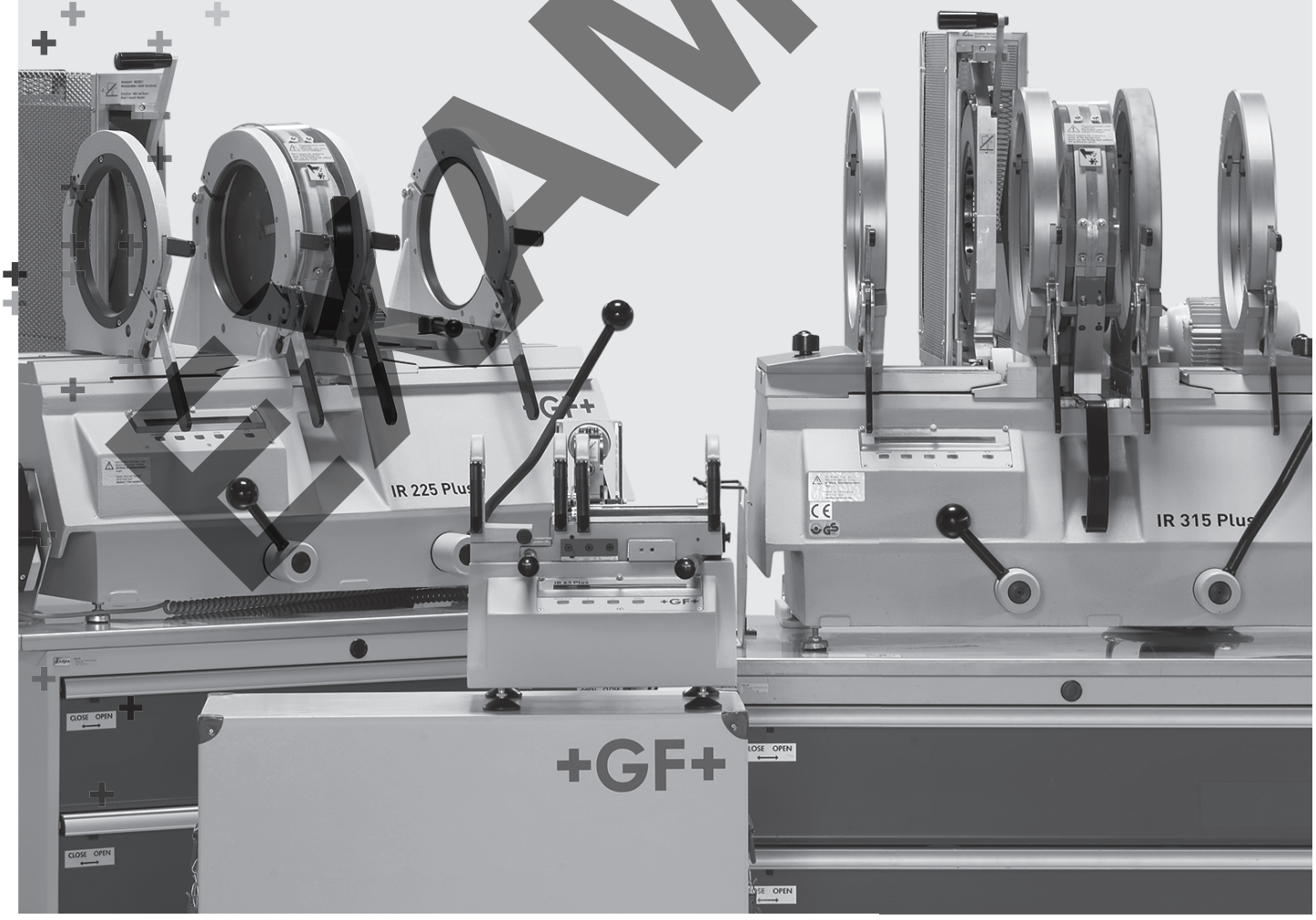
B

Sanitary Clamp

Size (inch)	Part No.
½	* 150 598 500
1	* 150 598 501
2	* 150 598 503
2 ½	* 150 598 504

Section 8

Fusion Machines and Tools



Fusion Technology Product Range

	Electrofusion			Socket		Contact Butt or Socket Manual	Contact Butt					Infrared (IR)						Bead and Crevice Free
	Electro Plus	MSA 250	MSA 330/340	MSE Hand Tool	SG-125	SG-160	MC 110	TM 160	TM 315	TM 400	TM 630	IR 63 Plus®	IR 110 Plus®	IR 110 A	IR 225 Plus®	IR 315 Plus®	IR 315 A	BCF® Plus
PROGEF® Standard	N/A	N/A	20–500 electro-fusion couplings	16–110	16–125	32–160	20–110	63-160	90–315	125–400	315–630	20–63	20–110	20–110	63–225	N/A	110–315	N/A
PROGEF® Natural	N/A	N/A	N/A	N/A	N/A	32–90	20–90	N/A	N/A	N/A	N/A	20–63	20–90	20–110	75–90	N/A	N/A	20–90
PPro-Seal™	½"–2"	½"–2"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SYGEF® Plus	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20–63	20–110	20–110	63–225	250–315	110–315	20–110
SYGEF®	N/A	N/A	N/A	16–63	16–63	32–160	N/A	N/A	N/A	N/A	N/A	20–63	20–110	20–110	63–225	250–315	110–315	20–110

Table of contents		Page
	IR Fusion Tools	288
	BCF Fusion Tools	300
	Butt Fusion Tools	309
	Electrofusion Tools	321
	Cutting, Chamfering and Peeling Tools	325
	Rental Equipment	332

IR Plus® Infrared Butt Fusion Technology

Features

- Non-contact Infrared heating
- Completely controlled and repeatable fusion process using our proven overlap system
- Minimized and defined weld bead
- Proven reliability and safe high purity fusion system
- Controlled cooling process based on ambient and bead temperature
- Electronic downloading of fusion data
- Integrated interface for label and standard printers (hard copy printout)

Infared (IR) Plus® Fusion Process Times*

Machine	Product	20	25	32	40	50	63	75	90	110	160	200	225	250	315
IR-63 Plus®	PROGEF® Standard	2:23	2:53	3:41	4:30	5:36	6:59								
	PROGEF® Natural PN 10	2:28	3:19	3:51	4:41	5:50	7:17								
	SYGEF® PN 16	1:48	1:48	2:32	2:32	3:23	3:27								
IR-225 Plus®	PROGEF® Standard						5:00	6:00	7:30	9:00	12:30	15:30	17:30		
	PROGEF® Natural PN 6						N/A	6:00	7:00	8:00					
	SYGEF® PN 10						-	-	3:30	3:45	4:00	5:00	5:30		
	SYGEF® PN 16						3:00	3:00	3:30	4:30					
IR-315 Plus®	SYGEF® PN 10													8:00	10:00

*All times in minutes:seconds and are approximate based on 68°F /20°C ambient temperature. Times only account for heating, joining and cooling of products per the GF Fusion Training Program.

IR63 Plus® Fusion Joining Machine and Accessories

D

IR-63 Plus® Fully-Equipped Machine

Model:

- Clamping inserts d 20-63 mm (8 pcs. per dimension)
- End caps PE d 20-63 mm (4 pcs. per dimension)
- Power supply cable 230 V (1 pcs.)
- Extension cable for remote weld device (1 pcs.)
- Extension cable for heater (1 pcs.)
- Extension cable for facing tool (1 pcs.)
- Cleaning brush No. 8 (1 pcs.)
- Hexagon key 3 mm (1 pcs.)
- Hexagon key 4 mm (1 pcs.)
- Heater protection shield (1 pcs.)
- Clamping unit extension (8 pcs.)
- Socket wrench (facing blades) (1 pcs.)
- Screw driver, Size 0 (1 pcs.)
- Accessory Tray (1 pcs.)
- Manual (1 pcs.)
- Fully-equipped fusion jointing machine for welding SYGEF Standard, SYGEF Plus, PROGEF Standard, PROGEF Natural, PROGEF Plus, PE 100, PFA in dimensions d 20-63 mm with integrated remote welding unit, 2 USB interfaces, monochrome display with icons and 12 languages.
- 1-phase AC (50/60 Hz) 230 V L/N/PE
- Machine housing complete (1 pcs.)
- Heater assembly (1 pcs.)
- Remote weld device (1 pcs.)
- Facing tool (1 pcs.)
- Transport box (1 pcs.)
- Pipe stop (1 pcs.)

d-d (mm)	Part No.	weight (lb)
20 - 63	* **790 131 005**	110.231

D

Power Converter

Description	Part No.
Power Converter 115/230V AC	* **790 103 095**

D

Clamping Inserts

- The clamping inserts are different for each dimension. They are used to clamp and position the pipe components.

	d (mm)	Part No.	weight (lb)	Pieces
*	25	* **150 131 039**	0.198	1
*	32	* **150 131 040**	0.115	1
*	40	* **150 131 041**	0.163	1
*	50	* **150 131 042**	0.220	1
*	20	* **150 131 038**	0.309	1
*	63	* **150 131 043**	0.077	1

D

Clamping Inserts, IPS

- The clamping inserts are different for each dimension. They are used to clamp and position the pipe components.

d (inch)	Part No.	weight (lb)	Pieces
¼	* 790 131 446	0.126	1
½	* 790 131 447	0.121	1
¾	* 790 131 448	0.117	1
1	* 790 131 449	0.112	1
1 ½	* 150 131 042	0.220	1
2	* 790 131 450	0.090	1

D

Replacement Blades for Facing Tool

- A set includes two facing knives. Each facing knife has four blades. The blade may be turned three times before it must be replaced.

d-d (mm)	Part No.	Pieces
20 - 63	* 790 131 045	2

D

PE Pipe End Caps

- A set includes 4 end caps. The end caps are different for each dimension. The ends of the pipe **must** be closed when welding. The caps prevent heat loss due to airflow in the fusion zone and guarantee optimum fusion results of the pipe components.

d (mm)	Part No.	Pieces
20	* 790 131 030	4
25	* 790 131 031	4
32	* 790 131 032	4
40	* 790 131 033	4
50	* 790 131 034	4
63	* 790 131 035	4

D

Heater Shield

Description	Part No.
Heater Shield IR63	* 790 131 051

D

Extension Cable clamping carriage

- Extension cable for remote fusion.

d-d (mm)	Weight (kg)	Length (m)	Part No.	weight (lb)	Pieces
20 - 63	0.700	5	* 790 131 047	1.543	1

D

Extension Cable facing tool

- Extension cable for remote fusion.

d-d (mm)	Length (m)	Part No.	Pieces
20 - 63	5	* 790 131 048	1

D

Extension Cable heater

- Extension cable for remote fusion.

d-d (mm)	Length (m)	Part No.	Pieces
20 - 63	5	* 790 131 049	1

D

Power Cord IR63

Description	Part No.
Power Cord IR63	* 150 131 246

D

Pipe Stop

- The pipe stop defines the allowance when the pipes are clamped into position.

d-d (mm)	Part No.	weight (kg)	Pieces
20 - 63	* 790 131 046	0.430	1

D

Adjustment Tools

Description	Part No.	weight (lb)
Allen Wrench 3mm	* 150 900 567	2.866
Allen Wrench 4mm	* 790 131 264	0.086
T-10 Torx Wrench	* 790 131 129	0.004

IR-110 Plus® Fusion Joining Machine and Accessories

D

IR-110 Plus Fully-Equipped Machine

Model:

- Fully-equipped fusion joining machine for welding SYGEF® Standard, SYGEF® Plus, PROGEF® Standard, PROGEF® Natural, PROGEF® Plus, PE 100 (PFA/ECTFE on request) in dimensions d 20-110 mm, 2 USB interfaces, monochrome display with icons and 12 languages.
- 1-phase AC (50/60 Hz) 230 V L/N/PE
- Machine housing complete (1 pcs.)
- Heater and facing tool assembly (1 pcs.)
- Transport box (1 pcs.)
- Pipe stop (1 pcs.)
- Clamping inserts d 20-90 mm (8 pcs. per dimension)
- End caps PE d 20-110 mm (4 pcs. per dimension)
- Power supply cable 230 V (1 pcs.)
- Cleaning brush No. 8 (1 pcs.)
- Hexagon keys 4 mm (1 pcs.), 5 mm (1 pcs.), 6 mm (1 pcs.)
- Socket wrench (facing blades) (1 pcs.)
- Accessory Tray (1 pcs.)
- Manual (1 pcs.)

d-d (mm)	Part No.
20 - 110	*** 790 132 001**

D

IR-110 A Automated Fusion Machine

Model:

- Fully equipped automated infrared fusion machine with integrated work table, for use in clean room conditions
- Welds SYGEF PVDF (HP / Standard), PROGEF PP (Standard / Natural), PE100 ecoFIT
- Weld dimensions d20-110mm
- User friendly, 12.1" touch screen interface with several languages
- 4 USB interfaces, LAN Ethernet interface, 230V output
- Automated facer, clamping slide and heater
- Integrated video camera and temperature sensors
- Movable clamping units
- Clamping inserts d20-90mm (8 pcs per dimension)
- End caps PE d 20-110 mm (4 pcs. per dimension)
- Shavings collection tray
- Transport box with integrated pallet
- 1-phase AC (50/60 Hz) 230 V L/N/PE
- Power supply cable 230V EU Standard
- Torx key for facing blades (KW3)
- Cleaning brush
- Label printer
- Instruction manual

d-d (mm)	Part No.	weight (kg)
20 - 110	**790 164 001**	250.000

D

Clamping inserts

- The clamping inserts are different for each dimension. They are used to clamp and position the pipe components.

d (mm)	Part No.	Pieces
20	*** 790 132 051**	1
25	*** 790 132 052**	1
32	*** 790 132 053**	1
40	*** 790 132 054**	1

table continued on the next page

D

d (mm)	Part No.	Pieces
50	* 790 132 055	1
63	* 790 132 156	1
75	* 790 132 157	1
90	* 790 132 158	1

D

Clamping inserts PFA Sch. 40 rigid pipe

- The clamping inserts are different for each dimension. They are used to clamp and position the pipe components.

d (inch)	Part No.	Pieces
¼	* 790 132 062	1
½	* 790 132 063	1
¾	* 790 132 064	1
1	* 790 132 065	1
2	* 790 132 066	1

D

Replacement Blades for Facing Tool

- A set includes two facing knives. Each facing knife has four blades. The blade may be turned three times before it must be replaced.

d-d (mm)	Part No.	Pieces
20 - 110	* 790 132 061	2

D

PE Pipe End Caps

- A set includes 4 end caps. The end caps are different for each dimension. The ends of the pipe **must** be closed when welding. The caps prevent heat loss due to airflow in the fusion zone and guarantee optimum fusion results of the pipe components.

d (mm)	Part No.	Pieces
20	* 790 131 030	4
25	* 790 131 031	4
32	* 790 131 032	4
40	* 790 131 033	4
50	* 790 131 034	4
63	* 790 131 035	4
75	* 790 133 036	4
90	* 790 133 037	4
110	* 790 133 038	4

D

Pipe Stop

- The pipe stop defines the allowance when the pipes are clamped into position.

d-d (mm)	Part No.	Pieces
20 - 110	* 790 132 059	1

D

Torx key

- For facing knives on the IR-110 A Automatic.

Description	Part No.
KW 3	* 790 131 129

IR-225 Plus® Fusion Joining Machine and Accessories

D

IR-225 Plus Fully-Equipped Machine with HP Working Table (HP = High Purity)

Model:

- Fully-equipped fusion jointing machine for welding SYGEF Standard, SYGEF Plus, PROGEF Standard, PROGEF Natural, PROGEF Plus, ecoFIT in dimensions d 63-225 mm, 2 USB interfaces, monochrome display with icons and 12 languages.
- Machine base (1 pcs.)
- Heater assembly (1 pcs.)
- Facing tool (1 pcs.)
- Movable clamping units (1 pcs.)
- Clamping inserts d 63-225 mm (8 pcs. per dimension)
- End caps PE d 63-225 mm (4 pcs. per dimension)
- Transportation lock (1 pcs.)
- Combination ring /open-jaw wrench 13 mm (1 pcs.)
- Cleaning brush (1 pcs.)
- Connecting cable 400V - 230V (1 pcs.)
- Ball for lever (1 pcs.)
- Manual (1 pcs.)
- 1-phase AC (50/60 Hz) 230V L/N/PE or 3-phase AC (50/60 Hz) 400V/230VL1/L2/L3/N/PE
- Working table, HP (1 pcs.)
- Pipe stop (1 pcs.)
- Hexagon key 5 mm (1 pcs.)
- Hexagon key 6 mm (1 pcs.)

d-d (mm)	Part No.
63 – 225	* 790 133 009

D

Pipe Clamp Inserts

- The clamping inserts are different for each dimension. They are used to clamp and position the pipe components.

d (mm)	Part No.	Pieces
63	* 790 133 026	1
75	* 790 133 027	1
90	* 790 133 028	1
110	* 790 133 029	1
160	* 790 133 032	1
200	* 790 133 033	1
225	* 790 133 034	1

D

Pipe Clamp Inserts, IPS

- The clamping inserts are different for each dimension. They are used to clamp and position the pipe components.

d (inch)	Part No.	Pieces
2	* 150 900 442	1
3	* 150 900 443	1
4	* 150 900 444	1
6	* 150 900 445	1
8	* 150 900 446	1

D

Replacement Blades for Facing Tool

- A set includes two facing knives. Each facing knife has four blades. The blade may be turned three times before it must be replaced.

d-d (mm)	Part No.	Pieces
63 - 225	* 790 133 046	2

D

Set of end caps

- A set includes 4 end caps. The end caps are different for each dimension. The ends of the pipe **must** be closed when welding. The caps prevent heat loss due to airflow in the fusion zone and guarantee optimum fusion results of the pipe components.

d (mm)	Part No.	Pieces
63	* 790 131 035	4
75	* 790 133 036	4
90	* 790 133 037	4
110	* 790 133 038	4
160	* 790 133 041	4
200	* 790 133 042	4
225	* 790 133 043	4

D

Pipe Stop

- The pipe stop defines the allowance when the pipes are clamped into position.

d-d (mm)	Part No.	Pieces
63 - 225	* 790 133 047	1

D

Adjustment Tools

Description	Part No.	weight (lb)
Allen Wrench 5mm	* 24387005	
Allen Wrench 6mm	* 790 101 238	0.176
T-25 Torx Wrench	* 790 133 577	0.020
Open Wrench 13mm	* 790 133 140	0.110

IR-315 Fusion Machine and Accessories

D

IR-315 Plus Fusion Machine

Model:

- Fully equipped infrared fusion machine with integrated work table, for use in clean room conditions
- Weld SYGEF PVDF HP / Standard
- Weld dimensions d225 - 315mm
- Monochrome display with icons and several languages
- 2 USB interfaces
- Heating and facing tools
- Clamping head with movable clamping units
- Cooling fan
- Clamping inserts for d225-280mm (8 pcs per dimension)
- End caps PE d20-63 mm (4 pcs. per dimension)
- Pipe Stop
- Transport box with integrated pallet (stainless steel)
- 1-phase AC (50 / 60 Hz), 230 V L/N/PE or 3-phase AC (50/60 Hz) 400 V / 230V L1/L2/L3/N/PE
- Connecting cable 400V - 230V
- Additional tools
- Label printer
- Instruction manual

d-d (mm)	Part No.	weight (kg)
225 - 315	**790 134 001**	466.000

D

IR-315 A Automated Fusion Machine

Model:

- Fully equipped automated infrared fusion machine and working table designed for industrial applications and clean room conditions
- Welding of PVDF SYGEF (Standard/Plus), PP PROGEF (Standard/Plus), PE100 ecoFIT (d≤d225 mm)
- Dimensions d110-315 mm
- Automated facer, clamping slide and heater
- Integrated cooling system
- User friendly, 12.1" touch screen interface with several languages
- 4 USB interfaces, LAN Ethernet interface, 230V output
- Integrated video camera and temperature sensors
- Clamping inserts d110-280 mm (8 pcs. per dimension)
- End caps PE d110-315 mm (4 pcs. per dimension)
- Transport cases with integrated Euro-pallet (fusion machine and working table)
- 3-phase AC (50/60 Hz) 400 V L1/L2/L3/N/PE
- Set of facing knives (2 pcs.)
- Torx key (T25) for facing knife
- Hexagon keys (10 mm + 8 mm)
- Fork key (36 mm)
- Cleaning brush
- Label printer (incl. ribbon 24 mm)
- Instruction manual

d-d (mm)	Part No.	weight (kg)
110 - 315	**790 165 001**	1070.000

D

Clamping inserts

- The clamping inserts are different for each dimension. They are used to clamp and position the pipe components.

d (mm)	Part No.	weight (kg)	Pieces
110	**790 165 010**	1.500	1
125	**790 165 011**	1.400	1
140	**790 165 012**	1.300	1
160	**790 165 013**	1.300	1
180	**790 165 014**	1.200	1
200	**790 165 015**	1.100	1
225	**790 165 016**	1.000	1
250	**790 165 017**	0.900	1
280	**790 165 018**	0.700	1

D

Set of end caps

- A set includes 4 end caps. The end caps are different for each dimension. The ends of the pipe **must** be closed when welding. The caps prevent heat loss due to airflow in the fusion zone and guarantee optimum fusion results of the pipe components.

d (mm)	Part No.	weight (kg)	Pieces
110	* **790 133 038**	0.180	4
125	**790 133 039**	0.150	4
140	**790 133 040**	0.180	4
160	* **790 133 041**	0.045	4
200	* **790 133 042**	0.080	4
225	* **790 133 043**	0.400	4
250	**790 134 151**	0.400	4
280	**790 134 152**	0.400	4
315	**790 134 153**	0.400	4

Set of facing knives

- A set includes two facing knives and ten screws. Each facing knife has four blades. In case of a blunt blade the facing knife may be turned three times before it must be replaced.

d-d (mm)	Part No.	weight (kg)	Pieces
110 - 315	**790 165 549**	0.100	2

D

Torx key

- For facing knives on the IR-110 A Automatic.

Description	Part No.	weight (kg)
T25	* **790 133 577**	0.009

Cleaning brush

Part No.	weight (kg)
790 133 198	0.055

Upgrade Programs for IR Plastic Fusion Joining Machines

D

IR Plus Upgrade Program

Description	Part No.	weight (lb)
Left Side Adjustable Clamping Station	* **790 131 110**	5.952
Right Side Adjustable Clamping Station	* **790 131 109**	4.828

D

IR 63 Plus Upgrade

In order to give you our existing IR-Plus customers the full benefit of GF fusion tool advantages, we offer a modification kit which enables a reconstruction of all existing IR-Plus machines.
The following modifications are included:
- 2 USB interfaces
- Monochrome display with icons
- New navigation panel
- operator guidance in 12 languages

The upgrade of the new IR-Plus components will be executed by Georg Fischer service centers in the USA (Irvine), Singapore and CSO Schaffhausen.

Part No.	weight (kg)	Type
* **790 131 124**	5.170	IR-63 Plus

D

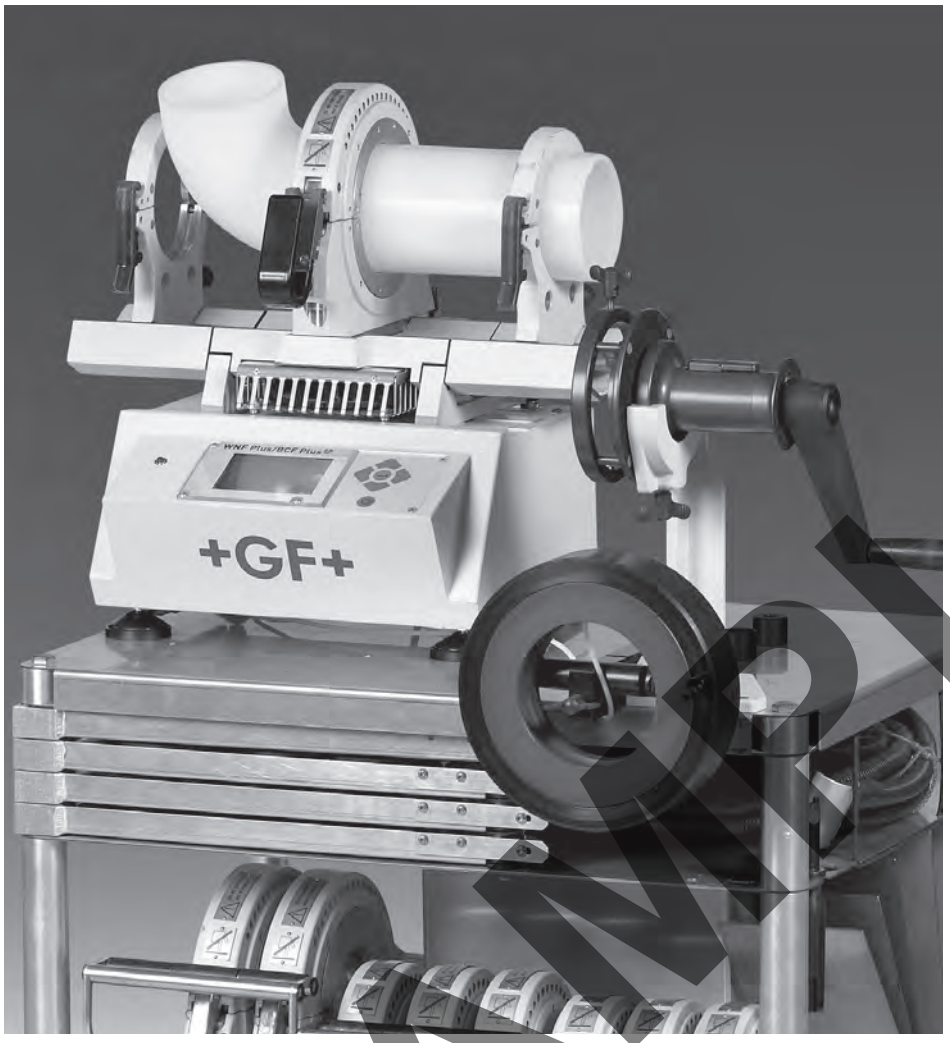
IR 225 Plus Upgrade

In order to give you our existing IR-Plus customers the full benefit of GF fusion tool advantages, we offer a modification kit which enables a reconstruction of all existing IR-Plus machines.
The following modifications are included:
- 2 USB interfaces
- Monochrome display with icons
- New navigation panel
- operator guidance in 12 languages

The upgrade of the new IR-Plus components will be executed by Georg Fischer service centers in the USA (Irvine), Singapore and CSO Schaffhausen.

Part No.	weight (kg)	Type
* **790 133 124**	6.650	IR-225 Plus

Bead and Crevice Free (BCF®) Plus Fusion



Evolution of Innovation

Unsurpassed fusion quality

- No beads
- No crevices
- No transitions
- No dead legs and no microorganic deposits
- Very high weld strength
- Very little stress in the fusion zone, therefore less prone to stress cracking
- Controlled and secured manufacturing processes
- Globally accepted certification training for quality control personnel and installers

BCF® Plus Fusion Process Times*

Machine	Product	20	25	32	40	50	63	75	90	110
BCF® Plus	PROGEF® Natural PN 6							13:00	17:00	24:00
	PROGEF® Natural PN 10	6:00	7:00	9:00	11:00	14:00	20:00	16:00	21:00	30:00
	SYGEF® PN 10								15:00	20:00
	SYGEF® PN 16	7:00	7:00	10:00	10:00	12:00	13:00	18:00	24:00	36:00

*All times in minutes:seconds and are approximate based on 68°F/20°C ambient temperature. Times only account for heating and cooling of products per the GF Fusion Training Program.

BCF Plus Plastic Fusion Joining Machine

D

BCF® Plus fully equipped machine d 20 - 63 mm

Fully-equipped machine for bead and crevice free jointing of SYGEF Standard, SYGEF Plus, PROGEF Natural of the dimensions
d 20-63 mm with integrated remote welding unit, 2 USB interfaces, monochrome display with icons and 12 languages.

Supply:
1-phase AC (50/60 Hz) 115 / 230 V L/N/PE

Delivery includes:

- Machine housing (1 pcs.) incl. remote welding unit (1 pcs.)
- Transport box (1 pcs.)
- HP working table (1 pcs.)
- Heating stations d 20-63 mm (6 pcs.)
- Clamping units small (2 pcs.) with clamping inserts d 20-63 mm (24 pcs.)
- Facing tool small (1 pcs.) with facing inserts d 20-63 mm (6 pcs.)
- Facing tool support (1 pcs.)
- Hose box (1 pcs.) incl. air hose (1 pcs.)
- Supporting tools small d 20-63 mm (2 pcs.)
- BReT (1 pcs.)
- Hose cutter (1 pcs.)
- Air hose reducer (6-4 mm) (1 pcs.), air hose socket (4-4 mm) (1 pcs.)
- Extension cable (1 pcs.)
- Manual (1 pcs.)

d-d (mm)	Part No.	SP	weight (kg)
20 - 63	* **790 121 002**	1	153.000

D

BCF® Plus fully-equipped machine d 20 -110 mm

Fully-equipped machine for bead and crevice free jointing of SYGEF Standard, SYGEF Plus, PROGEF Natural of the dimensions d 20-110 mm with integrated remote welding unit. Bladders to be ordered separately.
Supply:
1-phase AC (50/60 Hz) 115 / 230 V L/N/PE
Delivery includes:

- Machine housing (1 pcs.) incl. remote welding unit (1 pcs.)
- Transport box (1 pcs.)
- HP working table (1 pcs.)
- Heating stations d 20-110 mm (9 pcs.)
- Clamping units small (2 pcs.) with clamping inserts d 20-63 mm (24 pcs.)
- Clamping units big (2 pcs.) with clamping inserts d 75-110 mm (12 pcs.)
- Adapter for clamping unit d 75-110 mm (2 pcs.)
- Facing tool small (1 pcs.) with facing inserts d 20-63 mm (6 pcs.)
- Facing tool big (1 pcs.) with facing inserts d 75-110 mm (3 pcs.)
- Facing tool support (1 pcs.)
- Hose box (1 pcs.) incl. air hose (1 pcs.)
- Supporting tools small d 20-63 mm (2 pcs.)
- Supporting tools big d 75-110 mm (2 pcs.)
- BReT (1 pcs.)
- Hose cutter (1 pcs.)
- Air hose reducer (6-4 mm) (1 pcs.), air hose socket (4-4 mm) (1 pcs.)
- Extension cable (1 pcs.)
- Manual (1 pcs.)

d-d (mm)	Part No.	SP	weight (kg)
20 - 110	* 790 121 001	1	188.000

D

BCF Plus Large Dimension Package d75-110mm

- Heater heads not included
- Adapter for clamping unit d 75-110 mm (2 pcs.)
- Supporting tools tall (2 pcs.)
- Facing tool big (1 pcs.) with facing inserts d 75-110 mm (3 pcs.)
- Clamping units big (2pcs.) with clamping inserts d 75-110 mm (12 pcs.)
- **Delivery includes:**
- This package is necessary to complete BCF Plus machines which are only equipped for small dimensions d 20-63 mm.

Part No.	d-d (mm)
* 790 121 022	75 - 110

D

BCF® Plus Heating stations

d (mm)	Part No.	weight (kg)	Pieces
20	* 790 121 111	1.818	1
25	* 790 121 112	1.822	1
32	* 790 121 113	1.910	1
40	* 790 121 114	2.396	1
50	* 790 121 115	2.406	1
63	* 790 121 116	2.197	1
75	* 790 121 117	3.600	1
90	* 790 121 118	3.600	1
110	* 790 121 119	3.520	1

D

BCF® Bladder for SYGEF® PVDF

- Only suitable for welding SYGEF® PVDF and not for PROGEF® Natural. **Silver tip.**

d (mm)	Part No.	Pieces
20	* 790 122 041	1
25	* 790 122 042	1
32	* 790 122 043	1
40	* 790 122 044	1
50	* 790 122 045	1
63	* 790 122 046	1
75	* 790 121 047	1
90	* 790 121 048	1
110	* 790 121 049	1

D

BCF Plus Bladder for PROGEF Natural

- Only suitable for welding PROGEF Natural and not for SYGEF PVDF. **Blue bladder head!** d75 - 110 same as bladder for SYGEFY PVDF (silver bladder head):

d (mm)	Part No.	Pieces
20	* 790 122 091	1
25	* 790 122 092	1
32	* 790 122 093	1
40	* 790 122 094	1
50	* 790 122 095	1
63	* 790 122 096	1
75	* 790 121 047	1
90	* 790 121 048	1
110	* 790 121 049	1

D

BCF® Plus Facing Tool

- Inclusive crank handle, mounting material and clamping inserts. Suitable for SYGEF (PVDF) as well as PROGEF Natural.

d-d (mm)	Part No.	Pieces
20 - 63	* 790 121 052	1
75 - 110	* 790 121 053	1

D

BCF® Plus Facing Tool Inserts

- These dimension-specific parts are inserted into the facing tool, in order to be able to face the end of the pipes smoothly and parallel.

d (mm)	Part No.	Pieces
20	* 790 121 061	1
25	* 790 121 062	1
32	* 790 121 063	1
40	* 790 121 064	1
50	* 790 121 065	1
63	* 790 121 066	1
75	* 790 121 067	1
90	* 790 121 068	1
110	* 790 121 069	1

D

BCF® Plus Facing Tool Mounting Plate

- To attach facing tool on workbench

d-d (mm)	Part No.	Pieces
20 - 110	* 790 121 055	1

D

BCF® Plus Clamp Inserts

d (mm)	Part No.	Pieces
20	* 790 131 038	1
25	* 790 131 039	1
32	* 790 131 040	1
40	* 790 131 041	1
50	* 790 131 042	1
63	* 790 131 043	1
75	* 790 121 036	1
90	* 790 121 037	1

D

BCF Plus hose box incl. hose

- For the clean and professional storage of the air hose.

d (mm)	Part No.	Length (m)	Pieces
4	* 790 121 151	16	1

D

BCF® Plus Hose

d (mm)	Part No.	Length (m)
4	* 790 122 087	16

D

BCF Air Hose Reducer

Size (mm)	Part No.
4 x 6	* 790 122 103

D

BCF® Plus Supporting Tool

d-d (mm)	Part No.	Pieces
20 - 63	* 790 121 072	1
75 - 110	* 790 121 073	1

D

BCF® Plus Bladder Removal Tool

Part No.	Pieces
* 790 121 075	1

D

Modification Kit

In order to give our existing BCF Plus customers the full benefit of the advantages we offer a modification kit which enables a reconstruction of all existing BCF Plus machines.
The following modifications are included:

- 2 USB interfaces
- Monochrome display with icons
- New navigation panel
- operator guidance in 12 languages

The upgrade of the new BCF Plus components will be executed by Georg Fischer service centres in the USA/Tustin, Singapore and CSO Schaffhausen.

Part No.
* 790 121 124

Accessories for IR and BCF Plastic Fusion Joining Machines

D

Tangit KS-Cleaning Tissues

- Wet Tangit cleaning tissues to clean the fusion faces
- One box contains 100 tissues

Part No.	weight (lb)
* 799 298 024	0.734

D

IR-Plus Win Weld

- The PC data transfer software makes it possible to manage and evaluate easily the recorded fusion data as required.
- **incl. Record card / USB stick**

Standard	Part No.	Description	Pieces
WIN 2000/XP/7	* **790 131 471**	works with USB stick up to max. 2 GB	1

D

BCF® Plus Win-Weld Program

- **incl. Record card / USB stick**
- The PC data transfer software makes it possible to manage and evaluate easily the recorded fusion data as required.

Standard	Part No.	Pieces
WIN 2000/XP	* **790 121 471**	1
WIN 95/98/Me/NT	* **790 121 472**	1

D

Step-Up and Down Transformer

	Description	Part No.
*	Step-Down 480V to 400V	* **150 000 011**
*	Step-Up 220V to 400V	* **150 000 036**

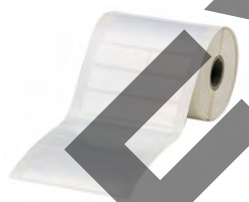
D

Label Printer for IR and BCF machines

Thermal label printer, including 1 ribbon and 1 roll of weld label stickers. Printer is calibrated and ready to connect to IR and BCF machines by USB port.

Part No.	weight (kg)
* **155 131 278**	3.856

D



Thermal Transfer Labels

- Label size: 38 x 19 mm
- Specification information available on request from George Fischer.
- The labels are made of white polyester. The printing, as well as the labels themselves, are resistant against:
- UV resistant
- Temperatures up to 140 °C (284 °F)
- Up to 95% humidity
- Cleaning agents (Isopropylalcohol etc.)
- Two identical labels are printed for each weld. Each roll contains 2500 labels.

Part No.	SP	weight (kg)	Pieces
* **790 131 028**	1	0.400	1

D

Thermal Printer Ribbon for TLP-2742 / TLP-2844

- The thermal transfer ribbon is specially suited for printing polyester labels.

Part No.	SP	weight (kg)	Pieces
* 790 131 029	1	0.076	1

Contact Butt Fusion Process Times*

Machine	Product	20	25	32	40	50	63	75	90	110	160	200	225	250	315	355	400	450	500	630
MC 110	PROGEF® Standard	7.00	7.00	7.00	8.00	11.00	12.00	15.00	18.00	21.00	-	-	-	-	-	-	-	-	-	-
TM 160	PROGEF® Standard	-	-	-	8.00	11.00	12.00	15.00	18.00	21.00	29.00	-	-	-	-	-	-	-	-	-
TM 315	PROGEF® Standard	-	-	-	-	-	-	-	18.00	21.00	29.00	35.00	38.00	42.00	52.00	-	-	-	-	-
TM 400	PROGEF® Standard	-	-	-	-	-	-	-	-	-	29.00	35.00	38.00	42.00	52.00	56.00	62.00	-	-	-
TM 630	PROGEF® Standard	-	-	-	-	-	-	-	-	-	-	-	-	-	52.00	56.00	62.00	70.00	75.00	89.00

** All times in minutes.seconds and are approximate based on 68°F/20°C ambient temperature and SDR 11 pipe. Times only account for heating, joining and cooling of products per the GF Fusion Training Program. GF recommends IR Plus fusion for SYGEF PVDF products.

MC 110 Butt Fusion Machine

D

MC 110 Portable Butt Fusion Machine

- Portable butt fusion machine for use in the workshop and on job sites. For fusion jointing of PP and PE pipes and fittings.
- Machine MC 110 complete includes: base machine, 2 base clamping plates (wide), base clamping plate (left narrow), electrically operated planer, heater, table clamp and transport box. Accessories such as reduction clamping inserts not included.

	Type	d-d (mm)	Performance
MC 110 with with electric planer and thermostatic heater		20 - 110	115V/1360W

Part No.	weight (kg)
* 790 109 321	31.000

D

Reduction clamping inserts, wide

- Each code number defines 1 half shell. Per wide base clamping plate 2 reduction half-shells are needed.
- 20 - 90 mm

d (mm)	Part No.	SP	weight (kg)
20	* 790 109 326	0	0.150
25	* 790 109 327	0	0.139
32	* 790 109 328	0	0.133
40	* 790 109 329	0	0.130
50	* 790 109 330	0	0.113
56	* 790 109 342	0	0.137
63	* 790 109 331	0	0.120
75	* 790 109 332	0	0.110
90	* 790 109 333	0	0.100

D

Base clamping plate, right narrow

- 110 mm for fitting/pipe joints
- For mounting the narrow reduction clamping inserts
- Freely adjustable (max. 15°)

d (mm)	Part No.
110	* 790 109 310

D

Planer, electrically operated

- Center of planing radial adjustable.

d-d (mm)	Performance	Part No.
20 - 110	115V/560W	* 790 109 324

D

Heater

- Choice of electronic or thermostatic temperature control
- Including machine mounting
- Control lamps (power, status)
- PTFE coating

d-d (mm)	Description	Performance	Part No.
20 - 110	thermostatic	115V/800W	* 790 109 322

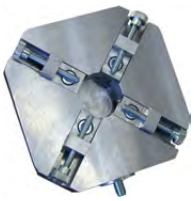
D

Table clamp

- For correct placement of heater

Part No.
* 790 109 315

D



Flange adapter clamping unit

- For correct clamping and fusion joining of short end fittings

d-d (mm)	Part No.
25 - 110	* 790 109 316

D

Replacement blade set for planer

- Blade has 2 cutting edges (1 set = 2 pieces)

Description	Part No.
Short	* 790 118 043

TM 160-315 CNC

D

TM 160 - 315 CNC
Automatic butt fusion machine for construction site

Butt fusion machine join PE, PP and PB pipes and fittings for pressure piping systems on building sites and in trenches.
Hydraulically operated with automatic CNC control unit.
Includes transport packaging (wooden crate). Reduction clamp inserts and other accessories must be ordered separately.

- **Base machine**
- High precision design. Rigid and sturdy machine frame.
- Good accessibility thanks to 35° inclination.
- The moving (sliding) 3rd clamp allows easy and time-saving clamping of bends or tees without need of additional tools.
- Clamps are hinged on top and tilt. Whenever necessary any of the four clamps can be quickly removed.
- Double-sided heating element designed for easy insertion and removal to ease change-over process.
- Distance control (potentiometer) mounted in base machine allows safe control the entire work process.
- Weight: TM 160 = 22 kg, TM 250 = 47 kg, TM 315 = 53 kg
- **Hydraulic Unit**
- Operator guidance from preparation to the end of the jointing process by use of symbols and graphics.
- Intuitive data input by touch screen operation (welding standard, material, diameter, SDR, traceability data).
- Automatic calculation, regulation and control of the fusion parameters - pressure, time and temperature - according to country specific guidelines.
- 10 freely programmable fusion cycles (e.g. for non-standard pipe dimensions).
- Selection of language.
- Operator ID (ISO 12176-3), job number and pipe codes (ISO 12176-4) could be input by means of the barcode scanner (ordered separately).
- On site check of memorized fusion protocol status directly on the touchscreen.
- Transfer of memorized fusion protocols to an external PC via USB memory stick (included).
- Internal aluminum frame providing high rigidity.
- Internal aluminum frame providing high rigidity.
- Integrated power outlets for planer and heating element.
- Accumulator for pressure equalization during the cooling phase.
- Max operating pressure: 160 bar
- Weight: 33 kg
- **Planer**
- Powerful parallel planer for single or double-sided facing of pipe ends.
- Ergonomic, weight-balanced handling
- Self-locking mechanism in working position.
- Safety microswitch prevents undesired start-up.
- Weight: TM 160 = 7 kg, TM 250 = 14 kg, TM 315 = 17 kg
- **Heating Element**
- High performance, electronically controlled heating element.
- High-quality, non-stick PTFE-coating with long service life.
- Temperature indicator integrated into the handle.
- Weight: TM 160 = 5.5 kg, TM 315 = 10 kg
- Input power: 230V/TM 160 = 1200W; TM 250 = 2000W; TM 315 = 2500W
- **Case**
- For safe storage of planer and heating element.
- Weight: TM 160 = 4.8 kg, TM 250 = 8 kg, TM 315 = 9 kg

Type	Performance	d-d (mm)	Part No.
TM 160 CNC	230V/2000W	40 - 160	* **790 150 012**
TM 315 CNC	230V/3750W	90 - 315	* **790 152 012**

TM 400 CNC Butt Fusion Machine

D

TM 400 CNC
Automatic butt fusion machine for construction site

Butt fusion machine join PE, PP and PB pipes and fittings for pressure piping systems on building sites and in trenches.
Hydraulically operated with automatic CNC control unit.
Includes transport packaging (wooden crate). Reduction clamp inserts and other accessories must be ordered separately.

- **Base machine**
- High precision design. Rigid and sturdy machine frame.
- Good accessibility thanks to 35° inclination.
- The moving (sliding) 3rd clamp allows easy and time-saving clamping of bends or tees without need of additional tools.
- Clamps are hinged on top and tilt. Whenever necessary any of the four clamps can be quickly removed.
- Double-sided heating element designed for easy insertion and removal to ease change-over process.
- Distance control (potentiometer) mounted in base machine allows safe control the entire work process.
- Weight: 95 kg
- **Hydraulic Unit**
- Operator guidance from preparation to the end of the jointing process by use of symbols and graphics.
- Intuitive data input by touch screen operation (welding standard, material, diameter, SDR, traceability data).
- Automatic calculation, regulation and control of the fusion parameters - pressure, time and temperature - according to country specific guidelines.
- 10 freely programmable fusion cycles (e.g. for non-standard pipe dimensions).
- Selection of language.
- Operator ID (ISO 12176-3), job number and pipe codes (ISO 12176-4) could be input by means of the barcode scanner (ordered separately).
- On site check of memorized fusion protocol status directly on the touchscreen.
- Transfer of memorized fusion protocols to an external PC via USB memory stick (included).
- Internal aluminum frame providing high rigidity.
- Internal aluminum frame providing high rigidity.
- Integrated power outlets for planer and heating element.
- Accumulator for pressure equalization during the cooling phase.
- Max operating pressure: 160 bar
- Weight: 37 kg
- **Planer**
- Powerful parallel planer for single or double-sided facing of pipe ends.
- Self-locking mechanism in working position.
- Safety microswitch prevents undesired start-up.
- **Heating Element**
- High performance, electronically controlled heating element.
- High-quality, non-stick PTFE-coating with long service life.
- Temperature indicator integrated into the handle.
- Input power: 230V/3500W
- **Case**
- For safe storage of planer and heating element.

Performance	d-d (mm)	Type	Part No.
400 V/5700 W	125 - 400	TM 400 CNC	* 790 153 001

D

Reduction clamping inserts, narrow

- Each code number defines 1 piece of reduction clamping insert

d (mm)	Part No.
160	* 790 112 102
200	* 790 112 104
250	* 790 112 106

D

Reduction clamping inserts, narrow

In order to mount the inserts d 315/d 355/d 400/d 450 to the base clamp d 630, the reduction clamping insert d 500 mm, code 790 117 012, must also be used

- Each code number represents 1 piece of reduction clamping insert. Per machine and dimension maximum 8 narrow or wide reduction clamping inserts are needed.
- We recommend 4 wide and 4 narrow half shells.

d (mm)	Part No.
315	* 790 127 111

D

Reduction clamping inserts set

- 4 wide and 4 narrow clamping inserts of each dimension
- 8 wide clamping inserts d 315 mm
- Reductions in inch sizes or special diameters upon request

d-d (mm)	Part No.
125 - 355	* 790 127 156

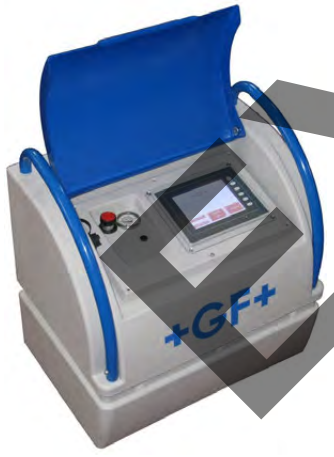
D

TM 400 Crane

Part No.
* 790 127 028

TM 630 CNC Butt Fusion Machine

D



TM 630 CNC

Type	d-d (mm)	Performance	Part No.
TM 630 CNC	315 - 630	400 V/6300 W	* 790 155 001

D

Reduction clamping inserts set

- 4 wide and 4 narrow clamping insets d 315, d 355, d 400, d 450
- 8 wide reduction inserts d 500, d 560

Part No.
* 790 117 021

D

Reduction clamping inserts, wide

In order to mount the inserts d 315/d 355/d 400/d 450 to the base clamp d 630, the reduction clamping insert d 500 mm, code 790 117 012, must also be used

- Each code number represents 1 piece of reduction clamping insert. Per machine and dimension maximum 8 narrow or wide reduction clamping inserts are needed.
- We recommend 4 wide and 4 narrow half shells.

d (mm)	Part No.
315	* 790 116 012
355	* 790 116 013
400	* 790 116 014
450	* 790 116 015

D

Reduction clamping inserts, narrow

- Each code number represents 1 piece of reduction clamping insert. Per machine and dimension maximum 8 narrow or wide reduction clamping inserts are needed.
- We recommend 4 wide and 4 narrow half shells.

In order to mount the inserts d 315/d 355/d 400/d 450 to the base clamp d 630, the reduction clamping insert d 500 mm, code 790 117 012, must also be used

d (mm)	Part No.
315	* 790 116 020
355	* 790 116 021
400	* 790 116 022
450	* 790 116 023

Facing Tool Blade Sets for TM 160-630

D

Planer Blades set GF 160

- Blade has 2 cutting edges (1 set = 2 blades)
- Blade has 2 cutting edges (1 set = 2 blades)
- Blade has 2 cutting edges (1 set = 2 pieces)

Type	d-d (mm)	Part No.
WELD 160	40 - 160	* 790 113 056
WELD 250	75 - 250	* 790 115 024

D

Planer Blades set TM 315 and TM 400

- Blade has 2 cutting edges (1 set = 2 blades)

d-d (mm)	Part No.
90 - 315	* **790 112 110**

D

Planer blades set TM 630

- Blade has 2 cutting edges (1 set = 2 pieces)

Part No.
* **790 117 041**

Socket Fusion Process Times*

Socket Fusion	Product	16	20	25	32	40	50	63	75	90	110
MSE Handtools or SG 125	PROGEF® Standard	15	15	21	24	38	44	62	68	88	110
	SYGEF® PVDF	14	16	18	26	28	34	44			

***All times in seconds and are approximate based on 68°F/20°C ambient temperature. Times do not account for facing, peeling, and cleaning per the GF Fusion Training program.**

SG 125 and MSE63/MSE110 Socket Fusion

D

SG 125 Socket Fusion Machine

- Portable heating element - socket fusion machine for use in the workshop and on job sites.
- For fusion jointing of PP, PE, PB and PVDF pipes and fittings; dimension 20 - 125 mm
- **Base machine**
- Compact, sturdy design, distortion-free machine bed
- Handwheel with torque locking mechanism for the slide movement
- Fast selection of insertion depth according to the pipe dimension
- **Heater**
- With electronic temperature control
- High temperature accuracy over the entire heating surface
- Additional Standard Equipment
- Universal, left and right prismatic clamping devices, complete, for chlamping pipe and fittings. Additional set of prismatic clamping devices for outer clamping of pipes available as an option.
- V-shaped pipe support d 20 - 125 mm
- Back stop
- Machine specific tool set
- Timer to clock fusion times

d-d (mm)	Performance	Part No.	weight (kg)
20 - 125	115 V/1500 W	* **790 310 036**	65.000

D

Universal prismatic clamping device, complete

d-d (mm)	Part No.
20 - 125	* **790 310 040**

D

Backstop, complete

d-d (mm)	Part No.
20 - 110	* **790 310 012**

D

V-shaped pipe support, complete

d-d (mm)	Part No.
20 - 110	* **790 310 013**

D

Replacement heating element SG125

d-d (mm)	Description	Performance	Part No.
20 - 125	thermostatic	115 V/1500 W	* **790 310 046**

D

MSE 63 Socket fusion tool

- For fusion jointing of PP, PE and PVDF pipes and fittings
- Choice of electronic or thermostatic temperature control
- Support for heating bushes and spigots of d 16 to 63 mm (110 mm)
- Pick up for floor stand or table clamp
- Monitoring and setting of heating element temperature
- High temperature accuracy over the entire heating surface
- T = thermostatic temperature control / E = electronic temperature control

d-d (mm)	Performance	Type	Part No.
16 - 63	115 V/800 W	MSE 63 T	* 790 105 096
16 - 63	115 V/800 W	MSE 63 E	* 790 105 097
16 - 110	115 V/1500 W	MSE 110 T	* 790 105 126
16 - 110	115 V/1500 W	MSE 110 E	* 790 105 127

D

MSE 63/MSE 110 - Set - Socket fusion tools

- For fusion jointing of PP, PE and PVDF pipes and fittings
- All devices equipped with on/off switch, mains and temperautre control lamp
- Choice of electronic or thermostatic temperature control
- Support for heating bushes and spigots of d 16 to 63 mm (110 mm)
- Pick up for floor stand or table clamp
- Monitoring and setting of heating element temperature
- High temperature accuracy over the entire heating surface
- High-quality, non-stick PTFE-coating with long service life.
- Heating bushes and spigots
- Available as a complete set in a practical metal case
- Table clamp
- Floor stand for MSE 63
- Allen screws and key
- T = thermostatic temperature control / E = electronic temperature control

Performance	d-d (mm)	Type	Part No.
115 V/800 W	16 - 63	MSE 63 T	* 790 105 098
115 V/800 W	16 - 63	MSE 63 E	* 790 105 099
115 V/1500 W	16 - 110	MSE 110 T	* 790 105 128
115 V/1500 W	16 - 110	MSE 110 E	* 790 105 129

D

Heating spigots and bushes

- High-quality, non-stick PTFE-coating with long service life.
- Type B according to DVS 2208-1 (mechanical calibrated pipe ends)
- Always delivered in pairs. For use with MSE 63, MSE 110 and SG 125.

d (mm)	Part No.
16	* 799 300 155
20	* 799 300 156
25	* 799 300 157
32	* 799 300 158
40	* 799 300 159
50	* 799 300 160

table continued on the next page

D

d (mm)	Part No.
63	* 799 300 161
75	* 799 300 162
90	* 799 300 163
110	* 799 300 164

D

Floor stand for manual fusion tools SSE/MSE

Part No.
* 790 105 063

D

Metal case

- For butt and socket fusion hand tools

Article	Part No.
MSE 63	* 790 105 089
MSE 110	* 790 105 090

D

Table clamp for SSE/MSE

- For correct placement of heater

Part No.	SP	weight (kg)
* 790 109 315	0	0.660

Electrofusion Process Times

Electrofusion	Product	½"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	12"
Electro Plus and MSA 250	PPro-Seal™	1:20	1:27	1:32	1:36	1:50	1:30					
	Fuseal®				1:20	1:30	1:40	1:55	3:10	4:00	4:00	5:00
	Fuseal 25/50™				1:26	1:39	1:52	2:10	3:55			

*All times in miutes: seconds and are approximate based in 68˚F/20˚C ambient temperature. These times are only for the fusion process and do not include the cooling times.

Number of Joints Possible per Cycle

Electrofusion	Product	½"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	12"
Electro Plus and MSA 250	PPro-Seal™	4	4	4	4	4	4					
	Fuseal®				4	4	4	4	4	2	2	2
	Fuseal 25/50™					4	4	4	4			

Electro Plus & Accessories

D

Electro Plus®

Advantages
Intuitive user interface
Multiple joint capability for speedy installations
Integral carrying case for ease of transportation
One-button repeat fusion cycle for same size joints
Self-diagnostic error detection system
Automatic compensation for ambient temperature
The Electro Plus® fusion machine can be used to join the following piping systems: Fuseal 1½-12", Fuseal Squared 1½-12", Fuseal 25/50 1½-6"·and PPro-Seal ½-3".
This complete machine includes:
Fusion Power Unit, Hand Held Unit and the Cable Assembly.

Technical Data

Operating Temperature	14°F (-10°C) to 113°F (45°C)
Input Voltage	100-130 V AC / 200-250 V AC
Input Frequency	50Hz - 60 Hz
Output Voltage	0 –·28.5 V AC
Output Current	0-50 Amps
Power Consumption	1200 Watts max.
Power Cable Length	5ft. (1.5m)
Fusion Cable Length	18ft. (5.5m)
Remote Cable Length	20ft. (6m)
Dimensions (WxHxD)	22x14x10 inch
Weight	45lbs (20.5kg)

Description	Part No.	weight (lb)
Electro Plus	* 150 000 001	45.195

D

Hand Held Unit

Complete hand held unit with connection cable and protection case.
This is a replacement unit which can be used on any Electro Plus machine.

Description	Part No.
Hand Held Unit	* 150 000 003

D

Cable Assembly

Complete cable assembly with connector plug.
This is a replacement unit which can be used on any Electro Plus machine.

Description	Part No.
Cable Assembly	* 150 000 004

MSA 330 & Accessories

D

MSA 330 Electrofusion unit with jointing data recording

The MSA 330 electrofusion unit combines high performance in jointing with easy and safe handling. The internal memory has a capacity of 500 jointing records, for data transfer the unit is equipped with an USB interface. The record is delivered as PDF or CSV format, both are manageable with common and free PC software applications. An intuitive operation menuguides youthrough the complete jointing process. For fusion data input a barcode reader pen or a scanner is connected. The entire welding process is controlled and regulated with energy output compensation depending on ambient temperature and the indication of cooling time. Robust aluminum housing with convenient cable winding and handle for weight balanced transport. The unit is suitable for jointing in series.
Scope of delivery: dedicated transport case, pouch for optical pen or scanner, 2 pairs of angle adapter clips 4,0 mm and 4,7 mm, operation instructions and configuration chart.

Technical Data

Ambient temperature	-10Cto +45C
Mains voltage	180 V - 265 V AC
Mains frequency	40 Hz -70 Hz
Fusion voltage	8 - 48V AC
Fusion current	max. 90 A
Suggested power generator	3,5 kVA (5,0 kVA for fittings with >200mm)
Protection	Class 1 / IP 54
Mains cable	4 m
Fusion cable	4 m
Interface	USB (type A) for PC communication and software updates
Dimensions (WxHxD)	280 x 480 x 320 mm
Weight incl. cables	ca. 21,7 kg
Display	LCD (20 alphanumerical char. x 4 lines), contrast adjustment, blue background, white characters
Languages	10

Description	Part No.	weight (lb)
barcode scanner, transport case	* **790 160 005**	66.139

MSA 340 & Accessories

D

ELECTROFUSION PROCESSORS: MSA 340 Processor

- Approval: ISO 12176-2, ISO 12176-3, ISO 12176-4, EN 60335-1 (Safety), EN 61000-6-2 (EMC), EN 610006-4 (EMC)
- *CSA Only
- Extension Cord Information: Cord Length - 25' Wire Gauge - #10/3 (6 mm2)
- Extension Cord Information: Cord Length - 50' Wire Gauge - #8/3 (10 mm2)

Please call for pricing and availability.

<...>	Description	Voltage	GF Part No.	weight (lb)
	Processor with Case, Scanner Kit, Barcode, Manual and CP Modes	230V	**360 029 070**	57.012
	Processor with Case, Scanner Kit, Barcode, Manual and CP Modes	115V	**360 029 067**	57.012

D

Adapter

- Adapters for Electrofusion units with 4 mm connectors.

Compatible with electrofusion units MSA 330 and MSA 340

Type	Description	Part No.	weight (lb)
4.0 x 4.7mm	Adapter, white	* **150 000 201**	0.06

D

MSA Barcode Scanner

Compatible with MSA 330 and MSA 340

Part No.	weight (lb)	Description
* **150 000 202**	1.268	Barcode scanner with pouch and instructions

Cutting, Chamfering and Peeling Tools

D

PPC Plastic Pipe Cutter

For cutting plastic pipes d10 - d160. S = wall thickness.

Article	d-d (mm)	Part No.	closest inch (inch)
PPC 63 max. s = 7.2 mm	10 - 63	* 790 109 001	⅛ - 2
PPC 110 max. s = 12.7 mm	50 - 110	* 790 109 002	1 ½ - 4
PPC 160 max. s = 19.0 mm	110 - 160	* 790 109 003	4 - 6

D

Manual Rotary Pipe Cutter

- Tool for precise and simple right angle cutting of plastic pipe with a wall thickness up to 12 mm PVDF/PVC and up to 20 mm PP/PE. The blade for PP/PE must be ordered separately (Code 790109861). Transport box is included.

Part No.	weight (kg)	d-d (mm)
* 790 109 850	7.000	63 - 200
* 790 109 851	5.000	90 - 315

D

Replacement Cutting Wheels

For plastic pipe cutter

d-d (mm)	Article	Part No.
10 - 63	SR 63 max. s=7.2 mm	* 790 109 011
50 - 110	SR 110/160 max. s = 12.7 mm	* 790 109 012
110 - 160	SR 160 max. s = 19.0 mm	* 790 109 013

D

EX 360E Pipe Cutter

- Voltage / Power: 230V / 1750W
- Voltage / Current: 110V, 120V / 15A

	Description	Part No.	weight (lb)
*	75mm – 360mm (3"-14") Pipe Cutter	* 150 100 300	2.2

D

KS 355 Plastic pipe cutter

- For 160 - 355mm diameter pipe with wall thickness 8 - 40mm.
- Unique clamping mechanism. No additional belts, chains or reduction inserts needed.
- Supplied with transport box: Dimensions 700 x 350 x 500 mm; Weight 17.0 kg

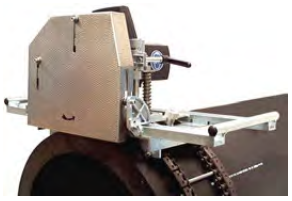
d-d (mm)	Part No.	Power
160 - 355	*** 790 202 001**	1750 W; 230 V; 50/60 Hz

D

KS 355 Saw blade Ø 180x30

Part No.
*** 790 202 011**

D



KS 1600 Plastic pipe cutter

- The easy handling and an optimal safety do make the saw indispensable on each construction site
- Motor hand-circular saw with chain guiding
- The machine consists of a motorized hand saw, with guide carriage and tensioning chain for each pipe diameter
- The tensioning chain is to be out around the pipe and tightened by means of the chain tensioner. The carriage is applied with the hand circular saw. The pipe is cut by moving the carriage around the pipe.
- A quick, clean and right angled cut is the result

The KS 1600 is used for cutting plastic pipes fast, cleanly and properly right-angled from diameter 500 mm up to 1600 mm with a wall thickness of max. 60 mm. For each pipe diameter, the appropriate chain length is necessary. The saw is to be put on the tensioned chain as per user manual which serves as a guiding device for the saw over a full 360° turn. The guard plate covers the saw blade also during operation and provides full protection for the user at all times. The KS 1600 basic kit consists of a circular-hand saw, 230 V / 2200 W with carriage, 2 tension chains for d560 mm and d630 mm as well as a chain tensioner. The whole equipment comes in a convenient and robust transport box. The easy handling and the optimal safety features make this tool indispensable on every building site.

Scope of delivery:
1 Circular-hand saw, 1 tensioning chain d560 mm, 1 tensioning chain d630 mm, 1 chain tensioner, 1 hex-wrench size 5, 1 hex-wrench size 6, 1 operating instruction, transport box

Technical data:
Dimension range:d500 - 1600 mm
(In combination with the respective tensioning chain)
Plug: EU-Plug
Voltage:230 V AC
Power: 2200 Watt
Frequency:50-60 Hz
Circular saw blade outer-Ø: 240 mm
RPM: 4100
Sound level: 104 dB (A)
Weight saw: 15.5 kg
Weight KS 1600 Basic Kit: 43.5 kg
Dimensions saw (W x H x D): 790 x 330 x 335 mm
Dimensions Transport Box: 950 x 400 x 395 mm

d-d (mm)	Type	Part No.
500 - 1600	KS 1600 Basic Kit	*** 790 109 600**

D

KS 1600 Chain Holder

- Chain tensioner is included in the scope of delivery of the KS 1600 Basic Kit (790 109 600).

d-d (mm)	Part No.
500 - 1600	* 790 109 616

D

KS 1600 Tensioning Chains

- Chains for d560 mm and d630 mm are included in the scope of delivery of the KS 1600 Basic Kit (790 109 600).

d (mm)	Part No.	weight (kg)
500	* 790 109 605	5.200

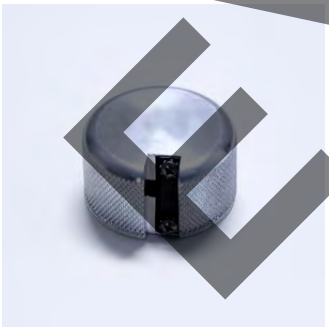
D

Chamfering tool

- Chamfering tool with 15° bevel for plastic pipes (PVC, ABS, PP, PB, PE). Coated prism surface suitable for clean room applications. Fast and reliable adjustment to different pipe diameters and wall thickness.

d-d (mm)	Part No.
16 - 200	* 790 309 003
63 - 400	* 790 309 004

D



Chamfering tool for PPro-Seal, Fuseal PP and Fuseal 25/50.

Size (inch)	Part No.
½	* 150 309 010
¾	* 150 309 011
1	* 150 309 012
1 ¼	* 150 309 013

D

Chamfering tool

Chamfering tool for PPro-Seal, Fuseal PP, and Fuseal 25/50. Sizes 1 1/4" to 4".

Part No.	Description
* 150 109 104	1 1/4" - 4" Chamfering Tool

D

Turbo Scrapers

For use with cordless drills
PE, PVDF Compatible with socket fusion

- Compatible with PE and PVDF material.

Part No.	d (mm)
* 150 201 000	20
* 150 201 001	25
* 150 201 002	32
* 150 201 003	40
* 150 201 004	50
* 150 201 005	63

D

Manual pipe peeling tool

d (mm)	Part No.
20	* 799 300 260
25	* 799 300 270
32	* 799 300 280
40	* 799 300 290
50	* 799 300 300
63	* 799 300 310
75	* 799 300 320
90	* 799 300 330
110	* 799 300 340

D

Replacement peeling tool blade

d (mm)	Part No.
20	* 799 300 266
25	* 799 300 276
32	* 799 300 286
40	* 799 300 296
50	* 799 300 306

table continued on the next page

D

d (mm)	Part No.
63	* 799 300 316
75	* 799 300 326
90	* 799 300 336
110	* 799 300 346

D

Rotary Peeler RS

The innovative Rotary Peeler RS is designed for universal peeling
of pipe ends for electrofusion couplings, tees and elbows, as well as for electrofusion saddles.
Suitable for peeling PE80, PE100, PEX and PP pipes.
Features and Benefits:
Time savings and highest repeatable peeling quality at smallest rotation radius.
Spring loaded peeling blade:
Peeling quality independent of pipe ovality or tolerance
Pivoted mounted peeling blade:
Compensates the shape of coiled pipe
Optimized cutting geometry:
Defined chip thickness with cutting width overlap
One tool per dimension:
Minimized swivel radius for peeling in narrow locations
Peeling length:
No limitation of peeling length
Guidance rolls:
3-point-support for dimensional optimized cutting feed
Time saving:
Tool is always ready for use.
Start the next peeling without having to set the peeling blade back in its original position
Time saving and highest repeatable peeling quality at smallest rotation radius. Eliminates operator errors
when changing dimensions
Included:
1 x Rotary Peeler RS, Transport case, Operating manual, Spare parts list

Article	d (mm)	Part No.
RS 40	40	* 790 136 001
RS 50	50	* 790 136 002
RS 63	63	* 790 136 003
RS 75	75	* 790 136 004
RS 90	90	* 790 136 005
RS 110	110	790 136 006
RS 160	160	* 790 136 009
RS 225	225	* 790 136 012
RS 250	250	* 790 136 013

D

Replacement blade to Rotary Peeler RS

d-d (mm)	Description	Part No.	weight (kg)
40 - 315	Hard metal	* 790 136 100	0.013

D

Transport cases for Rotary Peeler RS

- Included in the scope of delivery of the Rotary Peeler RS

Article	Part No.	weight (kg)	Description	Dimension (mm)
RSTC 40-110	* 790 136 211	0.718	for RS 40-RS 110	326 - 222 - 116
RSTC 125-160	* 790 136 212	1.212	for RS 125-RS 160	437 - 395 - 116
RSTC 180-225	* 790 136 213	1.796	for RS 180-RS 225	450 - 360 - 132
RSTC 250-315	* 790 136 214	2.901	for RS 250-RS 315	566 - 435 - 156

D

Peeling tool PT 2

- Scope of delivery: 1 tool (size 1, 2 or 3) in a metal carrying case.
- The rotating Peeling Tool PT 2 are suitable for preparing pipe ends (when installing Electrofusion couplers and fittings). The tool ensures a constant peeling quality on the complete peeling surface and is suitable for PE80, PE100 and PEX pipes.

d-d (mm)	Part No.	Description
63 - 250	* 799 300 752	Size 1, peeling length 140 mm

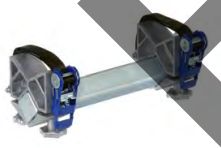
D

Peeling tool PT 4

- The easy-to-use peeling tools PT 4 are suitable for preparing pipe ends (when installing Electrofusion couplers and fittings). The tools ensure a constant peeling quality on the whole peeled area and are suitable for PE80 and PE100 pipes. There is no tool service arrangement for the PT 4.
- Scope of delivery: 1 tool with exchangeable blade (4 cutting surfaces).

d (mm)	e (mm)	Part No.
20	1.9	* 799 300 704
25	2.3	* 799 300 706
32	3.0	* 799 300 708
40	3.7	* 799 300 709
50	4.6	* 799 300 710
63	5.8	* 799 300 711

D



Double clamp

- The user-friendly Double Clamps are suitable for coupler connections. They are quickly and easily put into position and prevent pullout and pipe movements during the fusion time and cooling time.
- Scope of delivery: 1 tool consisting of 1 beam (compact), 2 V-clamps complete with ratchet and belt.

d-d (mm)	Part No.
63 - 125	* 799 301 484
110 - 225	* 799 301 486
225 - 500	* 799 301 488

D

Quadruple clamp

- The professional Quadruple Clamps are suitable for coupler connections. They are quickly and easily put into position and ensure a stress-free fusion. They prevent pullout and pipe movements during the fusion and cooling times.
- Recommended for difficult site conditions with large installation-induced stresses.
- Scope of delivery: 1 tool consisting of 1 beam (long), 4 V-clamps complete with ratchet and belt.

d-d (mm)	Part No.
63 - 125	* **799 301 459**
110 - 225	* **799 301 461**
225 - 500	* **799 301 463**

Rental Equipment

D

Electro Plus

- Prices are daily, prorated by calendar day, billed by the end of the month
- Complete Electro Plus Fusion Machine

d-d (inch)	Description	Part No.
½ - 12	Electro Plus	**R150000001B**

D

MSA 250 / MSA Multi

- Prices are daily, prorated by calendar day, billed by the end of the month
- Includes Cable Assembly, Bar Code Set with Continuity Tester and Carrying Case

d-d (inch)	Description	Part No.
½ - 12	MSA250 SE, 115V AC	**R799350500B**
½ - 12	MSA250 EX Multi, 230V AC	**R799350520B**
½ - 12	Electrofusion Unit MSA Multi, 230V AC	**R790156021B**
½ - 12	Electrofusion unit MSA Multi 2.0, 230V	**R790156001B**

D

MSA 330/340

- Prices are daily, prorated by calendar day, billed by the end of the month
- Includes Cable Assembly, Bar Code Set with Continuity Tester and Carrying Case

Description	Part No.
MSA 330 230V	**R790160005B**
MSA 340 230V	**R790160012B**
MSA 330 115V	**R010011335B**
MSA 340 115V	**R150900564B**
New MSA 340 115V	**R360290067B**
New MSA 340 230V	**R360290070B**

D

SG110/SG125 Socket Fusion Machines

- Prices are daily, prorated by calendar day, billed by the end of the month
- Rental does not include heater bushings or peeling tools; these items must be purchased separately

d-d (mm)	Description	Part No.
16 - 110	SG110 Socket Fusion Machine	**R790310003B**
20 - 90	SG125 Socket Fusion Machine	**R790310036B**

D

Contact Butt Fusion Machines

- Prices are daily, prorated by calendar day, billed by the end of the month
- The GF315 is equipped with an automatic heater

d-d (mm)	Description	Part No.
20 - 110	MC110	**R790109321B**
40 - 160	TM160	**R790114061B**
75 - 250	GF250	**R790115030B**
90 - 315	GF315 CNC	**R790112030B**
125 - 400	TM 400	**R790127069B**
200 - 500	GF500	**R790116040B**
315 - 630	TM 630	**R790117069B**

D

IR Plus Machines

- Prices are daily, prorated by calendar day, billed by the end of the month
- A power converter (115/230V AC) is included with the IR63 and IR110 machine

d-d (mm)	Description	Part No.
20 - 63	IR63 Plus	**R790131005B**
20 - 63	IR 63 with PFA Software and 1/4-2" inserts	**R155131005B**
20 - 110	IR110 Plus	**R790132001B**
63 - 225	IR225 Plus	**R790133009B**
250 - 315	IR315 Plus	**R790134001B**
20 - 110	IR-110 A Automated Fusion Machine	**R790164001B**

D

BCF Plus Machine

- Prices are daily, prorated by calendar day, billed by the end of the month
- Rental includes facing tool and remote head. Rental does not include bladders and air hose which must be purchased separately.

d-d (mm)	Description	Part No.
20 - 63	BCF Plus	**R790121002B**
75 - 110	BCF Plus Extension Package	**R790121022B**

D

Pipe Cutter Tools

- Prices are daily, prorated by calendar day, billed by the end of the month
- Rental does not include cutting blades, which must be purchased separately

d-d (mm)	Description	Part No.
110 - 250	PPC 250	**R790201002B**
110 - 250	PPC 250 HP	**R790201011B**
160 - 355	KS 355	**R790202001B**
315 - 500	KS 1600	**R790109601B**

D

EX 360E Pipe Cutter

- Prices are daily, prorated by calendar day, billed by the end of the month

Part No.	Description
R150100300B	75mm - 360mm (3" - 14") Pipe Cutter

D

Rotary Peeler RS

- Prices are daily, prorated by calendar day, billed by the end of the month

d (mm)	Part No.
63	**R790136003B**
75	**R790136004B**
90	**R790136005B**
110	**R790136006B**
160	**R790136009B**
225	**R790136012B**
250	**R790136013B**

D

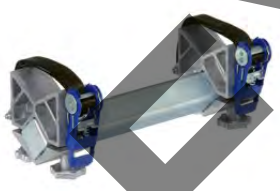
Step-Up and Down Transformer

- Prices are daily, prorated by calendar day, billed by the end of the month

Part No.	Description
R150000036B	Step-Up 220V to 400V
R150000011B	Step-Down 480V to 400V

D

Double clamp



- Prices are daily, prorated by calendar day, billed by the end of the month

d-d (mm)	Part No.
63 - 110	**R799301484B**
110 - 225	**R799301486B**
225 - 250	**R799301488B**

Machine Rental Agreement

This agreement is made as of the _____ day of _____ 20_____, between Georg Fischer LLC and _____ _____ _____(Herein named Distributor)

This rental agreement covers the rental of the following products/machines:

_____ Serial Number _____
_____ Serial Number _____
_____ Serial Number _____
_____ Serial Number _____

Other items/accessories: _____ _____ _____ _____ _____

Rental charges begin 7 days after shipping date and end on date machine is received at Georg Fischer and are based on a daily rate prorated by calendar days.

The distributor will be invoiced for rental charges at the end of the starting rental month and each month thereafter until the conclusion of the rental agreement *and* return of rented equipment. Georg Fischer will not assume any responsibility for delays in shipment due to shipping errors, strikes or circumstances beyond its control.

Default Remedies

If Distributor fails to pay any rental payment or other sum due Georg Fischer hereunder in a timely manner or fails to observe, keep or perform any other provision of this agreement required to be observed, kept or performed by Distributor, and does not cure such default within 5 days after notice from Georg Fischer, then Georg Fischer shall have the right to:

(a) Sue for and recover all rents and other payments then accrued or thereafter accruing under this agreement;

(b) Take possession of any or all of the items of Equipment covered by this Agreement, without demand or notice to Distributor, wherever the Equipment may be located, without any court order or other process of law, in which event Distributor grants Georg Fischer access and waives any and all damages occasioned by such taking of repossession, including, but not limited to, any damage caused to Distributor's premises in connection with the removal of the Equipment.

(c) Terminate this Agreement as to any or all items of Equipment covered by this Agreement; or

(d) Pursue any other available remedy to Georg Fischer at law or in equity.

Obligation of Distributor Continues

Notwithstanding any repossession of any item of Equipment by Georg Fischer or any other action which Georg Fischer may take, Distributor shall be and remain liable for the full performance of all of its obligations under this Agreement.

Availability of Rental Equipment

Georg Fischer does not guarantee the availability of rental equipment and will under no circumstances be liable for any loss of any nature, directly or indirectly arising from the lack of availability of rental equipment.

Maintenance

During the term of this Agreement, Distributor shall be responsible for maintaining, or causing to be maintained, the Equipment by providing or causing to be provided, routine preventative maintenance and inspection services, to assure proper operation thereof. In addition, Distributor shall be solely responsible for any and all repairs and maintenance required to be made to the Equipment during the term of this Agreement.

Use of Equipment

Distributor shall insure that the Equipment is used in a careful and proper manner and in strict conformity with the purposes and functions for which it was designed and is intended to be used, shall insure compliance in all respect with the operating and routine operator maintenance procedures as described in any manuals relating to the Equipment supplied to Distributor by Georg Fischer and shall comply with and conform to all applicable federal, state and municipal laws, ordinances and regulations relating to the possession, use or operation of the Equipment. In addition, Distributor shall not modify, alter, or change in any way the equipment.

Receipt of Equipment by Distributor

When Equipment is received by the Distributor, it is the responsibility of the Distributor to check the contents and packing slip to determine if all material is correct. Any discrepancies must be reported in writing to a Georg Fischer representative within 7 days after receipt of said Equipment by Distributor.

Return of Rented Equipment

All Equipment must be returned by the designated reshipment date and clearly tagged and identified with the RMA number. The distributor has to inform Georg Fischer about any circumstances that will affect the designated date of reshipment. Such notice has to be given at least 20 days prior to the designated day. The Equipment must be returned in the original container, properly packed and labeled. Lost, damaged, non-repairable shipping containers will be charged to the Distributor according to the Georg Fischer then effective Billing Procedures. The freight carrier must be approved by Georg Fischer. No machines shall be shipped by UPS without specific authorization from Georg Fischer LLC. All BCF and IR-63 machines shall be secured to a shipping pallet for all shipments. All C.O.D.s will be refused. All Equipment must be returned directly to Georg Fischer in Tustin, CA for inspection. A normal rework time of 2 hours is allowed per piece of Equipment. Rework time of more than 2 hours for a piece of Equipment will be charged to the Distributor according to the Georg Fischer then effective Billing Procedures.

Equipment Failure

Georg Fischer reserves the right to repair or replace any rental equipment which fails. When equipment must be returned to Georg Fischer for repairs or replacement before the end of the rental, and these repairs are due to normal wear and tear, Georg Fischer will pay for the surface shipping fees to Georg Fischer and return. Carrier must be a Georg Fischer approved carrier, see Return of Rented Equipment for details.

Insurance

Distributor shall name Georg Fischer as an additional named insured, with respect to the equipment, on Distributor's insurance policies covering all risk or hazards to the equipment.

DISCLAIMER

GEORG FISCHER WILL UNDER NO CIRCUMSTANCES BE LIABLE FOR ANY LOSS OR DAMAGE OF ANY NATURE, DIRECTLY OR INDIRECTLY ARISING FROM ANY INJURY CAUSED TO THE OPERATOR OF THE EQUIPMENT, SO LONG AS THE EQUIPMENT IS IN THE POSSESSION AND/OR CONTROL OF DISTRIBUTOR OR ANY THIRD PARTY.

DISCLAIMER OF WARRANTIES

GEORG FISCHER MAKES NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND WHATSOEVER WITH RESPECT TO THE EQUIPMENT INCLUDING, BUT NOT LIMITED TO: THE MERCHANTABILITY OF ANY ITEM OF EQUIPMENT OR ITS FITNESS FOR ANY PARTICULAR PURPOSE; THE DESIGN OR CONDITION OF ANY ITEM OR EQUIPMENT; THE QUALITY OR CAPACITY OF ANY ITEM OF EQUIPMENT; THE WORKMANSHIP IN ANY ITEM OF EQUIPMENT; COMPLIANCE OF ANY ITEM OF EQUIPMENT WITH THE REQUIREMENTS OF ANY LAW, REGULATION, SPECIFICATION OR CONTRACT PERTAINING THERETO; PATENT INFRINGEMENT; OR PATENT DEFECTS. GEORG FISCHER SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE, DIRECTLY OR INDIRECTLY ARISING FROM THE USE OF THE EQUIPMENT FOR ANY INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, SUCH AS LOSS OR PROFITS, LOSS OR PRODUCTION, LOSS OF USE OR LOSS OF CONTRACT, ARISING FOR ANY REASON, INCLUDING DAMAGES RESULTING FROM DEFECTIVE DESIGN, MATERIALS OR WORKMANSHIP OR FROM FAULTY INSTRUCTIONS AND WHETHER SUCH DAMAGES ARE CLAIMED TO ARISE FROM BREACH OF CONTRACT, IN TORT, THE THEORY OF PRODUCT LIABILITY OR OTHERWISE.

General Provisions

Georg Fischer's Inspection Rights

Georg Fischer shall, at any time and all times during regular business hours of Distributor or User, have the right to enter the premises of Distributor or User where the Equipment may be located for the purposes of inspecting the same or observing its operation and use. Distributor shall give Georg Fischer immediate notice of any attempted or actual attachment or other judicial process or levy affecting any of the Equipment.

Ownership of Equipment

Georg Fischer, Distributor and User acknowledge and agree that Distributor or User has no right, title or interest in or to the Equipment except for the rental interest set forth in this Agreement. To the extent necessary to affirm Georg Fischer's ownership interest in the Equipment, Distributor or User shall permit Georg Fischer to affix a label to each item of Equipment indicating Georg Fischer's ownership interest. This Agreement is intended by the parties hereto to create a rental agreement and not a sale, conditional sale, consignment or any other legal relationship. Upon request by Georg Fischer, Distributor or User agrees to execute UCC-1 financing statements, in form satisfactory to Georg Fischer, evidencing the rental of the Equipment pursuant to this Agreement. Georg Fischer, as the owner of the Equipment, shall be entitled to such deductions, credits and benefits as are provided by the Internal Revenue Code of 1986, as amended to the date hereof or at any time hereafter, to an owner of personal property including, without limitation, any investment tax credit with respect to the Equipment.

No Encumbrances or Liens: Notice

Distributor shall not pledge, encumber, create a security interest in or permit any lien to become effective on or with respect to any of the Equipment. If any of these events take place, Distributor shall be deemed to be in default of this Agreement. Distributor shall immediately notify Georg Fischer of any such liens, charges or other encumbrances of which Distributor has knowledge. Distributor shall immediately pay or satisfy any obligation from which any such lien, charge or encumbrance arises, and shall otherwise keep the Equipment and all right, title and interest therein free and clear of all such liens, charges and encumbrances. Distributor shall deliver to Georg Fischer appropriate satisfactions, waivers or evidence of payment or satisfaction of any such obligation.

Risk of Loss

All risk of loss, damage, theft or destruction of or to the Equipment shall be borne by Distributor. No such loss, damage, theft or destruction of or to the Equipment in whole or in part, shall impair the obligations of Distributor under this Agreement, all of which shall continue in full force and effect; and Distributor, at Georg Fischer's option, shall: (a) place the affected Equipment in good repair, condition and working order; (b) replace the same with like Equipment in good repair, condition and working order; (c) pay Georg Fischer an amount equal to all unpaid rent due and to become due under this Agreement during the term of this Agreement or (d) pay Georg Fischer the full replacement value of the affected Equipment.

Indemnification of Georg Fischer

Distributor shall indemnify and defend and hold Georg Fischer, its officers, directors, shareholders, agents, legal representatives, successors and assigns, and each of them, harmless from and against any and all claims, liabilities, actions, suits, proceeding, damages, judgments, costs and expenses, including attorneys's fees, arising out of, connected with or resulting from:

(a) Distributor's and/or Distributor's employees', agents' or invitees' use or misuse of the Equipment; or (b) the breach by Distributor of any covenant or obligation contained in this Agreement to be performed or observed by Distributor. The terms of this paragraph shall specifically survive the termination of this Agreement.

Governing Law

This Agreement will be construed and enforced in accordance with the internal laws of the State of California without regard to its conflicts law.

Recovery of Litigation Costs

If any arbitration or other legal proceeding is brought for the enforcement of this Agreement, or because of any alleged dispute, breach, default or misrepresentation in connection with or arising out of any of the provisions of this Agreement, the successful or prevailing party will be entitled to recover such party's reasonable attorneys' fees and other costs incurred by such party in such arbitration or other legal proceeding, in addition to any other relief to which such party or parties may be entitled.

Severability

In the event that any provision or any part of any provision of this agreement is held to be illegal, invalid or unenforceable, such illegality, invalidity or unenforceability will not affect the

validity, legality or enforceability of any other provision or part thereof.

Successors and Assigns. This Agreement will not be assignable by either party without the prior written consent of the other party.

Waiver

Failure to insist on compliance with any of the terms, covenants or conditions hereof will not be deemed a waiver of such terms, covenants or conditions, nor will any waiver or relinquishment of any right or power hereunder at any one time or more times be deemed a waiver or relinquishment of such rights or powers at any other time or times.

THIS AGREEMENT is made as of the _____ day of _____, 20_____ between Georg Fischer LLC and:

Co: _____

By: _____

Print: _____

and

Georg Fischer: _____

Print: _____

SPECIAL TERMS: _____

_____

Effective start date: _____ End date: _____

Approved by: _____

PO Number: _____

❑ Transformer or converter may be required to operate Georg Fischer welding equipment.
I have read and understand the power requirement for the equipment rented.

+GF+

General Terms and Conditions of Sale

Always check for the most current General Terms and Conditions and Warranty Statement at www.gfpiping.com under "Price Lists."

GF Piping Systems USA Terms and Conditions (Rev. 2/2017) supersede all previous Terms and Conditions for Georg Fischer LLC and Georg Fischer Harvel LLC.

It is the responsibility of the Distributor, Dealer, or Agent to provide a current copy of these Terms and Conditions to the Consumers of Georg Fischer Piping products.

Acceptance of Terms and Conditions

Acceptance by Customer of GF Piping Systems USA, (hereinafter "Seller") offer of Products for sale is hereby expressly conditioned upon Customer's acceptance of these General Terms and Conditions of Sale and these General Terms and Conditions of Sale will be deemed accepted, as written, despite any language in Customer's purchase order and/or other documentation which is either conflicting or supplemental, unless promptly after this offer, Customer specifically advises Seller of each term and condition not so accepted and Seller accepts Customer's conflicting and/or supplemental term(s) in writing.

Order Acceptance

Seller reserves the right to accept or reject any order. Possession of a price list by Customer does not constitute an offer to sell.

Credit Approval and Minimum Order Charge

Customer credit approval is required prior to any shipment.

The minimum order is $100 net.

List Price, Discount or Freight Charges

List prices, discount, and freight terms are subject to change without notice. All prices are F.O.B. Seller's factory or authorized warehouse at Seller's discretion.

Payment Terms

Net 30, from date the invoice is issued unless otherwise stated in a specific quotation. No unauthorized deductions allowed, such as deductions for pending Return Material Transactions that are subject to review. Seller reserves the right to apply a finance charge to the balance of any past-due invoice (over 30 days from date of invoice) at a rate of 1.5% per month, 18% per annum. Payment terms on fusion machine rentals net 30; see rental agreement for more details.

Taxes

Seller charges Customer for all sales, excise and other taxes and governmental charges Seller is required to collect from Customer. Customers claiming exemption must furnish documentation required by law which is satisfactory to Seller to permit Seller to refrain from collecting such charges.

WARRANTY AND LIMITATIONS

Seller's Products are carefully inspected for manufacturing defects; however, it is not always possible to detect hidden defects.

Seller warrants that its products shall conform to the description of such products as provided to Customer by Seller through Seller's catalog, analytical data or other literature. **THIS WARRANTY IS EXCLUSIVE, AND SELLER MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR COURSE OF DEALING OR USAGE OF TRADE – WHICH ARE HEREBY DISCLAIMED.** Seller's warranties made in connection with this sale shall not be effective if Seller has determined, in its sole discretion, that Customer has misused the products in any manner, has failed to use the products in accordance with industry standards and practices, or has failed to use the products in accordance with instructions, if any, furnished by Seller. **Seller does not warrant any Products obtained through an unauthorized Distributor, Dealer, or Agent.**

LIMITATIONS OF REMEDY

Seller's sole and exclusive liability and Customer's exclusive remedy with respect to products proved to Seller's satisfaction to be defective or nonconforming shall be repair or replacement of such products without charge or refund of the purchase price, in Seller's sole discretion, upon the return of such products in accordance with Seller's instructions. SELLER SHALL NOT IN ANY EVENT BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND RESULTING FROM ANY USE OR FAILURE OF THE PRODUCTS, EVEN IF SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE INCLUDING, WITHOUT LIMITATION, LIABILITY FOR LOSS OF USE, LOSS OF WORK IN PROGRESS, DOWN TIME, LOSS OF REVENUE OR PROFITS, FAILURE TO REALIZE SAVINGS, LOSS OF PRODUCTS OF CUSTOMER OR OTHER USE OR ANY LIABILITY OF CUSTOMER TO A THIRD PARTY ON ACCOUNT OF SUCH LOSS, OR FOR ANY LABOR OR ANY OTHER EXPENSE, DAMAGE OR LOSS OCCASIONED BY SUCH PRODUCT INCLUDING PERSONAL INJURY OR PROPERTY DAMAGE. Any and all claims of Customer against Seller must be brought within one (1) year of Seller's tender of delivery, regardless of their nature.

Order Changes or Cancellations

Cancellation or modifications of orders may be possible only with prior written consent from Seller. Since all orders are individually entered for processing immediately upon receipt, Seller reserves the right to charge back to the Customer costs incurred from either order cancellation or order modification. Seller also reserves the right to consider all order additions as new orders and subject to all terms and conditions.

Seller will not cancel orders for custom or non-cancelable products if Seller has already produced the product or incurred expenses toward producing the product at the time the Customer seeks to cancel.

Delivery

Seller disclaims liability for consequential damages from late deliveries unless seller assumes liability for such damages in writing when the order is placed. Further, Seller disclaims liability where delivery delays caused by strike, differences with workmen, or causes beyond Seller's control, including but not limited to fires, floods, accidents, government actions, shortages of labor, raw materials, production facilities, or transportation. Where delivery delays are caused by labor problems, Seller is not obligated to seek or obtain any settlement which, in Seller's judgment, is not in Seller's best interest.

Standard Packaging

Seller will accept orders from Customer exclusively in multiples of the standard packaging quantity or boxed quantity. Seller reserves the right to reject any order that is not a standard packaging or boxed quantity of a Product.

Freight

Continental US – Full freight will be paid on the following orders:

1. Pipe $7,500 net or greater in one of the following categories:
   a. PPro-Seal
   b. Contain-It
   c. Fuseal (1½"–6")
   d. SYGEF
   e. PROGEF
   f. PVC and CPVC, including shapes and rods
   g. PVC and CPVC, metric
   h. Duct
   i. CTS
   j. LXT
   k. Blazemaster
   l. PE 100
   m. COOL-FIT ABS
   n. COOL-FIT ABS Plus Pre-insulated

   Combination of products from one shipping point to meet freight allowance is at the sole discretion of the seller.

2. Fittings, Valves, & Actuation $1,500 net or greater

Freight allowed orders will be sent by a designated carrier of Seller's choice. Additional charges will be invoiced to Customer for special handling and air freight when requested. Standard Pipe lengths require long truck beds for shipping and may be shipped separately from valves and/or fittings purchased on the same order. Valves and/or fittings will be shipped using practical shipping methods.

Freight will not be paid on the following orders:

a. Signet Product
b. Custom Products
c. Heat Exchangers
d. PVC and CPVC Fabricated Fittings 14" and larger
e. Fuseal Squared, Tanks and Accessories, and Special Fabrications
f. Fuseal Large Diameter Pipe and Fittings 8" and larger
g. COOL-FIT ABS Lite Pipe
h. Double-See
i. International Orders
j. Fusion Machines and Accessories

Unless otherwise specified, shipments are surface, prepaid and added to invoice.

Mode of Shipment and Packaging

Seller reserves the right to ship orders in the most economical manner, as long as the product is shipped on or before the promised ship date. If product ships after the promised ship date, Seller may automatically adjust the shipping method to help improve delivery of the delayed shipment, at no additional cost.

If Seller pays freight, Seller may hold shipment until all items become available. Customer bears extra cost of non-standard packaging or handling requested by Customer.

Transfer of Ownership

All products are FOB Seller's facility and title of merchandise transfers when product is loaded onto carrier. Claims for damaged merchandise should be made to carrier by Customer.

Assignment. Customer may not assign its rights under or interest in any purchase order without the prior written consent of Seller. These terms and conditions of sale shall be binding upon and inure to the benefit of Customer and Seller, their successors and permitted assigns.

Technical Documentation and Intellectual Property. Unless specified otherwise, technical documents such as drawings, descriptions, illustrations and the like, constitute only an approximate guide. Seller reserves the right to make any changes considered necessary. Seller expressly reserves any and all intellectual property rights therein.

Non-Conforming Shipments

Customer must notify Seller in writing within 7 days after receipt of shipments not conforming with Customer's order, stating specifically Customer's claim of non-conformity, or Customer is deemed to accept the shipment as is. If Seller is satisfied the shipment is non-conforming, Seller will (i) credit Customer for the price of defective goods or goods shipped but not ordered (including allocated outbound and return freight) upon return of goods; (ii) promptly ship omitted items waiving Seller's new order charges. Customer is required to make timely payment to Seller of any amount which is undisputed or not subject to such claims.

Return of Goods for Credit

Seller accepts returns of certain Engineered Piping Products, Valve and Actuation Products, Signet Instrumentation Products, Waste and Containment Products, and Vinyl Piping Products for a standard restock charge of 25%. Pipe is not returnable. Products denoted with a caret (^) symbol in front of the part number in the current Master Distributor Price List have a 40% restock and products denoted with an asterisk (*) symbol are non-cancelable/non-returnable. Only products purchased within the past twelve (12) months, in original "like new" packaging (full carton quantities), of current design, and listed in the current Master Distributor Price List shall be considered for returns. All products qualifying for return are subject to review for marketability (quantities in question in relationship to historical stock movement) before issuance of a Return Material Authorization (RMA) number. Returns due to Seller's product warranty or order entry/shipping error will not be charged a restock fee.

Product for credit consideration should be returned to Seller's originating location. All returns are subject to inspection upon receipt. No credit will be issued until the returned material has been inspected, accepted, and processed. Customers will be contacted if quantity differences and/or non-acceptable material are found during inspection. Any credit issued will reflect only quantities actually received and accepted by Seller.

Disposition (return to Customer or scrap) of returned product not accepted back by Seller must be provided by Customer within 10 business days, otherwise it will be subject to disposal. All material returns must be accompanied by a valid Return Material Authorization (RMA) number. RMA numbers may be obtained from the Customer Service Department. When requesting a RMA, the original purchase order number and date of purchase must be provided.

All material returns must be received within thirty (30) days of the RMA issuance.

All material returns must be shipped freight prepaid. No collect shipments will be accepted by Seller. Restock charges and prepaid freight do not apply to warranty defective merchandise or returns due to Seller order entry or shipping errors.

Return of Goods for Warranty Evaluation

When requesting a RMA for material evaluation, Customer must first complete and submit a Material Safety Disclosure sheet and Request For Evaluation form obtained from Customer Service. Material arriving to Seller without a valid RMA number will be returned to the customer/distributor, freight collect. RMA numbers must be clearly referenced on all shipping documents and shipping containers.

+GF+

GF Piping Systems

Argentina / Southern South America
Georg Fischer Central Plastics
Sudamérica S.R.L.
Buenos Aires, Argentina
Phone +5411 4512 02 90
gfcentral.ps.ar@georgfischer.com

Australia
George Fischer Pty Ltd
Riverwood NSW 2210 Australia
Phone +61(0)2 9502 8000
australia.ps@georgfischer.com
www.georgfischer.com.au

Austria
Georg Fischer
Rohrleitungssysteme GmbH
3130 Herzogenburg
Phone +43(0)2782 856 43-0
austria.ps@georgfischer.com
www.georgfischer.at

Belgium / Luxembourg
Georg Fischer NV/SA
1070 Bruxelles/Brüssel
Phone +32(0)2 556 40 20
be.ps@georgfischer.com
www.georgfischer.be

Brazil
Georg Fischer Sist. de Tub. Ltda.
04795-100 São Paulo
Phone +55(0)11 5525 1311
br.ps@georgfischer.com
www.georgfischer.com.br

Canada
Georg Fischer Piping Systems Ltd
Mississauga, ON L5T 2B2
Phone +1(905)670 8005
Fax +1(905)670 8513
ca.ps@georgfischer.com
www.georgfischer.ca

China
Georg Fischer Piping Systems Ltd
Shanghai 201319
Phone +86(0)21 3899 3899
china.ps@georgfischer.com
www.georgfischer.cn

Denmark / Iceland
Georg Fischer A/S
2630 Taastrup
Phone +45 (0)70 22 19 75
info.dk.ps@georgfischer.com
www.georgfischer.dk

Finland
Georg Fischer AB
01510 VANTAA
Phone +358 (0)9 586 58 25
Fax +358 (0)9 586 58 29
info.fi.ps@georgfischer.com
www.georgfischer.fi

France
Georg Fischer SAS
95932 Roissy Charles de Gaulle Cedex
Phone +33(0)1 41 84 68 84
fr.ps@georgfischer.com
www.georgfischer.fr

Germany
Georg Fischer GmbH
73095 Albershausen
Phone +49(0)7161 302-0
info.de.ps@georgfischer.com
www.georgfischer.de

India
Georg Fischer Piping Systems Ltd
400 076 Mumbai
Phone +91 224007 2001
in.ps@georgfischer.com
www.georgfischer.in

Italy
Georg Fischer S.p.A.
20063 Cernusco S/N (MI)
Phone +3902 921 861
it.ps@georgfischer.com
www.georgfischer.it

Japan
Georg Fischer Ltd
556-0011 Osaka,
Phone +81(0)6 6635 2691
jp.ps@georgfischer.com
www.georgfischer.jp

Korea
Georg Fischer Piping Systems
271-3 Seohyeon-dong Bundang-gu
Seongnam-si, Gyeonggi-do
Seoul 463-824
Phone +82 31 8017 1450
Fax +82 31 8017 1454
kor.ps@georgfischer.com
www.georgfischer.kr

Malaysia
George Fischer (M) Sdn. Bhd.
40460 Shah Alam, Selangor Darul Ehsan
Phone +60 (0)3 5122 5585
my.ps@georgfischer.com
www.georgfischer.my

Mexico / Northern Latin America
Georg Fischer S.A. de C.V.
Apodaca, Nuevo Leon
CP66636 Mexico
Phone +52 (81)1340 8586
Fax +52 (81)1522 8906
mx.ps@georgfischer.com
www.georgfischer.mx

Middle East
Georg Fischer
Piping Systems (Switzerland) Ltd.
Dubai, United Arab Emirates
Phone +971 4 289 49 60
gcc.ps@georgfischer.com
www.export.georgfischer.com

Netherlands
Georg Fischer N.V.
8161 PA Epe
Phone +31(0)578 678 222
nl.ps@georgfischer.com
www.georgfischer.nl

New Zealand
Georg Fischer Ltd
13 Jupiter Grove, Upper Hutt 5018
PO Box 40399, Upper Hutt 5140
Phone +64(0)4 527 9813
nz.ps@georgfischer.com
www.gfps.com/nz

Norway
Georg Fischer AS
1351 Rud
Phone +47(0)67 18 29 00
no.ps@georgfischer.com
www.georgfischer.no

Poland
Georg Fischer Sp. z o.o.
05-090 Sekocin Nowy
Phone +48(0)22 31 31 0 50
poland.ps@georgfischer.com
www.georgfischer.pl

Romania
Georg Fischer
Piping Systems (Switzerland) Ltd.
020257 Bucharest - Sector 2
Phone +40(0)21 230 53 80
ro.ps@georgfischer.com
www.export.georgfischer.com

Russia
Georg Fischer
Piping Systems (Switzerland) Ltd.
Moscow 125047
Tel. +7 495 258 60 80
ru.ps@georgfischer.com
www.georgfischer.ru

Singapore
George Fischer Pte Ltd
11 Tampines Street 92, #04-01/07
528 872 Singapore
Phone +65 6747 0611
sgp.ps@georgfischer.com
www.sg.piping.georgfischer.com

Spain / Portugal
Georg Fischer S.A.
28046 Madrid
Phone +34(0)91 781 98 90
es.ps@georgfischer.com
www.georgfischer.es

Sweden
Georg Fischer AB
117 43 Stockholm
Phone +46(0)8 506 775 00
info.se.ps@georgfischer.com
www.georgfischer.se

Switzerland
Georg Fischer
Rohrleitungssysteme (Schweiz) AG
8201 Schaffhausen
Phone +41(0)52 631 30 26
ch.ps@georgfischer.com
www.piping.georgfischer.ch

Taiwan
Georg Fischer Co., Ltd.
San Chung Dist., New Taipei City
Phone +886 2 8512 2822
Fax +886 2 8512 2823
www.georgfischer.tw

United Kingdom / Ireland
George Fischer Sales Limited
Coventry, CV2 2ST
Phone +44(0)2476 535 535
uk.ps@georgfischer.com
www.georgfischer.co.uk

USA / Caribbean
Georg Fischer LLC
Irvine, CA 92618
Phone +1(714) 731 88 00
Toll Free 800 854 40 90
us.ps@georgfischer.com
www.gfpiping.com

Vietnam
George Fischer Pte Ltd
136E Tran Vu, Ba Dinh District, Hanoi
Phone +84 4 3715 3290
Fax +84 4 3715 3285

International
Georg Fischer
Piping Systems (Switzerland) Ltd.
8201 Schaffhausen/Switzerland
Phone +41(0)52 631 30 03
Fax +41(0)52 631 28 93
info.export@georgfischer.com
www.export.georgfischer.com

www.gfps.com

GF Piping Systems
9271 Jeronimo Road, Irvine, CA 92618
Tel. (714) 731-8800, Toll Free (800) 854-4090, Fax (800) 426-7188
e-mail: us.ps@georgfischer.com
www.gfpiping.com

+GF+

Item #1369 (2/18)