GF Piping Systems

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COOL-FIT® PE Plus

Catalog and Technical Information 2019

GF Piping Systems

COOL-FIT® PE Plus

Pre-insulated system for refrigeration and chilled water

Metric-To-Inch Conversion Chart

16 mm = 3/8"	75 mm = 2½"	355 mm = 14"
20 mm = ½"	90 mm = 3"	400 mm = 16"
25 mm = ¾"	110 mm = 4"	450 mm = 18"
32 mm = 1"	160 mm = 6"	500 mm = 20"
40 mm = 1¼"	225 mm = 8"	630 mm = 24"
50 mm = 1½"	280 mm = 10"	
63 mm = 2"	315 mm = 12"	

www.gfps.com

- Pipe
- Fittings
- Valves
- Instrumentation

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1 COOL-FIT® PE Plus

1.1 General Information

COOL-FIT® PE Plus is a pre-insulated plastic piping system that is a reliable and efficient solution for chilled water and other chilled liquids. The system is maintenance-free, easy to install, and will not corrode over time. Since the insulation on both the fittings and pipe is bonded together at the factory, no condensation can form between the vapor barrier. The weight is a fraction of metal solutions allowing it to be roof-mounted in locations that may be problematic for other systems. Unlike other plastic piping systems, COOL-FIT® PE Plus is designed to handle temperatures as low as -58^{0}F. The high thermal conductivity properties of the system and vapor barrier seal are incredibly efficient and have resulted in energy savings in several projects. Installation procedures can be learned in a matter of hours and are provided on-site by Georg Fischer.

Key Industries	
• Breweries and wineries	• Multi-use buildings
• Food processing	• Retail
• Cold stores	• Universities
• Supermarkets and dairies	• Apartment complexes
• Hospitals	• Hotels

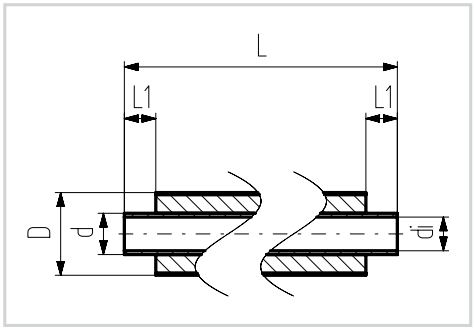
Key Applications	
• HVAC	• Process cooling
• Refrigerated liquid	• Cooling towers

2 System Specification

Specification		COOL-FIT PE Plus
Materials (All three materials are firmly bonded together.)	Pipe	PE100
	Insulation	GF PUR (Polyurethane) foam, halogen free, closed-cell
	Outer jacket	Pipe: PE
		Fitting: PE
Size		d32 (1") – d450 (18")
Joining technology		Electrofusion
Nominal pressure (at 68°F [20°C] Media Water)	16 bar (232 psi), SDR 11 10 bar (150 psi), SDR 17	d32 (1") – d450 (18")
Temperature	Media	-58°F to +140°F (-50 °C to +60 °C)
	Environment	-22°F to +140°F (-30 °C to +60 °C)
Thermal conductivity	$\lambda_{20°C}$ GF HE/PUR Foam PE jacket & inner pipe	 0.015 BTU/hr ft °F; 0.026 W/mK (d160-d450) 0.220 BTU/hr ft °F ; 0.38 W/mK
	Density	≥ 4.37 lb/ft^3; 70 kg/m^3
	Foam cell size	max. Ø 0.5 mm
Mechanical strength (from insulation)	Axial shear strength 2)	≥ 0.12 N/mm^2 (17.4 psi)
	Compressive strength	≥ 0.3 N/mm^2 (43.5 psi)
Color	Outer jacket	Black
Weight (without)	Pipe d32 (1")	0.95 lb/ft (1.41 kg/m)
	Pipe d110 (4")	4.17 lb/ft (6.20 kg/m)
	Pipe d225 (8")	11.15 lb/ft (16.6 kg/m)
Oxygen diffusion at < 58.1°F (14.5° C)	ISO 17455	≤ 0.32 mg/(m^2 d)
Environment		Moisture and vapor-tight
		Weather resistant UV resistant
	Global warming potential GWP	≤ 0.01
	Ozone Depletion Potential ODP	Zero
Standards and Guidelines	EN ISO 15494	Plastic piping systems for industrial applications
	ISO 7	Threaded Joints
	EN ISO 16135	Industrial valves – Ball valves made of thermoplastics
	EN ISO 16136	Industrial valves – Butterfly valves made of thermoplastics
	EN ISO 16137	Industrial valves – Backflow protection made of thermoplastics
	EN ISO 16871	Plastic piping and ducting systems – Plastic pipe and fittings – Method for exposure to direct (natural) weathering
Product declarations	Greenbuildings	According to: DGNB 2015 DGNB 2012 BREEAM 2016 LEED 2009 LEED v4

3 Technical Details

3.1 COOL-FIT® PE Plus Pipe and Fittings



Pipe	Pipe	Pipe	Outer jacket	Free pipe ends		Insulation thickness		Heat transfer coefficient (U)
d x e (mm)	d_i (mm)	d (in)	D x e1 (mm)	(mm)	(in)	(mm)	(in)	(W/m K)
32 x 2.9	26.2	1	90 x 3	36	1.4	26	1.0	0.13
40 x 3.7	32.6	1 ¼	110 x 3.4	40	1.6	31.6	1.2	0.14
50 x 4.6	40.8	1 ½	110 x 3.4	44	1.7	26.6	1.0	0.18
63 x 5.8	51.4	2	125 x 3.8	48	1.9	27.2	1.1	0.21
75 x 6.8	61.4	2 ½	140 x 4.0	55	2.2	28.5	1.1	0.23
90 x 8.2	73.6	3	160 x 4.0	62	2.4	31	1.2	0.24
110 x 10	90	4	180 x 4.0	72	2.8	31	1.2	0.28
160 x 9.5	141.0	6	250 x 5	90	3.5	40	1.6	0.37
225 x 13.4	198.2	8	315 x 6	110	4.3	39	1.5	0.50
280 x 16.6	246.8	10	400 x 6.3	123	4.8	53.7	2.1	0.48
315 x 18.7	277.6	12	450 x 6.4	126	5.0	61.1	2.4	0.48
355 x 21.1	312.8	14	500 x 7.4	133	5.2	65.1	2.6	0.49
400 x 23.7	352.6	16	560 x 8.4	148	5.8	71.6	2.8	0.50
450 x 26.7	396.6	18	630 x 7.6	150	5.9	82.4	3.2	0.50

Pipe	Weight empty		Weight with Water		Volume
d x e (mm)	lb/ft	kg/m	lb/ft	kg/m	(gal/ft)
32 x 2.9	0.95	1.41	1.31	1.95	0.043
40 x 3.7	1.38	2.05	1.94	2.38	0.067
50 x 4.6	1.49	2.22	2.37	3.53	0.105
63 x 5.8	2.01	2.99	3.40	5.06	0.167
75 x 6.8	2.53	3.76	4.52	6.72	0.238
90 x 8.2	3.24	4.82	6.09	9.07	0.342
110 x 10	4.37	6.50	8.64	12.86	0.512
160 x 9.5	6.69	9.95	17.18	25.56	1.257
225 x 13.4	11.15	16.60	31.88	47.45	2.484
280 x 16.6	15.21	22.63	47.33	70.43	3.850
315 x 18.7	19.09	28.41	59.74	88.90	4.871
355 x 21.1	23.76	35.36	75.37	112.16	6.185
400 x 23.7	29.61	44.06	95.19	141.66	7.859
450 x 26.7	37.29	55.49	120.26	178.97	9.942

d) Nominal outer diameter of the PE pipe

d_i) Nominal inside diameter of the pipe

D) Nominal outside diameter of the outer PE jacket

e, e1) Nominal wall thickness

COOL-FIT® PE Plus Fittings

General

COOL-FIT PE Plus fittings are based on the ELGEF electrofusion technology used successfully for more than a decade. They provide a safe and simple installation. The pre-insulated fittings are available in the following two types:

Type A

Electrofusion fitting with integrated heat coils for direct pipe-to-fitting connections. See page 8 for more information.

90° elbow and reducer as an example

Type B

Spigot fitting with pipe ends for COOL-FIT PE Plus electrofusion fittings. See page 8 for more information.

Fusion indicators

After the welding process, the indicator pin appears, confirming that fusion is complete

Sealing lip at fittings Type A d32-d225

The sealing lip ensures a tight fit system.

Label

Fittings are marked clearly with the product name, fitting size, and material code.

Weld bar-code

Product data and fusion parameters can be traced back to production via information codes.

Angle marking

Ends of the fitting markings are used to optimally align the pipe and fitting connections.

Joining

Pipe and Fitting

Type A fittings have a heating coil, which in turn generates energy to heat the material and produce thermal expansion of the pipe fittings. As the polyethylene surfaces melt they expand in volume to close any gaps between the pipe and fitting. Upon completion of the heating phase, the assembly is held stationary by external clamps as the melted materials begin to immediately cool and crystallize into a single homogenous structure. Once completely cooled, the surfaces are permanently joined together and cannot be separated.

Type B fittings feature non-insulated spigot ends. They are connected with electrofusion fittings type A to a pipe.

Fitting-to-fitting

Two COOL-FIT PE Plus fittings are usually connected together by one of the pipe ends or bare nipples. For compact joints, the special COOL-FIT PE Plus barrel nipple with insulation can be used.

Two COOL-FIT PE Plus Type B fittings can be joined using a type A electrofusion fitting.

Connecting Type A and B fittings are also available.

Components

COOL-FIT PE Plus Electrofusion coupler

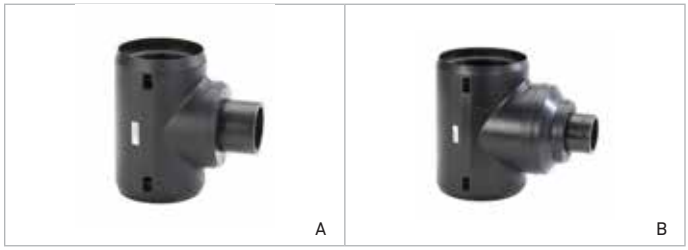
COOL-FIT PE Plus electrofusion couplers are used to connect pipe and components with pipe ends like type B fittings, valves and transition fittings.

COOL-FIT PE Plus Elbows 45° and 90°

COOL-FIT PE Plus T90 equal and COOL-FIT T90° reduced

Type A sizes 32mm-225mm (1" - 8"): Run

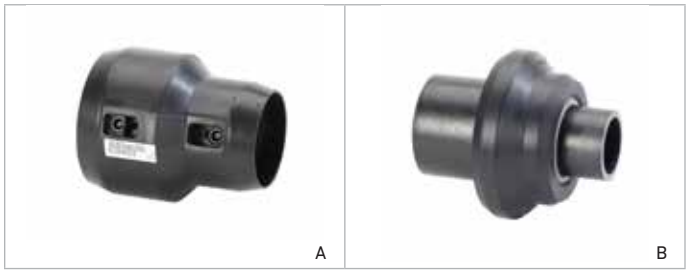
Type B sizes 280mm - 450mm (10" - 18"): Branch



COOL-FIT PE Plus reducer

The COOL-FIT PE Plus reducer can be used to decrease the diameter of the piping system to accommodate process specifications. The COOL-FIT PE Plus reducer can be used to decrease the flow rate

- Type A sizes 32mm - 50mm (1" - 1½")
- Type B sizes 63mm - 160mm (2" - 6")



COOL-FIT PE Plus barrel nipple

COOL-FIT PE Plus barrel nipple serves as a compact direct connector for type A fittings.

COOL-FIT PE Plus T90 and Reducer Combination Chart

Branch \ Run	40	50	63	75	90	110	160	225
32	X	X	X	O	O	O	O	O
40		X	X	O	O	O	O	O
50			X	O	O	O	O	O
63				Δ	Δ	Δ	Δ	Δ
75					Δ	Δ	□	□
90						Δ	Δ	Δ
110							Δ	Δ

Δ) T90° reduced
X) T90° equal + reducer type A
O) T90° reduced to d63 + reducer type A
□) T90° reduced to d90 + coupler d90 + reducer type B

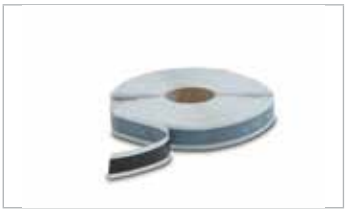
Accessories for dimensions d32 - d225

Insulation for fusion contacts

Supplied with each fitting. Prevent formation of a cold bridge at the fusion contacts. Insulation parts can also serve as an indicator that a connection has been welded. Install insulation after welding to show that the welding has been completed.

Sealing tape

The sealing tape with width 25mm ensures proper vapor sealing.



COOL-FIT® PE Plus Valves

The plastic valves designed for COOL-FIT PE Plus are supplied including PUR insulation shells with a protective PE jacket. The sealing faces between the shells are vapor tight by design. No additional tape or sealant is required.

Releasable plastic bands for sizes d32 (1")– d63 (2") with tension locks for sizes d75 (2½") – d225 (8") permit the pre-insulated shells to be fitted to and removed from the valves easily, allowing for quick maintenance.

The insulated ball valve in ABS is available in sizes d32 (1") – d90 (3"). For sizes d110 (4") – d225 (8"), butterfly valve kits which consist of a butterfly valve, flange adaptor, backing flange PP-St, screw-kits and insulation half shells. Both valve types are available either as manually operated or electrically actuated version.

The electric actuators used feature the following benefits:

- Position feedback via relays (open/close/middle)
- Heating element to prevent condensation
- Optical position indicator with LED status monitoring
- Third position between “open” and “closed” optional
- Relay output for “ready to operate” and 7-segment error display
- Integrated manual override with magnetic lock
- Long service life due to robust design and superior electronics
- Flexible configuration thanks to modular concept
- Numerous monitoring and control options
- Simple handling

COOL-FIT® PE Plus flange joints

Transition fittings and flange connectors enable connections to either metal or plastic systems. The components supplied includes insulation half shells with a protective PE jacket. The sealing faces between the shells are vapor tight by design.

	Size	Material	Thread type/ connector/bolt circle
Adaptor fitting	d32 – d63 1“ – 2“	PE – stainless steel	male thread (NPT), female thread (NPT)
Unions	d32 – d63 d32 – d110	PE – PE, PE – ABS	Welding spigots cementing sockets
Flange Adaptor (flange joints)	d32 – d225	PE	

COOL-FIT® PE Plus Flex Hoses

The EPDM rubber flexible hoses permit access to the chillers, fan coils, and allow expansion and contraction within the system. The tear-resistant protective jacket and its insulation stabilize the cooling fluid temperature inside the system.

COOL-FIT® PE Plus Instrument Fittings

The COOL-FIT PE Plus fittings are used to install various types of sensors to the system. Pressure or temperature sensors can be connected using the NPT female thread.

3.2 COOL-FIT® PE Plus Tools

Electrofusion machines are required to join COOL-FIT PE Plus components. The range includes dedicated and multipurpose electrofusion machines which are reliable and easy to use.

Long Fusion adaptors

Long Fusion adaptors serve as an extension of the fusion plugs of electrofusion machines. Compared to standard adaptors, the longer adaptor length matches the insulation of the COOL-FIT PE Plus electrofusion fittings. The long fusion adaptors are needed for electrofusion of fittings d ≥ d160/D250

Y-cable kit for COOL-FIT fixed point

Saves half of the normal welding time of the COOL-FIT fixed points.

Assembly aids

The COOL-FIT PE Plus assembly aids are used for an easy mounting of the COOL-FIT PE Plus fitting on pipe.

Foam removal tool and peeling tool – manually operated

The foam removal tool is used to prepare shortened COOL-FIT PE Plus pipe for electrofusion. The tool removes the foam, cuts the outer jacket, and peels the surface of the core pipe. The tool is available in three versions based on the following sizes:

1. for sizes d32 (1") – d90 (3")
2. for sizes d110 (4") – d225 (8")
3. for sizes d250 (10") – d450 (18")

Powered foam removal and peeling tool

The powered foam removal tool is also used to prepare a shortened COOL-FIT PE Plus pipe for electro fusion. Utilizing commonly used power drills, it serves as a supplement to the manually operated tool. The tool is available as a kit for d32 (1")-d63 (2") sizes.

Clamping tool

Clamping tool is designed to support the proper alignment and stress-free installation of the COOL-FIT PE Plus system. In order to secure the COOL-FIT pipe during the fusion and cooling process, it is recommended that the pipe and fittings be secured with installation clamps. By fitting the assembly with COOL-FIT installation clamps, optimal fusion is achieved by limiting the movement during the welding and cool-down process.

The hinge allows the use of the clamps on elbows and reducers. Depending on the length of the pipe, 2 or 4 of the glass-reinforced plastic holders can be used. Tension bands are included and a T-adaptor is optional available.

4 Dimensioning and Design

Plastics have different physical characteristics than metals. These characteristics must be taken into account when designing and installing thermoplastic piping systems. Although COOL-FIT PE Plus is a very robust system, care should be taken to avoid damage during handling and transportation.

For over 50 years, Georg Fischer Piping Systems has developed and sold a variety of plastic piping systems such as pre-insulated systems for cooling applications. Experience has shown that plastic provides an economical and reliable alternative to metal when designers and installers take account of the recommendations in the attached technical manual. Piping systems must be able to move to accommodate changes in length caused by fluctuations in temperature and pressure. To allow for these changes, the use of pipe holders that permit movement is required.

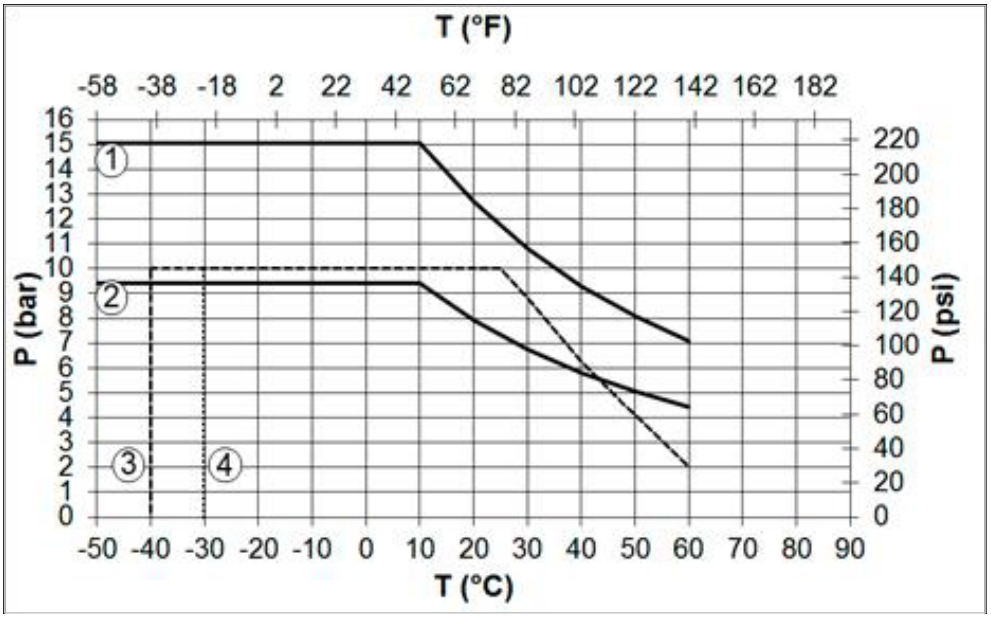
The following technical information contains detailed instructions. However, there might be aspects of your design that may require additional considerations. For more information, please contact your local Georg Fischer Piping Systems representative. Additional information is also available on the official Georg Fischer Piping Systems website.

4.2 COOL-FIT® PE Plus pressure-temperature diagram

The pressure resistance for thermoplastic pipe with water media is always specified at +68°F(+20 °C). At higher temperatures, additional consideration must be made for a lower maximum operating pressure.

The graph shows the maximum permissible pressure for COOL-FIT PE Plus pipe and fittings up to a media temperature of +140°F (+60 °C). The graph is based on an ambient temperature of +68°F(+20 °C). A safety factor of 1.6 and a minimum lifespan of 25 years have been allowed for in all calculations.

Pressure/temperature limits for COOL-FIT® PE Plus pipe, fittings, valves – water as secondary refrigerant



P) Allowable pressure (bar, psi)
T) Temperature (°C, °F)
C) Safety factor

1) COOL-FIT PE Plus Pipe and fitting d32 – d110, C = 1.6, SDR11
2) COOL-FIT PE Plus Pipe and fitting d160 – d450, C = 1.6, SDR17
3) COOL-FIT PE Plus Ball valve PN10
4) COOL-FIT PE Plus Butterfly valve PN10

Influence of secondary refrigerants with antifreeze additives

COOL-FIT PE Plus is generally resistant to secondary refrigerants such as glycol and salt solutions. For some refrigerants a reduction factor is necessary depending on the type and mixing ratio. The permissible operating pressure is corrected downwards from the pressure-temperature curve for water.

Reduction factors	COOL-FIT PE Plus Pipe and Fitting	COOL-FIT PE Plus Valves
Inorganic brine solutions	F = 1.0	F = 1.0
Organic salt solutions	F = 1.0	F = 1.25
Glycol solutions (max. 50 %)	F = 1.1	F = 1.7

For the calculation, the following formula is used:

$$P_{AF} = \frac{P_w}{AF}$$

P_{AF} Permissible pressure with reduction factor
P_W Permissible pressure for water
AF Reduction factor

Glycol solutions

COOL-FIT PE Plus can be used with glycol solutions with concentrations up to 50%. The chemical resistance of COOL-FIT PE Plus systems is suitable for the following glycol types:

Brand name	Manufacturer	Type
Antifrogen N	Clariant	Ethylene glycol
Antifrogen L	Clariant	Propylene glycol
Showbrine Blue Showa standard EC brine	Showa Brine	Ethylene glycol
Tyfocor L	Tyfo	Propylene glycol
Tyfocor	Tyfo	Ethylene glycol
DOWFROST	DOW	Propylene glycol
Zytrec FC	Frigol	Propylene glycol
Zytrec LC	Frigol	Propylene glycol
Zytrec MC	Frigol	Ethylene glycol
Neutrogel Neo	Climalife Dehon	Ethylene glycol
Friogel Neo	Climalife Dehon	Propylene glycol
DOWTHERM SR-1	DOW	Ethylene glycol

When using other secondary refriegerants, compatibility with COOL-FIT PE Plus should be clarified with Georg Fischer Piping Systems.

Example – glycol dissolved in water

For water-glycol mixture ≤ 50%, the reduction factor for the pressure-temperature diagram is 1.7 (for COOL-FIT PE Plus valves). Thus, at +10 °C, with a minimum life of 25 years, the maximum allowable working pressure is reduced as follows:

$$P_{AF} = \frac{10 \text{ bar}}{1.7} = 5.88 \text{ bar}$$

Organic salt solutions

These media are usually potassium formates or potassium acetates: aqueous solutions with low viscosity at low temperatures. COOL-FIT PE Plus can be used with the media below. The manufacturer's instructions must be followed.

Brand name	Manufacturer	Type
Kilfrost ALV	Clariant	Brine
Zytrec S-55	Frigol	Brine
Temper[1)]	Temper	Brine
Hycool	Addcon	Brine

1) Please contact Georg Fischer Piping Systems

For detailed information on resistance and reduction factors, see Planning Fundamentals "Material selection – Chemical resistance".

4.3 Polyethylene (PE)

The core pipe of COOL-FIT PE Plus is PE-100. Since it comes in contact with the media, its properties are of particularly high relevance.

Properties of PE (approximate)

Property	PE 100-value[1]	Unit	Testing standard
Density	0.95	g/cm³	EN ISO 1183-1
Yield stress at 73°F (23°C)	25	N/mm²	EN ISO 527-1
Tensile modulus at 73°F (23°C)	900	N/mm²	EN ISO 527-1
Charpy notched impact strength at 73°F (23°C)	83	kJ/m²	EN ISO 179-1/1 eA
Charpy notched impact strength at -40°F (-40°C)	13	kJ/m²	EN ISO 179-1/1 eA
Crystallite melting point	130	°C	DIN 51007
Thermal conductivity at 73°F (23°C)	0.38	W/m K	EN 12664
Water absorption at 73°F (23°C)	0.01 to 0.04	%	EN ISO 62
Color	9,005	-	RAL
Oxygen Index (LOI)	17.4	%	4589-1

1) Typical, measured on material characteristics, should not be used for calculations.

General information

Polymers which consist only of carbon and hydrogen (hydrocarbons) are called polyolefins. Polyethylene (PE) belongs to this group. It is a semi-crystalline thermoplastic. Polyethylene is the best known standard polymer. The chemical formula is:(CH2-CH2)n. It is an environmentally friendly, hydrocarbon product. PE is considered a non-polar material, meaning it does not dissolve in common solvents and hardly swells. As a result, PE pipes cannot be solvent cemented. The appropriate joining method for this material is heat fusion. Modern PE100 grades show a bimodal molecular weight distribution, i.e., they consist of two different kinds of molecular chains (short and long). These polyethylenes combine high tensile strength with high resistance against fast and slow crack propagation. PE also shows a very high impact resistance throughout its entire temperature range. Because PE is a robust materials with acute resistance to fracture, it has significant advantages in applications where lower temperatures (down to -58°F) would cause other thermoplastic piping systems to become brittle.

Advantages of PE

- Light weight
- Excellent flexibility
- Good wear resistance (abrasion resistance)
- Corrosion resistance
- Ductile fracture properties
- High impact strength even at very low temperatures
- Very good chemical resistance
- Weldable

Mechanical properties, chemicals, weathering and abrasion resistance

UV and weather resistance

PE is a weather resistant material due to the carbon black additives used in the GF resin. This stabilizes the material against UV exposure, so it can be used in wind and rain without restrictions.

Chemical resistance

PE exhibits good resistance to a wide range of media. For detailed information, please see the detailed chemical resistance list from Georg Fischer Piping Systems.

Abrasion resistance

PE has excellent resistance to abrasive wear. You can therefore find PE piping systems in use in numerous applications for transporting solids and media containing solids.

Thermal and electrical properties

Operating limits

At higher temperatures, the tensile strength and stiffness of the material are reduced.

Electrical properties

PE, like most thermoplastics, is non-conductive. This means that systems in PE do not suffer from electrolytic corrosion. However, the non-conductive properties must be taken into consideration, as electrostatic charges can build up in the pipe. Polyethylene has good electrical insulation properties. The volume resistance is 3.5 x 10^{16} Ωcm, the surface resistance 10^{13} Ω. This must be taken into account in applications where there is danger of fire or explosion.

4.4 Hydraulic design

Determination of pipe diameter based on flow rate

As a first approximation, the required pipe cross-section for a certain flow rate can be calculated using the following formula:

$$d_i = 18.8 \cdot \sqrt{\frac{Q_1}{v}} \quad \text{oder} \quad d_i = 35.7 \cdot \sqrt{\frac{Q_2}{v}}$$

v	flow velocity (m/s)
d_i	Pipe internal diameter (mm)
Q_1	Flow rate (m^3/h)
Q_2	Flow rate (l/s)
18.8	Conversion factor for units Q_1 (m^3/h)
35.7	Conversion factor for units Q_2 (l/s)

Example calculation of an internal diameter d_i

COOL-FIT PE Plus pipe	SDR17
Flow rate Q_2	55 l/s
Usual flow velocity v	1.5 m/s

$$d_i = 35.7 \cdot \sqrt{\frac{55}{1.5}} = 216.2 \text{ mm}$$

A pipe with d225/D315 is used. After the internal diameter has been determined that way, the actual flow rate is determined with the following formula:

$$v = 354 \cdot \frac{Q_1}{d_i^2} = 1.8 \frac{m}{s} \quad \text{oder} \quad v = 1275 \cdot \frac{Q_2}{d_i^2} = 1.8 \frac{m}{s}$$

v	Flow velocity v (m/s)
d_i	Pipe internal diameter (mm)
Q_1	Flow rate (m^3/h)
Q_2	Flow rate (l/s)
354	Conversion factor for units Q_1 (m^3/h)
1275	Conversion factor for units Q_2 (l/s)

Determination of pipe diameter based on cooling capacity

As a first approximation, the required pipe cross section for a certain cooling capacity can be calculated using the following formula.

$$d_i = 18.8 \cdot \sqrt{\frac{\left(\frac{Q_L \cdot 3600}{\Delta T \cdot c \cdot \rho}\right)}{v}}$$

d_i Pipe inner diameter (mm)
Q_L Cooling capacity in kW
ΔT Temperature difference supply - return (K)
c Specific heat capacity (kW*s/(kg*K))
ρ Density of the medium (kg/m³)
v Flow velocity (m/s)

Example for calculating the inner diameter d_i based on cooling capacity with water medium water

Cooling capacity Q_L	2000 kW
Specific heat capacity (20 °C) c	4.187 kJ/(kg*K)
Water density (20 °C) ρ	998.2 kg/m³
Temperature difference ΔT	10 K
Flow velocity v	1.5 m/s

$$d_i = 18.8 \cdot \sqrt{\frac{\left(\frac{2000 \cdot 3600}{10 \cdot 4.187 \cdot 998.2}\right)}{1.5}} = 18.8 \cdot \sqrt{\frac{172.3}{1.5}} = 201.5 \text{ mm}$$

The flow rate should be estimated on the basis of the intended purpose of the pipe. As a guide for the flow rate, the following specifications apply.

Fluid

v = 0.5 – 1.0 m/s for the suction side

v = 1.0 – 3.0 m/s for the pressure side

This method of calculation of pipe diameter does not allow for hydraulic losses. They must be calculated separately. The following sections serve that purpose.

Conversion table with units of flow rate.

(m³/h)	(l/min)	(l/s)	(m³/s)
1.0	16.67	0.278	2.78×10^{-4}
0.06	1.0	0.017	1.67×10^{-5}
3.6	60	1.0	1.00×10^{-3}
3600	60 000	1000	1.0

Correlation of outer diameter - inner diameter

To determine the outer diameter based on the internal diameter and SDR, the following formula can be used:

$$d = d_i \cdot \frac{SDR}{SDR - 2}$$

Correlation between pipe external and internal diameter

d_i (mm)	26.2	32.6	40.8	51.4	61.4	73.6	90	141.0	198.2
d (mm)	32	40	50	63	75	90	110	160	225

4.5 Nomogram for easy calculation of diameter and pressure loss

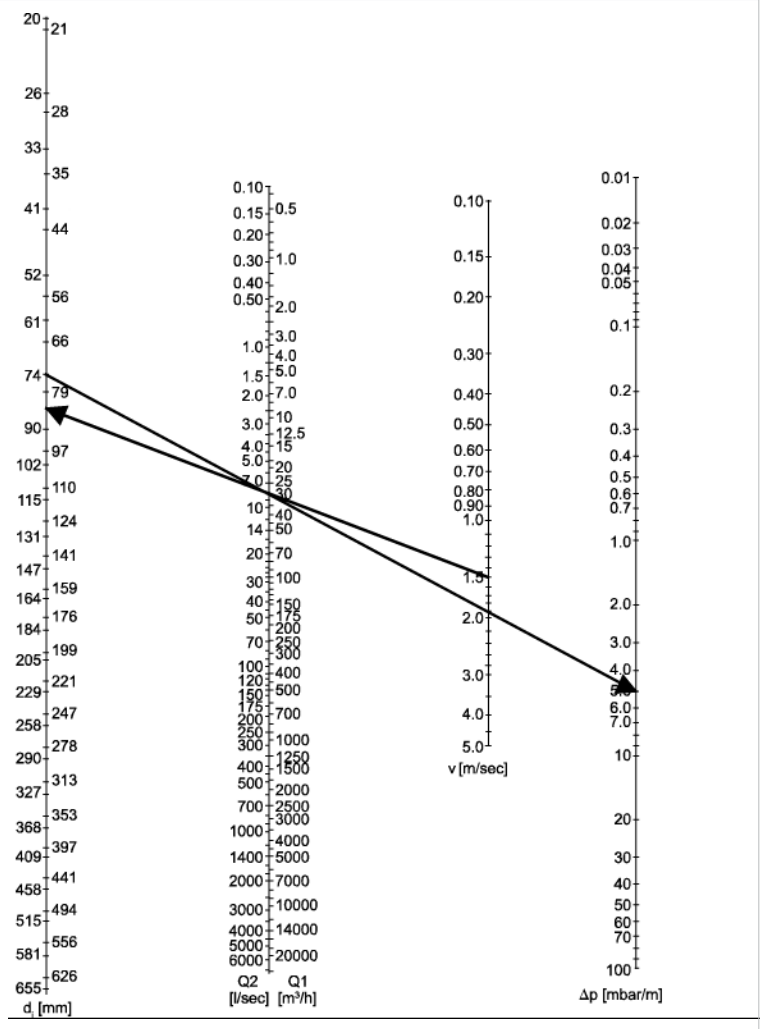
The nomogram below can be used to simplify the determination of the diameter required. The pressure loss in the pipe can be read off per meter of the pipe length.

The pressure loss calculated using the nomogram only applies to flows of substances with density 1000 kg/m³, i.e. water. Further pressure losses from fittings, valves, etc. also need to be considered using the instructions that follow.

Using the nomogram

Based on a flow velocity of 4.9 ft/s (1.5 m/s), a line is drawn through the desired flow rate (i.e. 30 m³/h) to the axis which shows an internal diameter d_i (≈ 84 mm). Here, a closely matching diameter (74 mm for SDR11) and a second line is drawn back through the desired flow rate to the pressure drop axis Δp (5 mbar per meter of pipe).

Nomogram for COOL-FIT® PE Plus pipe (PE, SDR11) using the metric system



For detailed information on the determination of diameter and pressure loss, see Planning Fundamentals "Hydraulic calculation and pressure losses of metric industrial piping systems".

4.6 Pressure loss

Pressure loss in straight pipe

In determining pressure losses in straight pipe sections, a distinction is made between laminar and turbulent flows. The Reynolds number (Re) determines this. The change from laminar to turbulent occurs at the critical Reynolds number Re_{crit} = 2320.

In practice laminar flows occur particularly for the movement of viscous liquids. In most applications, including flows of aqueous materials, there is turbulent flow with a substantially more uniform velocity distribution over the pipe cross-section than in laminar flow.

The pressure loss in a straight pipe section is inversely proportional to the pipe diameter and is calculated as follows:

$$\Delta p_R = \lambda \cdot \frac{L}{d_i} \cdot \frac{\rho}{2 \cdot 10^2} \cdot v^2$$

Δp_R	Pressure loss in the straight pipe run (bar)
λ	Pipe friction factor
L	Length of the straight pipe section (m)
d_i	Inner diameter of the pipe (mm)
ρ	Density of the flow material (kg/m³) (1 g/cm³ = 1000 kg/m³) for water 20 °C = 998.2 kg/m³
v	Flow velocity v (m/s)

In practice, when making a rough calculation (i. e. smooth plastic pipe and turbulent flow) it is enough to use the value λ = 0.02 to represent the hydraulic pressure loss.

Pressure losses in fittings

Coefficient of resistance

The pressure losses depend upon the type of fitting as well as on the flow in the fitting. The so-called coefficient of resistance (ζ value) is used for calculations.

Fitting type	Coefficient of resistance ζ	
Elbow 90°	1.2	
Elbow 45°	0.3	
Tee-90[1)]	1.3	
Reducer (contraction)	0.5	
Reducer (extension)	1.0	
Coupler, Flange joints, Transition Fittings	d32: 0.8 d40: 0.7 d50: 0.6	d63: 0.4 d75: 0.3 d90-d225: 0.1

1) For a more detailed view differentiate between coalescence and separation values for ζ up to a maximum of 1.3 can be found in the respective literature. The overall pressure loss in a Tee is very small, it is reasonable to assume ζ = 1.3

Calculation of the pressure loss

To calculate the total pressure loss in all fittings in a piping system, take the sum of the individual losses, i. e. the sum of all the ζ-values. The pressure loss can then be calculated according to the following formula:

$$\Delta p_{Fi} = \Sigma\zeta \cdot \frac{v^2}{2 \cdot 10^5} \cdot \rho$$

Δp_{Fi}	Pressure loss of all fittings (bar)
$\Sigma\zeta$	Sum of all individual losses
v	Flow velocity v (m/s)
ρ	Density of the medium in kg/m³ (1 g/cm³ = 1000 kg/m³)

Pressure loss in valves

The k_v factor is a convenient means of calculating the hydraulic flow rates for valves. It allows for all internal resistances and for practical purposes is regarded as reliable. It is defined as the flow rate of water in liters per minute with a pressure drop of 1 bar across the valve. The technical data of the Georg Fischer Piping Systems valves contains the k_v values as well as pressure loss charts. The latter make it possible to read off the pressure loss directly. But the pressure loss can also be calculated from the k_v value according to the following formula:

$$\Delta p_{Ar} = \left(\frac{Q}{k_v}\right)^2 \cdot \frac{\rho}{1000}$$

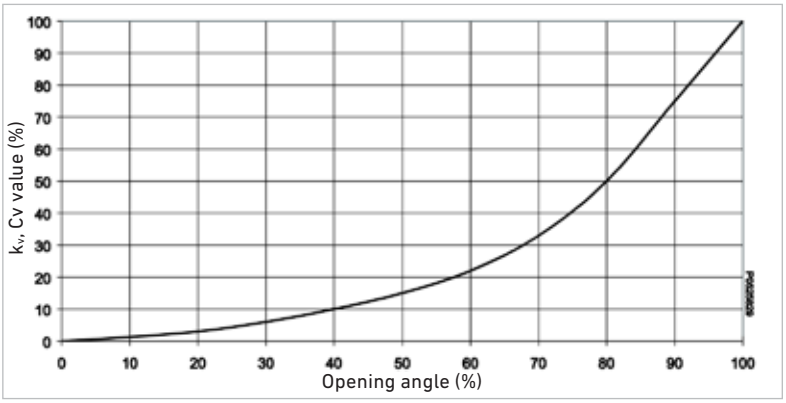
Δp_{Ar}	Pressure loss for the valve (bar)
Q	Flow rate (m³/h)
ρ	Density of the conveyed medium (kg/m³) (1 g/cc = 1000 kg/m³)
k_v	Valve characteristic value (m³/h)

Valves

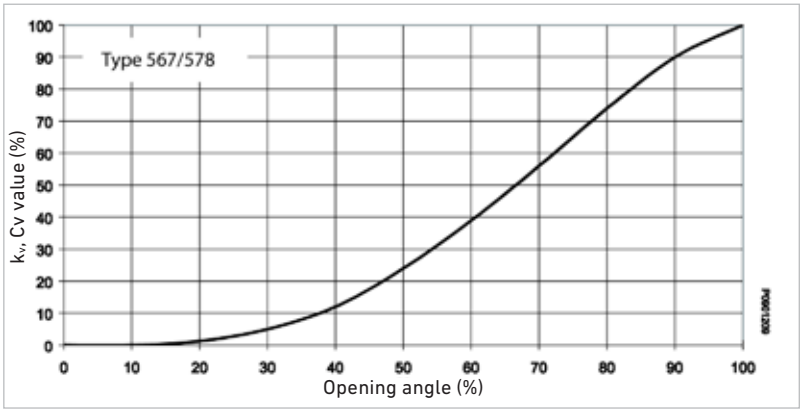
DN (mm)	Size (inch)	K_v 100 (l/min)	C_v100 (gal/min)	K_v 100 (m³/h)
32[1]	1	700	49.0	42
40[1]	1 ¼	1000	70.0	60
50[1]	1 ½	1600	112.0	96
63[1]	2	3100	217.1	186
75[1]	2 ½	5000	350.0	300
90[1]	3	7000	490.0	420
110[2]	4	6500	455	390
160[2]	6	16600	1162	1000
225[2]	8	39600	2772	2380

1) COOL-FIT PE Plus Ball valve
2) COOL-FIT PE Plus Butterfly valve

Flow characteristic Ball valve



Flow characteristic butterfly valve



Pressure difference between the static pressure

If the piping system is installed vertically, then a geodetic pressure difference must be calculated for it. This pressure difference is calculated as follows:

$$\Delta p_{geod} = \Delta H_{geod} \cdot \rho \cdot 10^{-4}$$

Δp_{geod}	Geodetic pressure difference (bar)
ΔH_{geod}	Difference in elevation of the piping system (m)
ρ	Density of the medium (kg/m³) (1 g/cm³ = 1000 kg/m³)

At closed systems, the geodetic pressure difference does not need to be considered

Sum of pressure losses

The sum of all pressure drops for a piping system is calculated as follows:

$$\Sigma\Delta p = \Delta p_R + \Delta p_{Fi} + \Delta p_{Ar} + \Delta p_{geo}$$

Example for pressure drop calculations

The following example illustrates the calculation process for determining the pressure loss of a piping system.

		Number of Fittings
COOL-FIT PE Plus pipe	d40 mm	12 x 90° angle
SDR11 - flow rate	1.5 l/s	4 x 45° angle
Medium	Water	3 x T-piece
Density of the medium	1.0 g/cm³	3 x screws
Length straight pipe	15 m	2 x flange connections
Height difference	2.0 m	1 x ball valve, 80 % opened

The wall thickness of the piping system can be calculated as follows with the SDR:

$$e = \frac{d}{SDR} = \frac{40\ mm}{11} = 3.6\ mm$$

The inner diameter of the piping system is as follows:

$$d_i = d - 2 \cdot e = d - \frac{2 \cdot d}{SDR} = 32.8\ mm$$

With the desired flow rate of 1.5 l/s, the flow velocity is as follows:

$$v = 1275 \cdot \frac{Q_2}{d_i^2} = 1275 \cdot \frac{1.5}{32.8^2}\ \frac{m}{sec} = 1.78\ \frac{m}{sec}$$

Pressure loss	Formula
Pressure loss for straight pipe sections	$\Delta p_R = 0.02 \cdot \frac{15}{32.8} \cdot \frac{1000}{2 \cdot 10^2} 1.78^2 = 0.14$ bar
Pressure loss for fittings incl. connections	$\Sigma\zeta = (12 \cdot 1.2) + (4 \cdot 0.3) + (3 \cdot 1.3) + (5 \cdot 0.7) = 23$
	$\Delta p_{Fi} = 23 \cdot \frac{1.78^2}{2 \cdot 10^5} \cdot 1000 = 0.36$ bar
Pressure loss for the valve 80 % opened. With the flow characteristics diagram for ball valves type 546, from an 80 % opening angle a percentile k_v value of 50 % can be read out,that means 50 % of the k_v value 100: 0.5 * 60 m^3/ H (flow rate 1.5 l/s = 5.4 m^3/h)	$\Delta p_{Ar} = \left(\frac{5.4}{0.5 \cdot 60}\right)^2 \cdot \frac{1000}{1000} = 0.03$ bar
Pressure loss of height difference	$\Delta p_{geod} = 2.0 \cdot 1000 \cdot 10^{-4} = 0.2$ bar
Whole pressure loss of the piping	$\Sigma\Delta p = 0.14$ bar + 0.36 bar + 0.03 bar + 0.2 bar = 0.73 bar

4.7 Dimension comparison of COOl-FIT PE Plus and Metal

COOL-FIT PE Plus		Metal	
d (mm)	d_i (mm)	d (inches)	d_a (mm)
32	26.2	1	33.7
40	32.6	1 ¼	42.4
50	40.8	1 ½	48.3
63	51.4	2	60.3
75	61.4	2 ½	75.3
90	73.6	3	88.9
110	90.0	4	114.3
160	141.0	6	168.3
225	198.2	8	193.7
280	246.8	10	273.0
315	277.6	12	323.9
355	312.8	14	355.6
400	352.6	16	406.4
450	396.6	18	457.0

d) Nominal external diameter of PE/metal pipe

d_i) Nominal internal diameter of pipe

4.8 Z-dimension method

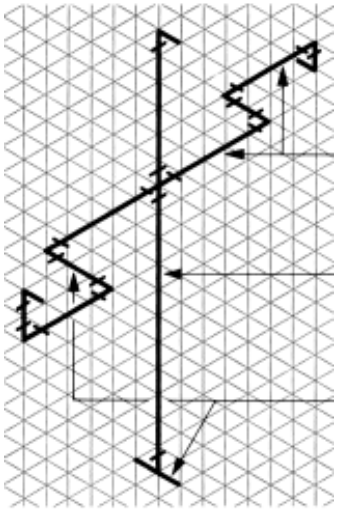
Overview

The Georg Fischer Piping Systems method of assembly is highly efficient. We use a fast and precise way of preparing whole groups of the pipe according to the engineering design plan.

The respective pipe group with the corresponding design dimensions and cut lengths can be entered into the isometric paper of Georg Fischer Piping Systems, see Measuring Sheet on page 28.

Please adhere to the following guidelines for drawing:

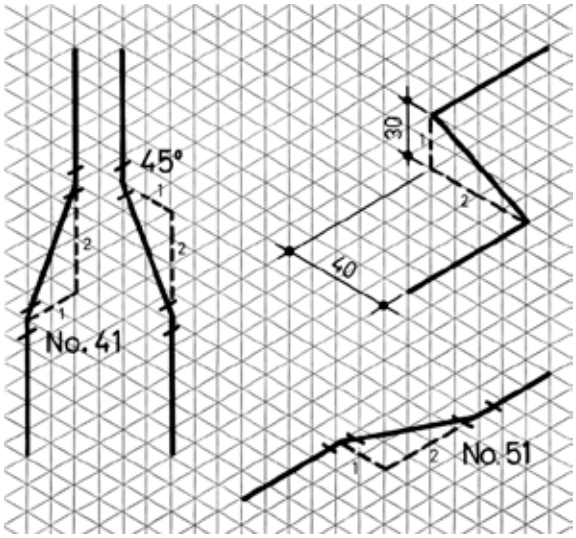
Pipe running perpendicular to one another	Pipe running diagonally



Horizontally:
left and right

Vertical

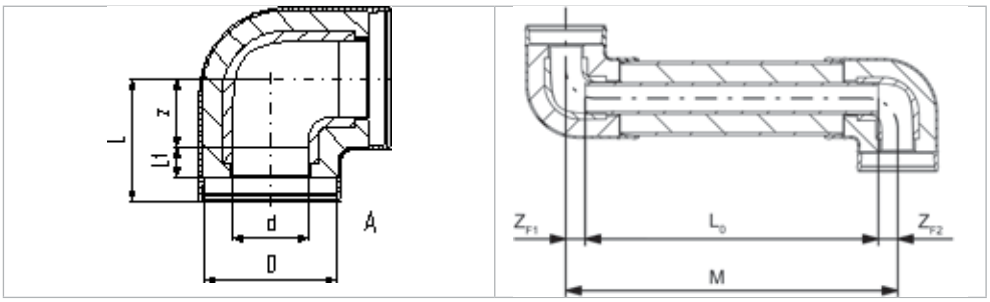
Horizontally:
front and rear



The z-dimensions of the fittings are needed for determining the actual cutting lengths of the pipe. The tables in our product ranges and in the online catalogs contain all the relevant data for the fittings. The length of pipe to be cut is given as in the following diagram by the distance between the center of adjoining fittings less the sum of the z-dimension of the fittings. (See page 27 for the pipe cut length).

Procedure

Electrofusion



Formula for determining the required pipe length

$L_0 = M - Z_{F1} - Z_{F2}$

L_0 Pipe length to be cut
M Center to center distance between fittings
z_{F1} z measurement for fitting 1
z_{F2} z measurement for fitting 2

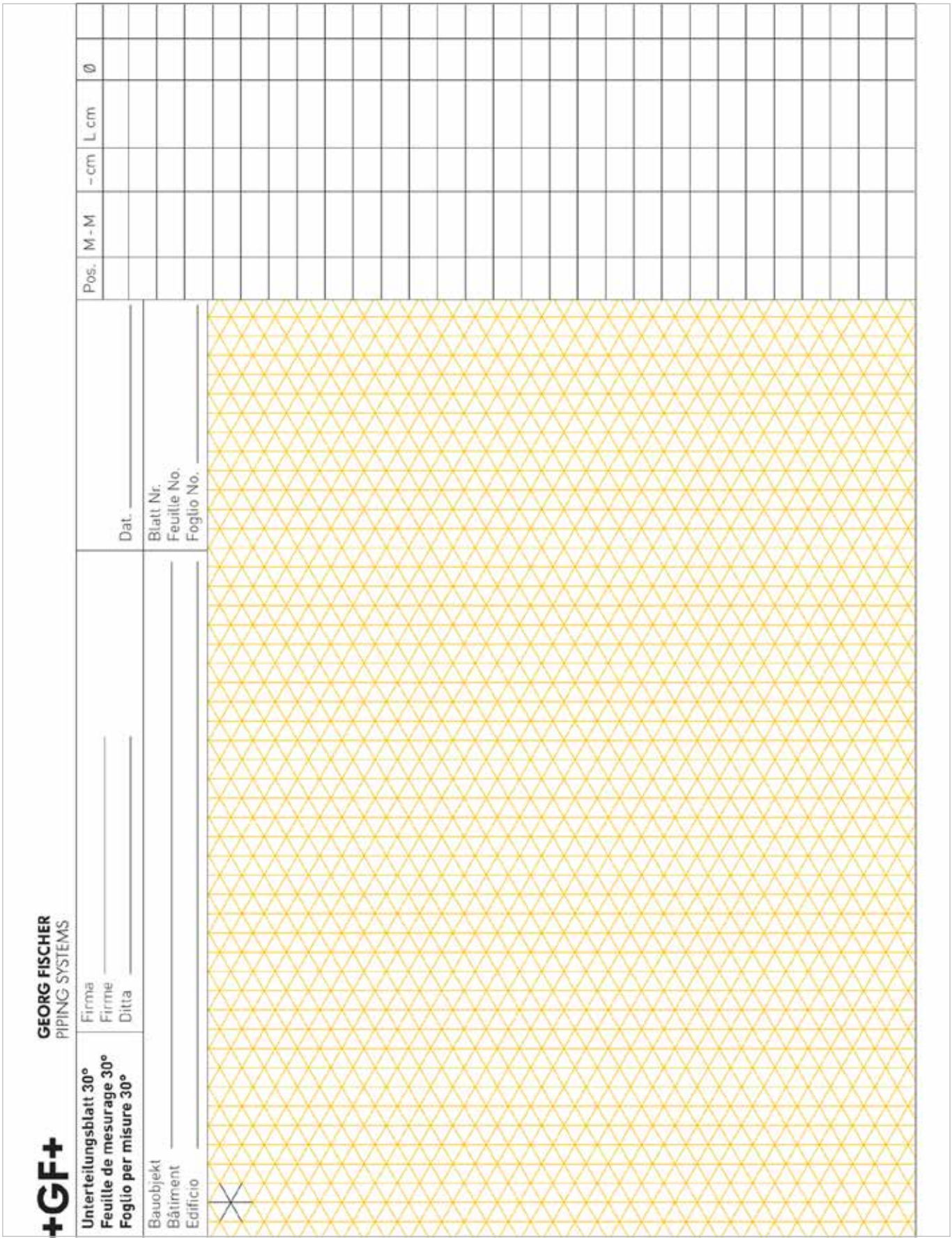
Example

Dimension	d32/D90
Center to center distance M	1000 mm
z measurement for 90° elbow z_{F1}	20 mm
z measurement for 90° elbow z_{F2}	20 mm

M = 1000 mm; L_0 = ?

L_0 = 1000 mm – 20 mm – 20 mm = 960 mm

Measuring Sheet



4.9 Length changes and flexible sections

Overview

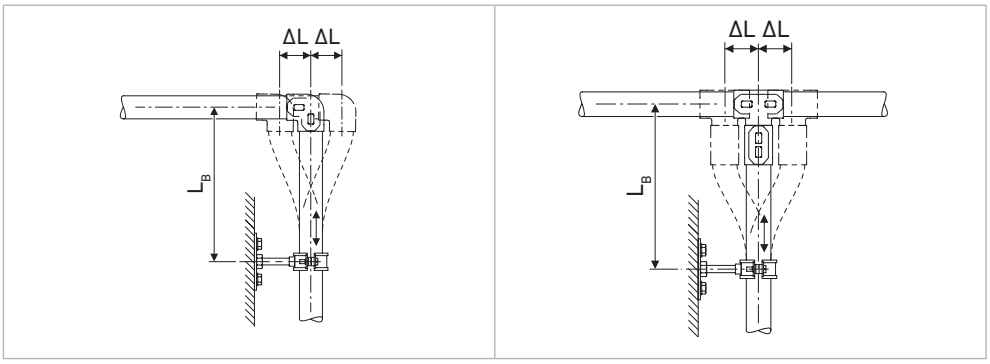
Length changes ΔL and expansion bend L_B – General

All materials expand or contract. Variations in temperature cause more significant length changes in thermoplastic materials than in metals. In the case of an above-ground installation, wall or duct mounted pipework, it is necessary to make suitable provision for length changes to prevent additional stresses.

To accommodate a change in length, the following options can be considered:

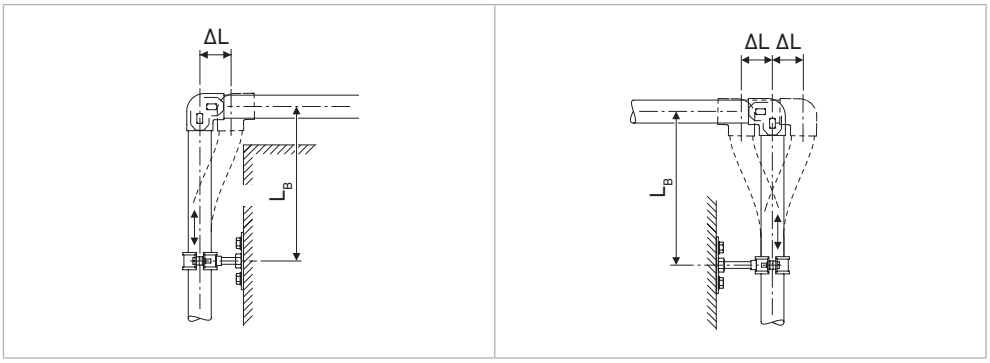
A Flexible sections
B Flexible hoses
C Compensators

Flexible sections are the most common, the simplest and the most economical solution. The calculations and positioning of flexible sections are therefore described in detail.



ΔL) Change in length
L_B) Flexible section

Thermoplastics are subject to more significant thermal expansion and contraction than metallic materials. A pipe installed above ground, against walls or in ducts, require changes in length to prevent any extra strain on the pipe.



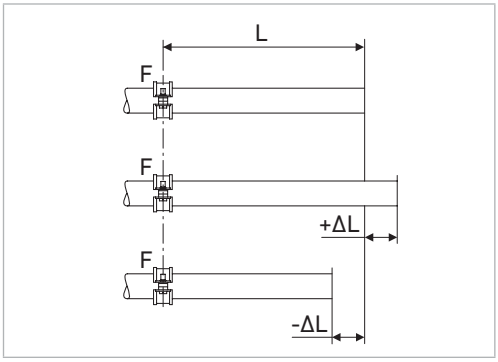
Flexible sections arise naturally at any branching or change in the direction of the piping system. Fixed pipe brackets must not restrain the movement L_B of the flexible section as a result of a change ΔL in length.

Length Change Calculation

To determine the **change in length due to temperature** ΔL (mm) of COOL-FIT PE Plus pipe, the following temperatures must be known:

Installation temperature

- Minimum flow temperature
- Maximum flow temperature
- Minimum ambient temperature
- Maximum ambient temperature



F) Fixpoint
L) Length of pipe section

The following tables show changes in length at different media temperatures for certain conditions. To determine the change in length for other conditions, the COOLING Tool-Box can be used. Contact your local Georg Fischer Piping Systems representative or visit www.gfps.com

Example of use:

Installation temperature	77°F (25 °C)
Min. ambient temperature	77°F (25 °C) constant
Max. ambient temperature	77°F (25 °C) constant
Min. flow temperature	See table
Max. flow temperature	77°F (25 °C)

Length change ΔL (mm) at 20° C (68°F) flow temperature				
L (m)	25	50	100	150
d32	-5	-10	-20	-30
d40	-5	-11	-22	-33
d50	-7	-14	-29	-43
d63	-8	-17	-33	-58
d75	-9	-18	-36	-66
d90	-10	-20	-40	-72
d110	-11	-23	-45	-81
d160	-10	-21	-42	-63
d225	-12	-24	-47	-71

Length change ΔL (in) at 20° C (68°F) flow temperature				
L (ft)	82	164	328	492
d32	-0.2	-0.4	-0.8	-1.2
d40	-0.2	-0.4	-0.9	-1.3
d50	-0.3	-0.6	-1.1	-1.7
d63	-0.3	-0.7	-1.3	-2.3
d75	-0.4	-0.7	-1.4	-2.6
d90	-0.4	-0.8	-1.6	-2.8
d110	-0.4	-0.9	-1.8	-3.2
d160	-0.4	-0.8	-1.7	-2.5
d225	-0.5	-0.9	-1.9	-2.8

L) Pipe length

Length change ΔL (mm) at 15° C (59°F) flow temperature				
L (m)	25	50	100	150
d32	-11	-21	-42	-63
d40	-11	-23	-46	-69
d50	-15	-30	-61	-91
d63	-17	-35	-69	-104
d75	-19	-38	-75	-113
d90	-21	-42	-84	-125
d110	-23	-47	-94	-140
d160	-22	-43	-86	-129
d225	-24	-48	-97	-145

Length change ΔL (in) at 15° C (59°F) flow temperature				
L (ft)	82	164	328	492
d32	-0.4	-0.8	-1.7	-2.5
d40	-0.4	-0.9	-1.8	-2.7
d50	-0.6	-1.2	-2.4	-3.6
d63	-0.7	-1.4	-2.7	-4.1
d75	-0.7	-1.5	-3.0	-4.4
d90	-0.8	-1.7	-3.3	-4.9
d110	-0.9	-1.9	-3.7	-5.5
d160	-0.9	-1.7	-3.4	-5.1
d225	-0.9	-1.9	-3.8	-5.7

L) Pipe length

Length change ΔL (mm) at 10° C (50°F) flow temperature				
L (m)	25	50	100	150
d32	-17	-33	-66	-100
d40	-18	-36	-72	-109
d50	-24	-48	-95	-143
d63	-27	-54	-108	-161
d75	-29	-58	-117	-175
d90	-32	-64	-129	-193
d110	-36	-72	-144	-215
d160	-33	-66	-133	-199
d225	-37	-74	-148	-222

Length change ΔL (in) at 10° C (50°F) flow temperature				
L (ft)	82	164	328	492
d32	-0.7	-1.3	-2.6	-3.9
d40	-0.7	-1.4	-2.8	-4.3
d50	-0.9	-1.9	-3.7	-5.6
d63	-1.1	-2.1	-4.3	-6.3
d75	-1.1	-2.3	-4.6	-6.9
d90	-1.3	-2.5	-5.1	-7.6
d110	-1.4	-2.8	-5.7	-8.5
d160	-1.3	-2.6	-5.2	-7.8
d225	-1.5	-2.9	-5.8	-8.7

L) Pipe length

Length change ΔL (mm) at 5° C (41°F) flow temperature				
L (m)	25	50	100	150
d32	-23	-46	-93	-139
d40	-25	-50	-101	-151
d50	-33	-66	-131	-197
d63	-37	-74	-148	-222
d75	-40	-80	-160	-240
d90	-44	-88	-176	-264
d110	-49	-97	-195	-292
d160	-45	-91	-181	-272
d225	-50	-100	-200	-301

Length change ΔL (in) at 5° C (41°F) flow temperature				
L (ft)	82	164	328	492
d32	-0.9	-1.8	-3.7	-5.5
d40	-1.0	-2.0	-4.0	-5.9
d50	-1.3	-2.6	-5.2	-7.8
d63	-1.5	-2.9	-5.8	-8.7
d75	-1.6	-3.1	-6.3	-9.4
d90	-1.7	-3.5	-6.9	-10.4
d110	-1.9	-3.8	-7.7	-11.5
d160	-1.8	-3.6	-7.1	-10.7
d225	-2.0	-3.9	-7.9	-11.9

L) Pipe length

Length change ΔL (mm) at 0° C (32°F) flow temperature				
L (m)	25	50	100	150
d32	-30	-60	-121	-181
d40	-33	-65	-131	-196
d50	-42	-85	-169	-254
d63	-47	-95	-190	-285
d75	-51	-102	-205	-307
d90	-56	-112	-224	-336
d110	-62	-124	-247	-371
d160	-58	-115	-230	-346
d225	-63	-127	-254	-381

Length change ΔL (in) at 0° C (32°F) flow temperature				
L (ft)	82	164	328	492
d32	-1.2	-2.4	-4.8	-7.1
d40	-1.3	-2.6	-5.2	-7.7
d50	-1.7	-3.3	-6.7	-10.0
d63	-1.9	-3.7	-7.5	-11.2
d75	-2.0	-4.0	-8.1	-12.1
d90	-2.2	-4.4	-8.8	-13.2
d110	-2.4	-4.9	-9.7	-14.6
d160	-2.3	-4.5	-9.1	-13.6
d225	-2.5	-5.0	-10.0	-15.0

L) Pipe length

Length change ΔL (mm) at -5° C (23°F) flow temperature				
L (m)	25	50	100	150
d32	-37	-75	-150	-225
d40	-41	-81	-162	-243
d50	-52	-104	-208	-313
d63	-58	-116	-233	-349
d75	-63	-125	-250	-375
d90	-68	-137	-273	-410
d110	-75	-150	-300	-449
d160	-70	-140	-280	-421
d225	-77	-154	-307	-461

Length change ΔL (in) at -5° C (23°F) flow temperature				
L (ft)	82	164	328	492
d32	-1.5	-3.0	-5.9	-8.9
d40	-1.6	-3.2	-6.4	-9.6
d50	-2.0	-4.1	-8.2	-12.3
d63	-2.3	-4.6	-9.2	-13.7
d75	-2.5	-4.9	-9.8	-14.8
d90	-2.7	-5.4	-10.7	-16.1
d110	-3.0	-5.9	-11.8	-17.7
d160	-2.8	-5.5	-11.0	-16.6
d225	-3.0	-6.1	-12.1	-18.1

L) Pipe length

Length change ΔL (mm) at -10° C (14°F) flow temperature				
L (m)	25	50	100	150
d32	-45	-90	-180	-270
d40	-49	-97	-195	-292
d50	-62	-124	-245	-373
d63	-69	-138	-276	-414
d75	-74	-148	-296	-445
d90	-81	-161	-322	-483
d110	-88	-176	-352	-528
d160	-83	-165	-331	-496
d225	-90	-180	-361	-541

Length change ΔL (in) at -10° C (14°F) flow temperature				
L (ft)	82	164	328	492
d32	-1.8	-3.5	-7.1	-10.6
d40	-1.9	-3.8	-7.7	-11.5
d50	-2.4	-4.9	-9.6	-14.7
d63	-2.7	-5.4	-10.9	-16.3
d75	-2.9	-5.8	-11.7	-17.5
d90	-3.2	-6.3	-12.7	-19
d110	-3.5	-6.9	-13.9	-20.8
d160	-3.3	-6.5	-13.0	-19.5
d225	-3.5	-7.1	-14.2	-21.3

L) Pipe length

Length change ΔL (mm) at -15° C (5°F) flow temperature				
L (m)	25	50	100	150
d32	-53	-106	-211	-317
d40	-57	-114	-228	-342
d50	-72	-145	-289	-434
d63	-80	-160	-320	-481
d75	-86	-171	-343	-514
d90	-93	-186	-372	-558
d110	-101	-202	-405	-607
d160	-95	-190	-381	-571
d225	-104	-207	-414	-621

Length change ΔL (in) at -15° C (5°F) flow temperature				
L (ft)	82	164	328	492
d32	-2.1	-4.2	-8.3	-12.5
d40	-2.2	-4.5	-9.0	-13.5
d50	-2.8	-5.7	-11.4	-17.1
d63	-3.1	-6.3	-12.6	-18.9
d75	-3.4	-6.7	-13.5	-20.2
d90	-3.7	-7.3	-14.6	-22
d110	-4.0	-8.0	-15.9	-23.9
d160	-3.7	-7.5	-15.0	-22.5
d225	-4.1	-8.1	-16.3	-24.4

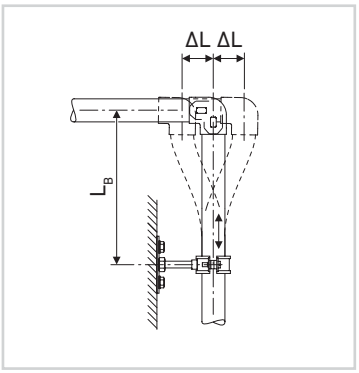
L) Pipe length

COOL-FIT® PE Plus Flexible sections

Flexible Section L_B

The values for L_B (mm) from this table can be used for a given ΔL (mm) and the relevant pipe size:

Flexible section L_B (mm)													
ΔL (mm)	10	20	30	40	50	60	70	80	90	100	150	200	300
d32	78	110	135	156	174	191	206	221	234	247	302	349	427
d40	86	122	149	172	193	211	228	244	259	273	334	386	472
d50	86	122	149	172	193	211	228	244	259	273	334	386	472
d63	92	130	159	184	206	225	243	260	276	291	356	411	503
d75	97	138	168	195	218	238	257	275	292	308	377	435	533
d90	104	147	180	208	233	255	275	294	312	329	403	465	570
d110	110	156	191	221	247	270	292	312	331	349	427	493	604
d160	130	184	225	260	291	318	344	368	390	411	503	581	712
d225	146	206	253	292	326	357	386	413	438	461	565	653	799

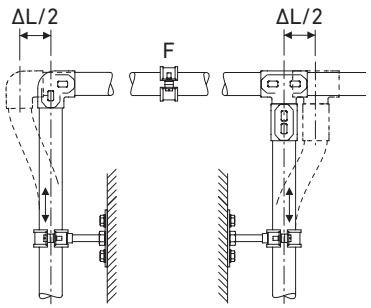
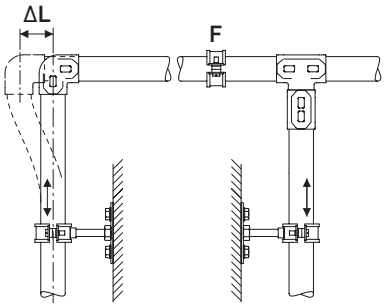


Flexible section L_B (in)													
ΔL (mm)	10	20	30	40	50	60	70	80	90	100	150	200	300
d32	3.07	4.33	5.31	6.14	6.85	7.52	8.11	8.70	9.21	9.72	11.89	13.74	16.81
d40	3.39	4.80	5.87	6.77	7.60	8.31	8.98	9.61	10.20	10.75	13.15	15.20	18.58
d50	3.39	4.80	5.87	6.77	7.60	8.31	8.98	9.61	10.20	10.75	13.15	15.20	18.58
d63	3.62	5.12	6.26	7.24	8.11	8.86	9.57	10.24	10.87	11.46	14.02	16.18	19.80
d75	3.82	5.43	6.61	7.68	8.58	9.37	10.12	10.83	11.50	12.13	14.84	17.13	20.98
d90	4.09	5.79	7.09	8.19	9.17	10.04	10.83	11.57	12.28	12.95	15.87	18.31	22.44
d110	4.33	6.14	7.52	8.70	9.72	10.63	11.50	12.28	13.03	13.74	16.81	19.41	23.78
d160	5.12	7.24	8.86	10.24	11.46	12.52	13.54	14.49	15.35	16.18	19.80	22.87	28.03
d225	5.75	8.11	9.96	11.50	12.83	14.06	15.20	16.26	17.24	18.15	22.24	25.71	31.46

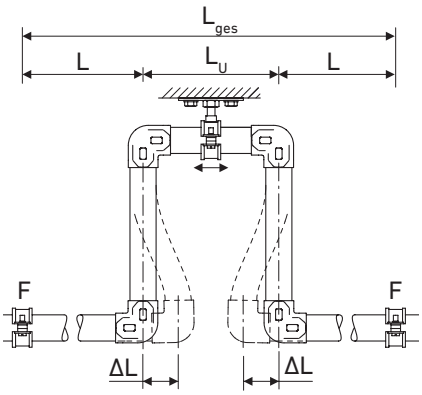
4.10 Installation

Recommendations for installation

Most piping systems have occasional changes in directions which will allow the thermally included length changes to be compensated for offsets of the pipe beyond the bends. The following examples show how the changes can be distributed in pipe sections by suitable positioning of fixed brackets:

Recommended installation	Not recommended installation
	

Expansion loops can be installed to compensate changes in length when flexible sections cannot be included at a change in direction or branch in the piping system or if substantial changes in the length of a straight section need to be compensated. In such a case the compensation for changes in length is distributed over two flexible sections.



Bending stress can lead to leaks in mechanical joints.

Do not use any unions or flanged connections close to expansion bends and loops.

Pre-Stressing

In particularly difficult situations with large changes in one direction only, it is possible to pre-stress the flexible section during installation in order to reduce the length of LB, as illustrated in the next example:

Example

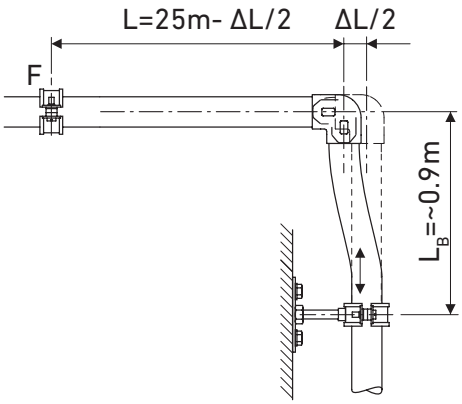
Pipe length L	25 m
Diameter	d225/D315 mm
Installation temperature	77°F (25 °C)
Min ambient temperature	77°F (25 °C) constant
Max ambient temperature	77°F (25 °C) constant
Min flow temperature	50°F (10 °C)
Max flow temperature	77°F (25 °C)

Change in length from the table or COOLING Tool-Box:
-ΔL = 39 mm

A flexible section to take up a change in length of +/- ΔL = 40 mm needs to be L_B (mm) = 2920 mm long according to the table.

If the flexible section is pre-stressed to ΔL/2, the flexible section required is reduced to ~2060 mm (2.06 m). The change in length starting from the 0 position is then +/- ΔL/2 = 39/2 = 19.5 mm. (0.77")

By pre-stressing the flexible section makes it possible to reduce its required length in installations where space is restricted. Pre-stressing also reduces the bending of the flexible section in service, improving the appearance of the piping system.



4.11 Pipe bracket spacing and support of piping systems

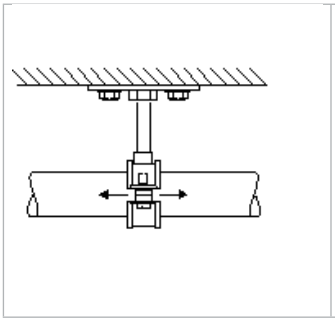
Overview

COOL-FIT PE Plus pipe should be installed using supports designed for use with plastics and should be installed taking care not to damage or overstress the pipe.

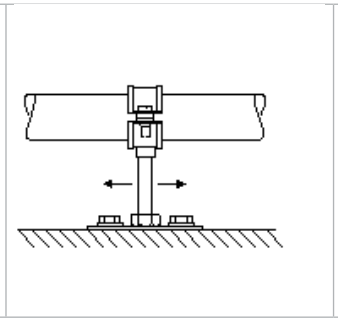
Thanks to the excellent insulating properties of the COOL-FIT PE Plus pipe and its hard, impact resistant outer jacket, standard pipe clamps with hard plastic inlay may be used.

Pipe Bracket Requirements

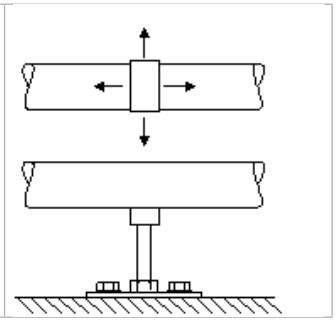
A loose bracket is a pipe bracket which allows axial movement of the pipe. This allows stress-free compensation of temperature changes and compensation of any other operating condition changes.



Axial displacement of the pipe through the clamp.



The pipe is fixed by the clamp with free axial displacement

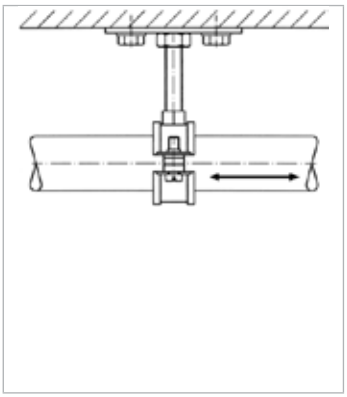


The pipe is fixed by the clamp with free biaxial displacement

The inner diameter of the bracket must be larger than the outer diameter of the pipe to allow free movement of the pipe. The inner edges of the brackets should be free from any sharp contours to avoid damaging the pipe surface.

It is recommended to use brackets with spacers in the bolts which also avoids clamping the bracket on the pipe

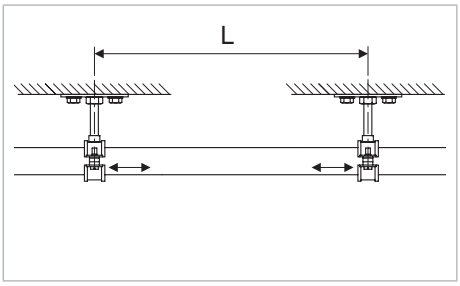
The axial movement of the piping may not be hindered by fittings arranged next to the pipe bracket or other diameter changes. Sliding brackets and hanging brackets permit the pipe to move in different directions. Attaching a sliding block to the base of the pipe bracket allows free movement of the pipe along a flat supporting surface. Sliding and hanging brackets are needed in situations where the piping system changes direction and free movement of the pipe must be allowed.



Spacers prevent pinching the pipe

Pipe bracket spacing

Plastic pipelines need to be supported at certain intervals depending on several factors; the material, the average pipe wall temperature, the density of the fluid transported and the size & wall thickness of the pipe. Determining the spacing between pipe brackets is based on the permissible deflection of the pipe between consecutive brackets.



L) Pipe bracket spacing

Pipe bracket intervals L for COOL-FIT PE Plus

d/D (mm)	32/90	40/110	50/110	63/125	75/140	90/160	110/180	160/250	225/315
L (ft)	5.91	6.4	6.4	6.56	6.89	7.05	7.55	8.53	9.35

d/D (mm)	250/355	280/400	315/450	355/500	400/560	450/630
L (ft)	10.83	11.48	12.14	12.8	13.45	14.11

d/D (mm)	32/90	40/110	50/110	63/125	75/140	90/160	110/180	160/250	225/315
L (m)	1.80	1.95	1.95	2.00	2.10	2.15	2.30	2.60	2.85

d/D (mm)	250/355	280/400	315/450	355/500	400/560	450/630
L (m)	3.30	3.50	3.70	3.90	4.10	4.30

The pipe clamp intervals from the table can be increased by 30% for vertical pipe. Multiply the values given by 1.3 in this case.

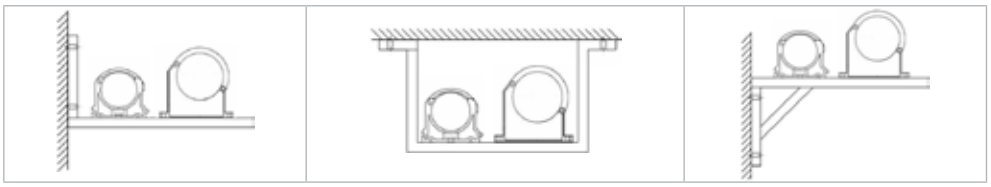
KLIP-IT pipe brackets

These robust plastic pipe brackets can be used not only under rigorous operating conditions, but also where the pipework is subject to aggressive media or atmospheric conditions. Pipe brackets and pipe clamps from Georg Fischer Piping Systems are suitable for all pipe materials used.

Do not use KLIP-IT pipe brackets as fixed points!

COOL FIT PE Plus Pipe sizes d90 to d400

The KLIP-IT brackets must be installed in the standing position (see below image) The support distance given in the following, specified for the KLIP-IT clamps, apply only to the mounting method.



Arranging fixed points

A fixed point is a bracket which prevents the pipe from moving in any direction. The purpose of a fixed point is to control tension caused by temperature changes and guide the expansion/ contraction in a certain direction.

Fixpoint design

The pipe must not be fixed by clamping it in the pipe bracket. This can cause deformation and physical damage to the pipe, damage that sometimes does not appear until very much later.

Pipe brackets must be robust and have the ability to dissipate the forces resulting from changes in pipe length. Hanging brackets or KLIP-IT pipe brackets are unsuitable for use as fixed points.

COOL-FIT® PE Plus Fixpoint

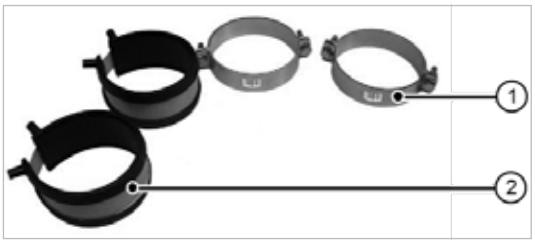
The COOL-FIT PE Plus fixed point consists of fusion tapes and brackets. The electrofusion bands need to be installed on each side of the bracket that will be dissipating the forces (fixed point). There shall be no space between the bands and this bracket. When installing these bands, the use of metal brackets (included) is required to build up the fusion pressure as well as hold them in place during the fusion process. For fusion, use an MSA 2.x, MSA 4.x, MSA 250, 300, 350, 400 or commercially available 110-V electrofusion unit. If you use an MSA electrofusion unit by Georg Fischer Piping Systems, use the y-cable kit with code 790.156.032.

The table below shows the the maximum allowed forces on the fusion bands

Diameter (mm)	32/ 90	40/ 110	50/ 110	63/ 125	75/ 140	90/ 160	110/ 180	d160/ D250	d225/ D315	d250/ D355
Maximum force F (lbs)	449.62	674.43	1124.04	1798.47	2248.08	2248.08	2248.08	2248.08	2248.08	2248.08

⚠ **The fixed points must be calculated according to the application and therefore to the forces generated. Fixed point brackets and cross braces are not included.**

Scope of delivery



1) Clamps to hold the bands in place during the fusion process.
2) Electrofusion band

Y-cable kit for COOL-FIT fixed points

The COOL-FIT Y-cables can be used for a faster installation of COOL-FIT fix points. Since electrofusion bands always come in pairs, Y-cables allow for a simultaneous fusion process, cutting fusion time in half.

Rigidly fixed installations

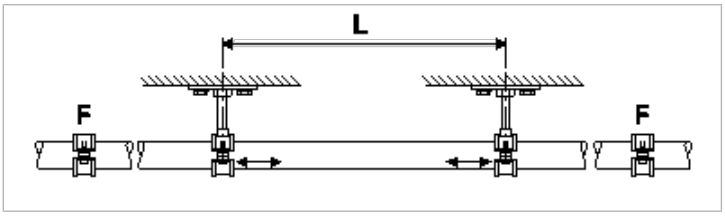
⚠ **The pipe which is axially clamped and rigidly fixed must be tested for damage. In most cases, this test results in a reduction of the maximum internal pressure and more tightly spaced supports. The forces acting on the fixed points should be considered.**

COOL-FIT PE Plus pipe and fittings are suitable for a rigidly fixed installation

Values for forces acting on fixed points as well as the resulting pipe bracket spacing are listed in following tables.

Example of use:

Installation temperature	77°F (25 °C)
Min. ambient temperature	77°F (25 °C) constant
Max. ambient temperature	77°F (25 °C) constant
Min. flow temperature	See table
Max. flow temperature	77°F (25 °C)



Fixpoint forces F and maximal pipe bracket spacing L at 59°F (15 °C) flow temperature									
d/D (mm)	**32/90**	**40/110**	**50/110**	**63/125**	**75/140**	**90/160**	**110/180**	**160/250**	**225/315**
F (kN)	0.42	0.67	0.98	1.53	2.12	3.05	4.5	6.51	12.72*
L (mm)	1800	1950	1900	2000	2100	2150	2200	2600	2850
Fixpoint forces F and maximal pipe bracket spacing L at 41°F (5 °C) flow temperature									
d/D (mm)	**32/90**	**40/110**	**50/110**	**63/125**	**75/140**	**90/160**	**110/180**	**160/250**	**225/315**
F (kN)	0.97	1.53	2.27	3.55	4.93	7.09	10.49*	15.12*	29.59*
L (mm)	1800	1950	1900	2000	2100	2150	2200	2600	2850
Fixpoint forces F and maximal pipe bracket spacing L at 23°F (-5 °C) flow temperature									
d/D (mm)	**32/90**	**40/110**	**50/110**	**63/125**	**75/140**	**90/160**	**110/180**	**160/250**	**225/315**
F (kN)	1.62	2.57	3.84	6.01	8.36	12.03*	17.81*	25.65*	50.27*
L (mm)	1800	1950	1900	2000	2100	2150	2200	2600	2850
Fixpoint forces F and maximal pipe bracket spacing L at 5°F (-15 °C) flow temperature									
d/D (mm)	**32/90**	**40/110**	**50/110**	**63/125**	**75/140**	**90/160**	**110/180**	**160/250**	**225/315**
F (kN)	2.38	3.77	5.66	8.88	12.34*	17.78*	26.34*	37.9*	74.38*
L (mm)	1800	1950	1900	2000	2100	2150	2200	2600	2850

* max allowed force for COOL-FIT fixed point exceeded

⚠ **Please contact Georg Fischer Piping Systems for rigidly fixed installations that contain ball valves and mechanical joints as well as if the max. allowed forced on the fixed points are exceeded**

4.12 Hoses

Installation of elastomer hoses

To ensure the usability of hose lines and to avoid shortening their service life through additional stresses, please note the following:

- Hose lines must be installed so that their natural position and movement is not obstructed.
- During operation, hose lines must in principle not be subjected to external forces such as tension, torsion and compression, unless they have been specially made for the purpose.
- The minimum radius of curvature specified by the manufacturer must be observed.
- Buckling is to be avoided, particularly by the joint.
- Before putting the system into operation, check that the mechanical connections are properly tightened.
- If there is visible external damage, the hose line must not be put into operation.
- The connection fittings should be firmly fastened together.

Proper use of the hose line

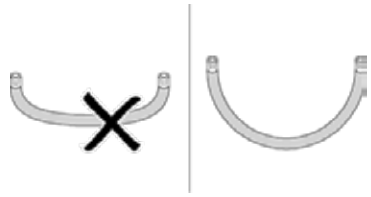
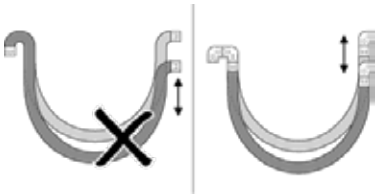
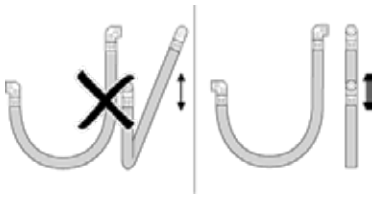
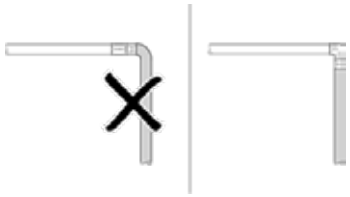
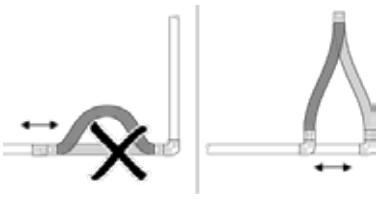
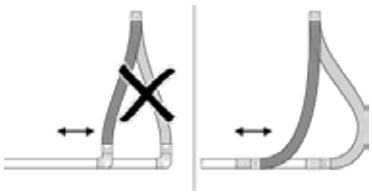
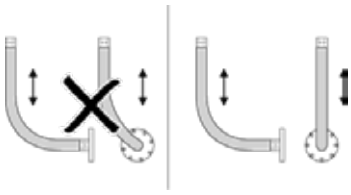
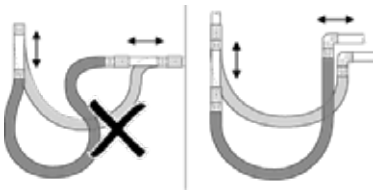
- Pressure: do not exceed maximum permitted working pressure and operating vacuum
- Temperature: do not exceed maximum permitted temperature for the medium

Storage

- Must be stored in a cool, dry, and dust-free area. Avoid direct sunlight or ultraviolet irradiation, and protect the hoses from nearby heat sources. Piping must not come into contact with substances that can cause damage.
- Hoses and hose assemblies must be stored horizontally, free of tension or bending forces.

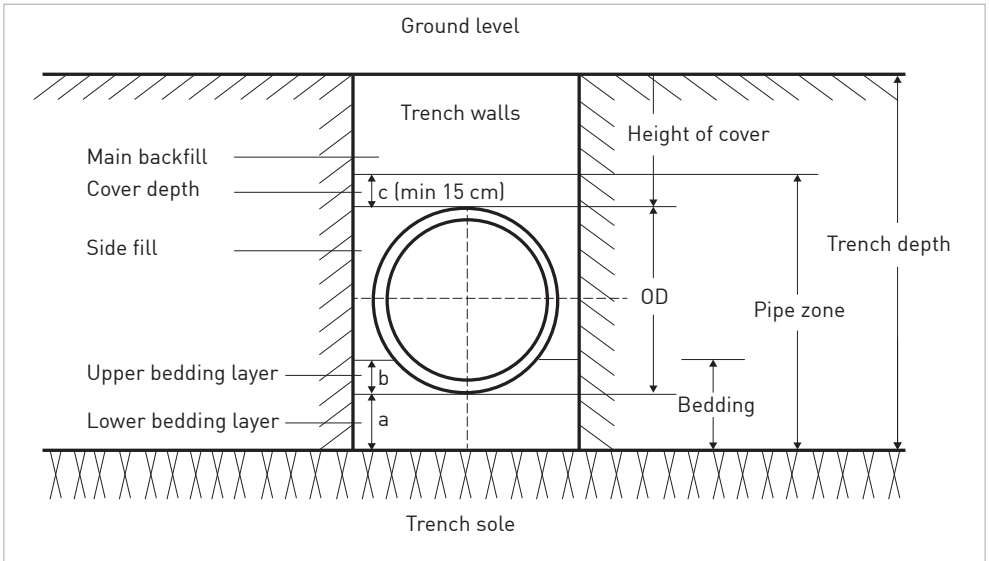
COOL-FIT® Hoses

In order to ensure the functionality of flexible hose joints following installation and handling instructions have to be considered.

Installation and handling instructions (false/correct)	Description
	Ensure hose is long enough to form an even curve radius.
	Avoid excessive bending or curving behind the fitting; use elbows.
	Where there is significant axial expansion, the direction of movement and hose axis must lie in the same plane in order to avoid torsion.
	Avoid excessive bending stress by using elbows.
	If the hose absorbs expansion, it must be installed transversally to the direction of expansion.
	For large lateral movements, a 90° angle should be allowed.
	Expansion take-up must be in the same direction of the pipe to avoid twisting
	For major axial expansion, the pipe must be installed in a U-shape to avoid twisting.

4.13 Underground installation

COOL-FIT PE Plus can be used underground. The corresponding national installation guidelines apply to building the pipe trenches and installing the pipe. In general, trenches should not be less than 1 meter deep; deeper depth recommended if frost is present. The sand bed must be built in such a way that the pipe is evenly supported. The pipe must be laid in a sand bed and protected against sharp stones and debris. The sand must be well compacted.



The pipe zone has to be designed according to planning requirements and static calculations. The area between trench sole and side fill is referred to as bedding. A load-carrying bedding must be created by using soil replacement. For regular soil conditions, EN 1610 specifies a minimum thickness of a = 5.9 (150 mm) in for the lower bedding. In addition to the minimum thickness, corresponding requirements are also imposed on the building materials that must be used for the bedding.

No building materials with components exceeding the following ranges may be used:

- 22 mm for (0.87")

The upper bedding layer b is derived from static calculations. It is also important to ensure that no cavities are created below the pipe. The bedding dissipates all loads from the pipe securely and evenly into the ground. For this reason, the COOL-FIT PE Plus pipe has to rest solidly on the bedding across its entire length. The upper end of the pipe zone is defined according to EN 1610 as 5.9 (150 mm) in above the pipe apex or 3.9 (100 mm) in above the pipe connection. Ensure that the pipe is not damaged when the cover and main backfill are filled and compacted.

The COOL-FIT PE Plus system has a higher degree of stiffness and a higher weight than the non-insulated pipe. For this reason, the pipe should always be connected in the trench. Unnecessary stress on the COOL-FIT PE Plus joining elements thus avoided. Under normal circumstances, it is not necessary to install expansion loops in the system.

A movement of the pipe before filling the pipe trench should be avoided. Please contact Georg Fischer Piping Systems concerning recommendations for underground installations.

4.14 COOLING Tool-Box

The Georg Fischer Piping Systems COOLING Tool-Box is used to help in the dimensioning and design of cooling systems.

The COOLING Tool-Box handles:

- Expansion, contraction
- Flexible section design
- Energy savings
- Pipe dimensioning
- Pressure loss
- Dew point/ insulation thickness
- Weight comparison
- CO_2 footprint

Data for the most commonly used secondary refrigerants are already stored in the calculation tool. It calculates all system components such as pipe, fittings and valves. The menu is available in several different languages. It allows system design to be efficient and optimized. With the function "comparison" a COOL-FIT system can be compared to a black steel, stainless steel or copper system.

COOLING Tool-Box: Get in contact with your Georg Fischer Piping Systems representative or visit www.gfps.com

5 Joining and Installation

5.1 Joining of COOL-FIT® PE Plus

For general information on electrofusion, see Planning Fundamentals chapter "Joining technology", section "Electrofusion joints".

General advice

The quality of a weld is largely determined by careful preparation. The welding surface must be protected from adverse weather conditions such as rain, snow, or wind. The permissible temperature range for fusion is 14°F (-10 °C) to 113°F (45 °C). National regulations must be observed. Indirect sunlight and shielding of the welding area can help create an even temperature profile around the whole circumference of the pipe. It is particularly important to ensure that the climate conditions are the same for both the electro fusion machine and the welding area.

Electrofusion Process

Protect the welding area

The surfaces to be welded on the pipe and the fitting must be carefully protected from dirt, grease, oils and lubricants. Minimum 90% Isopropyl Alcohol is the recommended solution for cleaning.

No fats (i.e. hand cream, oily rags, silicone, etc.) must be introduced into the fusion zone!

Joining d32 – d225

1. Without touching the surface, remove product immediately before the installation from packaging

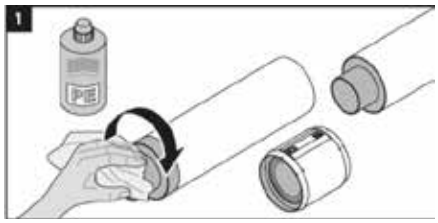
If necessary, prepare the pipe for fusion joints using the Foam removal tool (foam removal, cutting the jacket and peeling the media pipe) and check afterwards that the shaving thickness is 0.008 in - 0.016 in (0.2mm – 0.4mm) and that the minimum permissible external diameter after peeling is met:

- **COOL-FIT PE Plus Valves and COOL-FIT PE Plus Fittings d32 – d225 (Type B, barrel nipple and transition fittings) don't need to be peeled, just cleaned with minimum 90% Isopropyl Alcohol.**

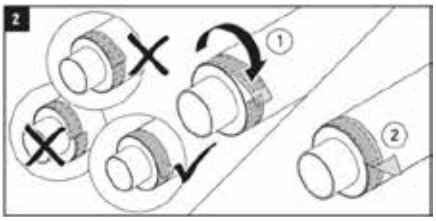
Minimum permitted pipe external diameter after peeling for COOL-FIT PE Plus

d/D (mm)	32/90	40/110	50/110	63/125	75/140	90/160	110/180	160/250	225/315
Min. d (in)	1.2	1.6	1.9	2.5	2.9	3.5	4.3	6.3	8.8

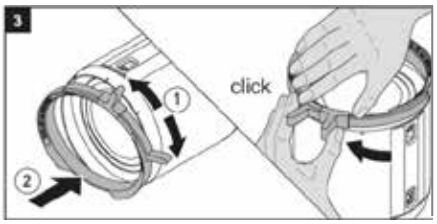
Mounting of sealing tape



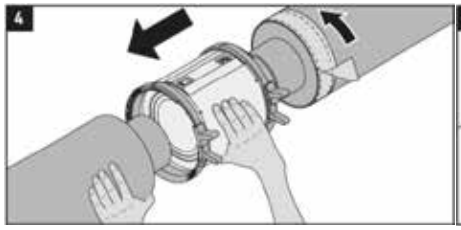
Step 1
In addition to the fusion zone, also clean the jacket of the pipe



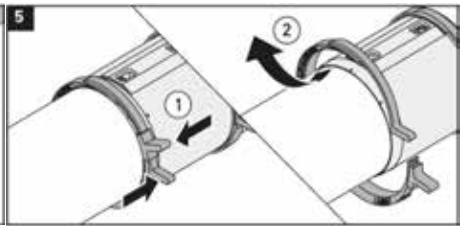
Step 2
Mount sealing tape end to end without offset and fold down liner



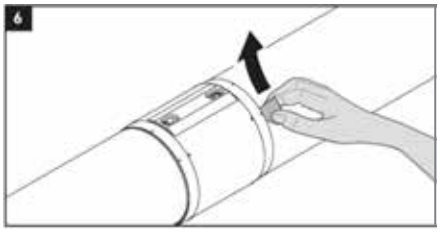
Step 3
Mount the assembly aids on the sealing lips of the COOL-FIT PE Plus fitting



Step 4
On pushing together, slightly turn either fitting or pipe assembled with sealing tape/ transition of insulation

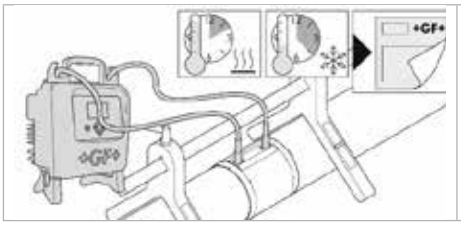


Step 5
Remove the assembly aids

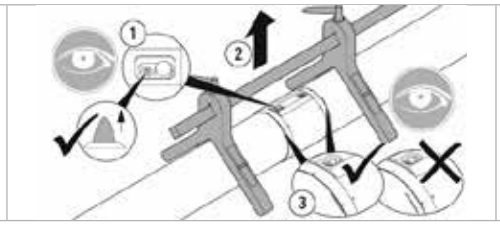


Step 6
Pull off the liner after removal of assembly aids

3. Welding process

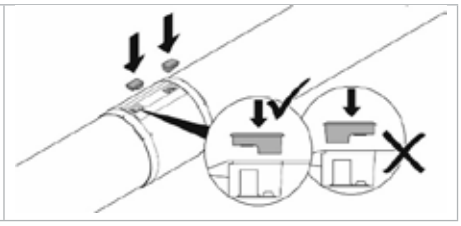


Step 1
Power the machine on, and follow the screen step-by-step fusion process. Use long fusion adaptors (790128035). Pay attention to fusion and cooling time.

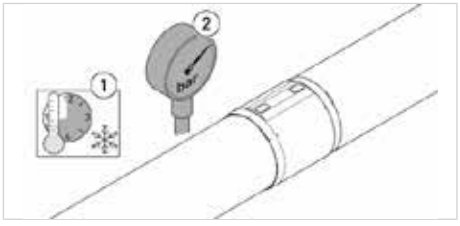


Step 2
After fusion, check fusion indicators on the electrofusion fitting and note the messages on the display of the electrofusion machine.
Mark the fitting with following information
- Date
- Welder/ Weld number
- Time at the end of cooling time

Remove the clamping tool after cooling time



Step 3
Fit the insulation of the weld pins onto the fusion contacts



Step 4
After cooling perform pressure tests as per table.

Cooling Time Table

d (mm)	Cooling time before Remove clamping tool [min.]	Cooling time before internal pressure test at 6 bar ≤ 87 psi [min.]	Cooling time before internal pressure test at 18 bar ≤ 261 psi [hours]
32	10	15	3.0
40	10	20	5.0
50	10	20	5.0
63	10	20	5.0
75	15	25	6.0
90	20	35	8.0
110	30	50	8.0
160	45	90	8.0
225	45	90	9.5

The values are valid for pressure tests using water or a liquid compatible with PE (check chemical resistance table or contact GF technical support) at ≤ 68°F (20 ° C). For testing with nitrogen (do not use comptressed air) a cooling time of 12 hours is recommended.

Joining d250 – d450

Preparing for fusion

Step 1	Step 2	Step 3
		
Clean the welding surfaces of the COOL-FIT PE Plus fittings and pipes	Check the pipe outer diameter before and after peeling with a circumferential measuring tape.	Check the free spigot length.

Overview of pipe outer diameter and insulation free spigot length

Dimension (mm)	Minimum permissible pipe outer diameter after peeling (mm)	Factory-set spigot length (mm)	Minimum permissible pipe outer diameter after peeling (in)	Factory-set spigot length (in)
d250	249.3	113 – 123	9.8	4.4 - 4.8
d280	279.3	116 – 126	11.0	4.6 - 5.0
d315	314.3	123 – 133	12.4	4.8 - 5.2
d355	354.3	135 – 145	13.9	5.3 - 5.7
d400	399.3	137 – 147	15.7	5.4 - 5.8
d450	449.3	153 – 163	17.7	6.0 - 6.4

Cleaning

Step 1	Step 2	Step 3
		
Peel the outer jacket and foam with the peeling tool	Clean peeled pipe section with PE cleaner and lint-free cloth and allow to air out.	Clean fusion area of the electrofusion coupler with PE cleaner and lint-free cloth and allow to air out.

Fusion process

Step 1	Step 2	Step 3
		
Slide on the electrofusion socket up to the insulation without touching the fusion area. Slide on the shrink socket and fix the components stress-free[1].	Power the machine on, and follow the screen step-by-step fusion process. Use long fusion adaptors (790128035). Pay attention to fusion and cooling time	After fusion, check fusion indicators on the electrofusion fitting and note the messages on the display of the electrofusion machine. Mark the fitting with following information • Date • Welder/ Weld number • Time at the end of cooling time Remove the clamping tool after cooling time

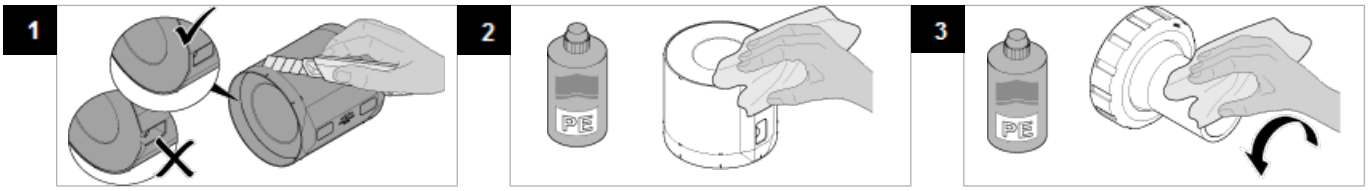
1) The use of suitable fixing devices is recommended.

Sealing

Step 1	Step 2	Step 3
		
Place the sealing tape centered over the gap and overlap it at the end. Press it on well and smooth out folds.	Position the shrink socket centered.	Using a roofers torch (yellow flame), strike the shrink socket as vertically as possible. keep the flame moving over the shrink socket to maintain an uniform heating process. Avoid applying unnecessary heat to the fittings.

Valves and flange joints

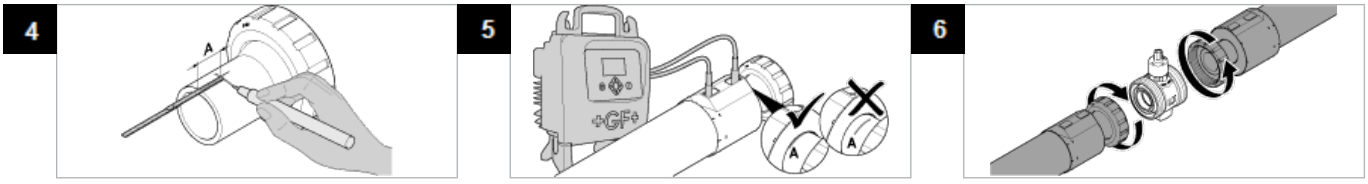
1. Preparation of fitting – cut the sealing lip flush on one side, clean the sealing surfaces



For joining the valve or flange adaptor, the sealing lip of the fitting has to be removed on the side that will be joining with the valve or flange adaptor. The sealing and fusion areas need to be cleaned.

2. Standard fusion

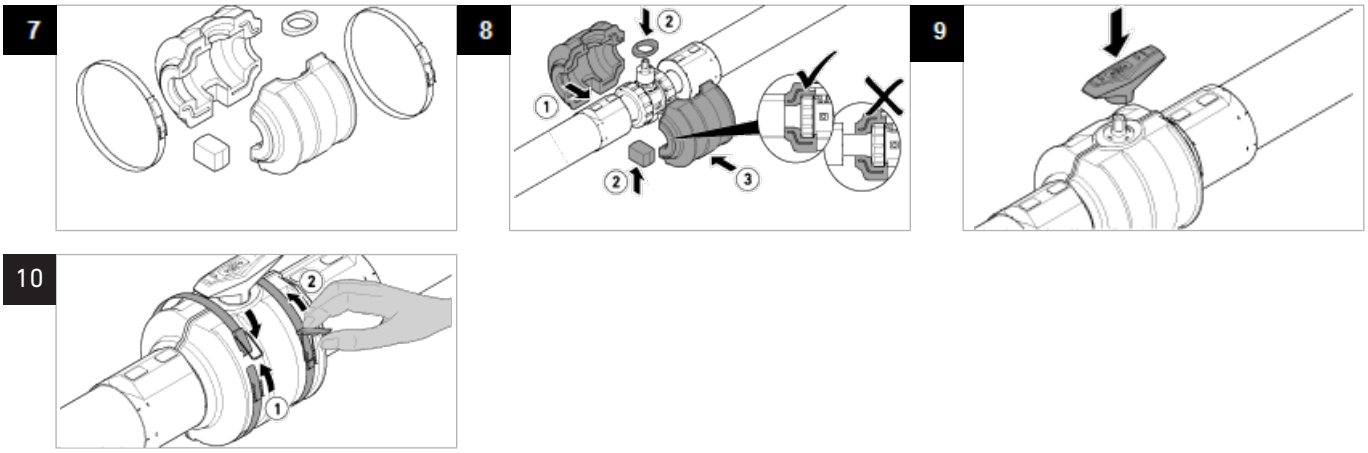
Fuse both valve ends without valve mounted.



Following insertion depths A are valid for COOL-FIT PE Plus components:

d/D (mm)	32/90	40/110	50/110	63/125	75/140	90/160	110/180	160/250	225/315
L1 (in)	1.4	1.6	1.7	1.9	2.2	2.4	2.8	3.5	4.3
L1 (mm)	35.6	40.6	43.2	48.3	55.9	61.0	71.1	88.9	109.2

3. Assembling the valve/flange insulation



Further information can be found in the assembly instructions "COOL-FIT / COOL-FIT PE Plus insulation for Ball Valve and Butterfly Valve".

It's recommended to re-tighten the bolts of COOL-FIT PE Plus butterfly valves and flange joints at operating temperature.

Compact connection fitting-to-fitting

For compact connections between fittings and pipe, the foam removal tool enables pipe lengths as short as 4.33 in (~110 mm) for the dimensions d32-d90 (2"-3"), and 6.69 in (~170 mm) for the dimensions d110-d225 (4" -8").

For compact fitting-to-fitting joints, COOL-FIT PE Plus barrel nipple can be used.

For shorter fitting to pipe connections (d75), an uninsulated PE100 SDR11 pipe with a piece of insulation can be used. After peeling the outer layer of the uninsulated pipe, the sealing lip is pulled over the pipe and then welded with the fitting.

d	d75	d90	d110	d160	d225
L (mm)	165	186	216	270	330

d	d75	d90	d110	d160	d225
L (in)	6.5	7.3	8.5	10.6	13.0

L) Length of un-insulated PE100 SDR11 pipe needed

Transition Fittings

The Georg Fischer Piping Systems range of fittings provides a variety of transitions and threaded fittings to connect plastic piping components to pipe, fittings or valves in metal (or vice versa). The metal threads Rp, R or NPT can be sealed with a PTFE tape as long as the counterpart is not made of plastic. Male and female G threads must be sealed with flat gaskets. The advantage of a threaded G connection is radial and torsion-free possibility for installing and uninstalling.

To prevent electrochemical corrosion, stainless steel connecting elements should preferably be used for steel transitions.

Combining G and R threads

The connection of an external parallel pipe thread G in accordance with EN ISO 228-1, with an internal parallel pipe thread Rp in accordance with ISO 7-1 is not intended according to standards. A tight connection is possible under favorable conditions, but cannot be established reliably.

Mounting the insulation half shells of Transition Fittings

Following the joining of the COOL-FIT PE Plus Transition Fittings with the COOL-FIT PE Plus Fitting Type A, and the mechanical joining of the threaded components, the insulation half shells can be mounted. Assembling of the shells can be done in the same way like for the COOL-FIT PE Plus valves. With the exception of COOL-FIT unions, the sealing lip of the type A fitting must not be cut off on mounting the insulation half shells of transition fittings.

Further information can be found in the assembly instructions "COOL-FIT PE Plus insulation for transition fittings".

Connecting the flexible hose insulation to the Transition Fittings

The radial joining of the joining face of the NBR insulation of flexible hoses to the insulation of transition fittings can be applied either by adhesive cement or by adhesive tape.

Joining Instructions for the adhesive cement

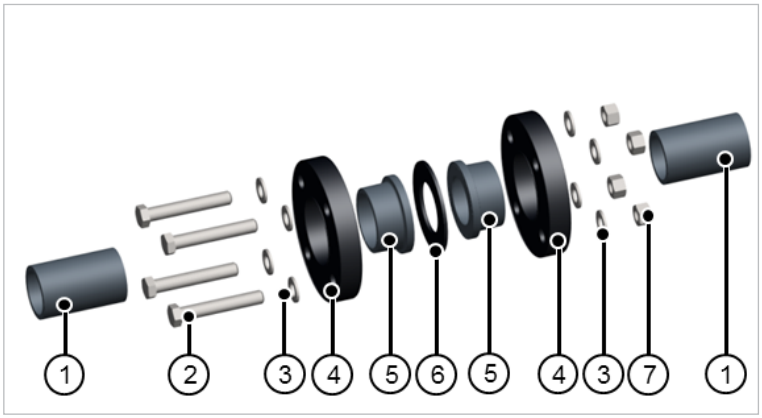
The adhesive should be thoroughly stirred before use. A thin film is applied using the brush to both surfaces to be bonded. The open joint time is about 3 to 15 minutes depending on temperature and humidity of surrounding air.

Before the coated surfaces are bonded together, the adhesive must still be wet but should not transfer to the skin when touched. The surfaces should be brought together quickly and firmly and should be held together for a few seconds.

The recommended temperature for storage and processing is in the range between 59°F (+15 °C) and 77°F (25 °C). The adhesive should not be used below 50°F (+10 °C).

Flange joints

The gasket dimensions must match the outer and inner diameter of the flange adaptor or valve end. Differences between the inner diameters of gasket and flange that are greater than 0.93" (10 mm) may result in malfunctioning flange connections.



Recommended backing flange of COOL-FIT PE Plus flange joints

1) Pipe
2) Bolt
3) Washer
4) Backing Flange
5) Flange Adaptor/ Valve End
6) Flange Gasket
7) Nut

Tightening the Bolts

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

- Tighten the bolts by using a torque wrench.
- The bolts must be tightened diagonally and evenly: First, tighten the bolts by hand so that the gasket is evenly contacting the joining faces. Then tighten all bolts diagonally to 50 % of the required torque, followed by 100 % of the required torque. The recommended bolt tightening torques are listed in the table.

Selecting and handling bolts

- The length of the bolts should be in such a way that the bolt thread does not extend beyond 2-3 turns of the thread at the nut. Washers must be used at the bolts as well as the nut. If bolts are too long it's not possible to mount the insulation half shells afterwards.
- To ensure that the connecting bolts can be easily tightened and removed after a lengthy period of use, the thread should be lubricated, e.g. with molybdenum sulphide.
- However, deviations may occur in practice, e. g. through the use of stiff bolts or pipe axes that are not aligned. The Shore hardness of the gasket can also influence the necessary tightening torque.
- We recommend checking the tightening torques 24 hours after assembly according to the specified values and, if necessary, retighten them. Always tighten diagonally here, as well.
- After the pressure test, the tightening torques must be checked in any case and, if necessary, retightened.
- 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 GF Technical support.

In the area of flexible sections and expansion loops, no mechanical joints should be used since the bending stress may cause leaks.

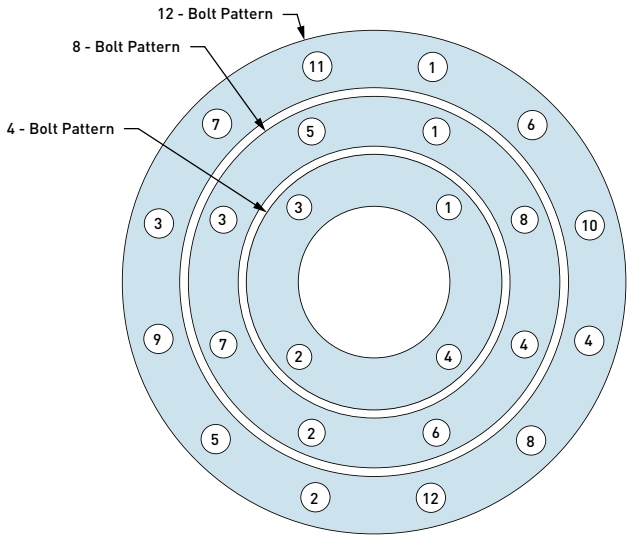


Figure 1 Recommended Bolt Tightening Sequence

Bolt tightening torque guidelines for metric flange connections

The indicated torques are recommended by Georg Fischer Piping systems. These torques already ensure a sufficient tightness of the flange connection. They deviate from the data in the DVS 2210-1 Supplement 3, which are to be understood as upper limits. The individual components of the flange connection (valve ends, flange adaptors, flanges) by Georg Fischer Piping systems are dimensioned for these upper limits.

Maximum operating pressure 87.01 psi (6 bar)

Bolt tightening torque guidelines for ISO flange connections

Pipe outside diameter d (mm)	Tightening torque MD (ft/lbs)		
	Flat ring maximum pressure 150 psi (10 bar)/ 104°F (40 °C)	Profile seal maximum pressure 232 psi (16 bar)	O-ring maximum pressure 232 psi (16 bar)
d32	11.1	7.38	2.38
d40	14.8	11.1	11.1
d50	18.4	11.1	11.1
d63	25.8	14.8	14.8
d75	36.9	18.4	18.4
d90	22.1	11.1	11.1
d110	25.8	14.8	14.8
d160	33.2	18.4	18.4
d225	51.6	33.2	25.8
d250	47.9	25.8	-
d280	47.9	25.8	-
d315	66.4	36.9	-
d355	66.4	36.9	-
d400	73.8	44.3	-
d450	140.0	51.6	-

Length of bolts

In practice, it is often difficult to determine the correct bolt length for flange joints. It can be derived from the following parameters:

- Thickness of the washer (2x)
- Thickness of the nut (1x)
- Thickness of the gasket (1x)
- Flange thickness (2x)
- Thickness of flange collar (valve end or flange adaptor) (2x)
- Valve installation length, if applicable (1x)

In order to ensure the fitting of the insulation half shells of the COOL-FIT PE Plus flange adaptors the used bolts must not be too long.

The following table is useful in determining the necessary bolt length.

Online "Lengths of bolts and tightening torques" tool on www.gfps.com/tools

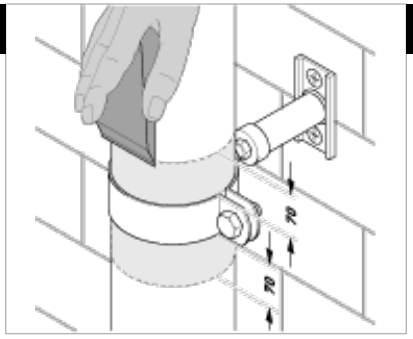
For COOL-FIT PE Plus Flange adaptors used together with PP-Steel backing flanges, the following bolt lengths can be used:

Dimension	d32	d40	d50	d63	d75	d90	d110	d160	d225
Bolts	M12x80	M16x80	M16x90	M16x90 or M16x100	M16x100	M16x100	M16x100	M16x200	M20x220

COOL-FIT® PE Plus Installation of fixed points

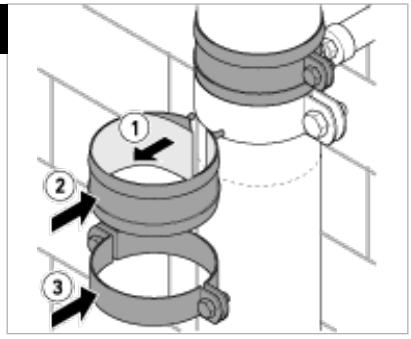
The COOL-FIT piping system must me mounted in final position in the regular fixpoint clamp.

1



Step 1
Remove the outer layer of the PE jacket with a pipe scraper.

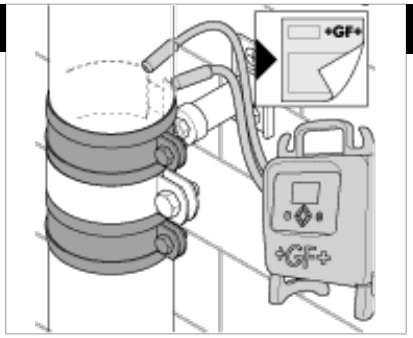
2



Step 2
Remove the yellow protection band from the welding bands and place them on the COOL-FIT pipe. Fix the welding bands with the metal clamps provided.

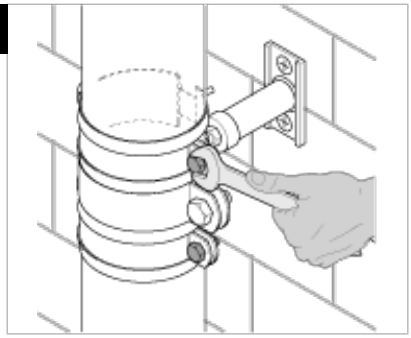
Note: The necessary welding pressure on the clean and dry COOL-FIT pipe is achieved by tightening the metal clamps. Take care that between the metal clamps and weld band there are no visible holes.

3



Step 3
Fuse the welding band with the COOL-FIT pipe in accordance with the operating instructions of the electrofusion machine. Use the COOL-FIT Y cables with integrated welding adaptors for the fusion.

4



Step 4
Retighten the pipe clips after 10 minutes

5.2 Pressure test

Internal pressure test

For internal pressure testing and commissioning, the same conditions apply for COOL-FIT PE Plus as for the non-insulated ecoFIT system (PE).

5.3 Internal pressure and leak testing

Introduction to the pressure test

Overview of the various test methods

Test methods	Inner Pressure test		Leak test
Medium	Water	Gas[1]	Gas
Type	Incompressible	Compressible	Compressible
Test pressure (overpressure)	$P_{p\,(perm)}$ or $0.85 \cdot P_{p\,(perm)}$	Operating pressure 29 psi (2 bar)	7.2 psi (0.50 bar)
Potential risk during the pressure test	Low	High	Low
Significance	High: Proof of pressure resistance incl. impermeability to test medium	High: Proof of pressure resistance incl. impermeability to test medium	Low

1) Follow the applicable safety precautions. More information is available in DVS 2210-1 addendum 2.

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

The purpose of a pressure test is:

- Ensure the resistance to pressure of the piping system, and
- Show the leak-tightness against the test medium

Usually, the internal pressure test is done as a water pressure test and only in exceptional cases (under consideration of special safety precautions) as a gas pressure test with nitrogen.

Water is an incompressible medium. In case of a leakage during the pressure test relative low energy is set free. Therefore the hazard potential is significantly lower compared to testing with a compressible medium.

Internal pressure test with water or similar incompressible test medium

The internal pressure test is done when installation work is completed, the fixed points (if required) re-installed and presumes operational requirements are satisfied. The test pressure load should provide preliminary proof of operational safety.

Test parameters

The following table provides recommendations on the performance of the internal pressure test

Purpose	Preliminary Review	Main examination
Test pressure pp (depends on the pipe wall temperature and the permitted test pressure of the installed components, see "determination of the test pressure")	≤ $P_{p\ (perm)}$	≤ 0.85 $P_{p\ (perm)}$
Test duration (depends on the length of the pipe sections)	L ≤ 328ft (100 m): 3 h 328ft (100 m) < L ≤ 1640ft (500 m): 6 h	328ft (L ≤ 100 m): 3 h 328ft (100 m) <L ≤ 1640ft (500 m): 6 h
Checks during the test (test pressure and temperature curves must be recorded)	At least 3 checks distributed across the test period with test pressure restored	At least 3 checks distributed across the test period without restoring the test pressure

Pre-test

The pre-test serves to prepare the piping system for the 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. A material related drop in pressure will occur which will require repeated pumping to restore the test pressure and also frequently a re-tightening of the flange connection bolts.

The guidelines for an expansion-related pressure decrease in pipe are:

Material	Pressure drop (bar/h)	Pressure drop (psi/h)
COOL-FIT PE Plus	1.2	17.4

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 piping system to be tested contains compensators, it has an influence on the expected axial forces on the fixed points of the piping system. Because the test pressure is higher than the operating pressure, the axial forces on the fixed points increase proportionately. 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 piping system (end or final valve), the valve and the pipe end should be closed by a cap. This prevents an accidental opening of the valve and release of the medium.

Filling the pipe

Before starting the pressure test, the following points should be checked:

1. The installation has been carried out in accordance with its plans.
2. All pressure relief and check valves are fitted in the direction of flow.
3. All end valves have been closed.
4. All valves for devices have been closed to secure against pressure.
5. A visual inspection has been made of all connections, pumps, measurement devices and tanks.
6. The waiting time after the last weld

Now the piping system 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 piping system and these should be open when filling the system. Flushing velocity should be at least 3.3 ft/s (1 m/s.)

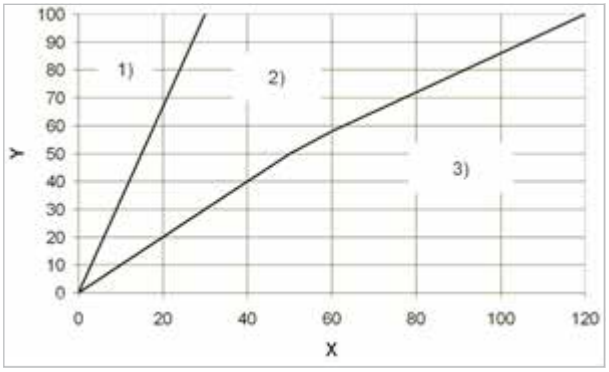
Reference values for the filling volume are given in the table below:

d (mm)	V (gal/s)	V (l/s)
≤ 90	3.96	15
110	7.93	30
160	18.5	70
225	39.6	150
250	52.8	200
315	79.3	300
400	158.5	600

Allow sufficient time to pass between filling and testing the pipe for the air in the piping system to escape through the vents: about 6 to 12 hours, depending on nominal diameter.

Applying the test pressure

The test pressure is applied in accordance with this diagram. It is important to ensure that the rate of pressure increase does not cause any water hammers.



Y) Test pressure (%)
X) Time of test pressure increase (min)
1) Rate of pressure increase up to 4"
2) Range of pressure increase rates between 4" and 16"
3) Guideline rate of pressure increase for 20" and higher: 20" psi/10 min (bar/10 min)

Determination of the test pressure

The permissible test pressure is calculated using the following formula:

$$P_{p(zul)} = \frac{1}{SDR} \cdot \frac{20 \cdot \sigma_{v(T,\,100\,h)}}{S_p \cdot A_G}$$

$\sigma_{v(T,\,100\,h)}$	Creep strength for the pipe wall temperature (at t= 100h)
S_p	Minimum safety factor for creep strength
A_G	Processing method or geometry specific factor which reduces the permissible test pressure
T_R	Pipe metal temperature: mean temperature of test medium and pipe surface

Material	Sp minimum safety factor
COOL-FIT PE Plus Pipe and Fittings (PE100)	1.25
COOL-FIT PE Plus Valves (ABS)	1.6

Checks during testing

The following measurement values must be recorded consistently during testing:

1. Internal pressure at the absolute lowest point of the piping system
2. Medium and ambient temperature
3. Water volume input
4. Water volume output
5. Pressure drop rates

5.4 Start-up with secondary refrigerants

Secondary refrigerants in pre-mixed solutions should be introduced into COOL-FIT PE Plus piping systems. Filling should be performed slowly from the lowest point of the system to allow the piping system to vent at its highest point.

Filling and de-aeration

It is important to vent air from all piping systems. This is particularly important with saline solutions, because of their corrosive properties. Venting process:

- The system must be filled slowly.
- Manual or automatic venting devices must be fitted at the highest point of the system.
- Long horizontal lines should be installed at a slight gradient.
- The piping layout should be chosen in such a way as to prevent the formation of air pockets.
- Installation of an air vent with a medium column as a reserve.
- Follow the specific manufacturer instructions for the liquids as regards filling

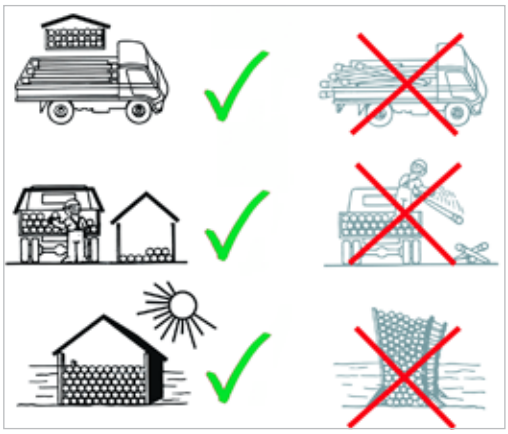
6 Transport, Handling and Storage

6.1 Transport

On trucks/in crates, manual transport

6.2 Storage

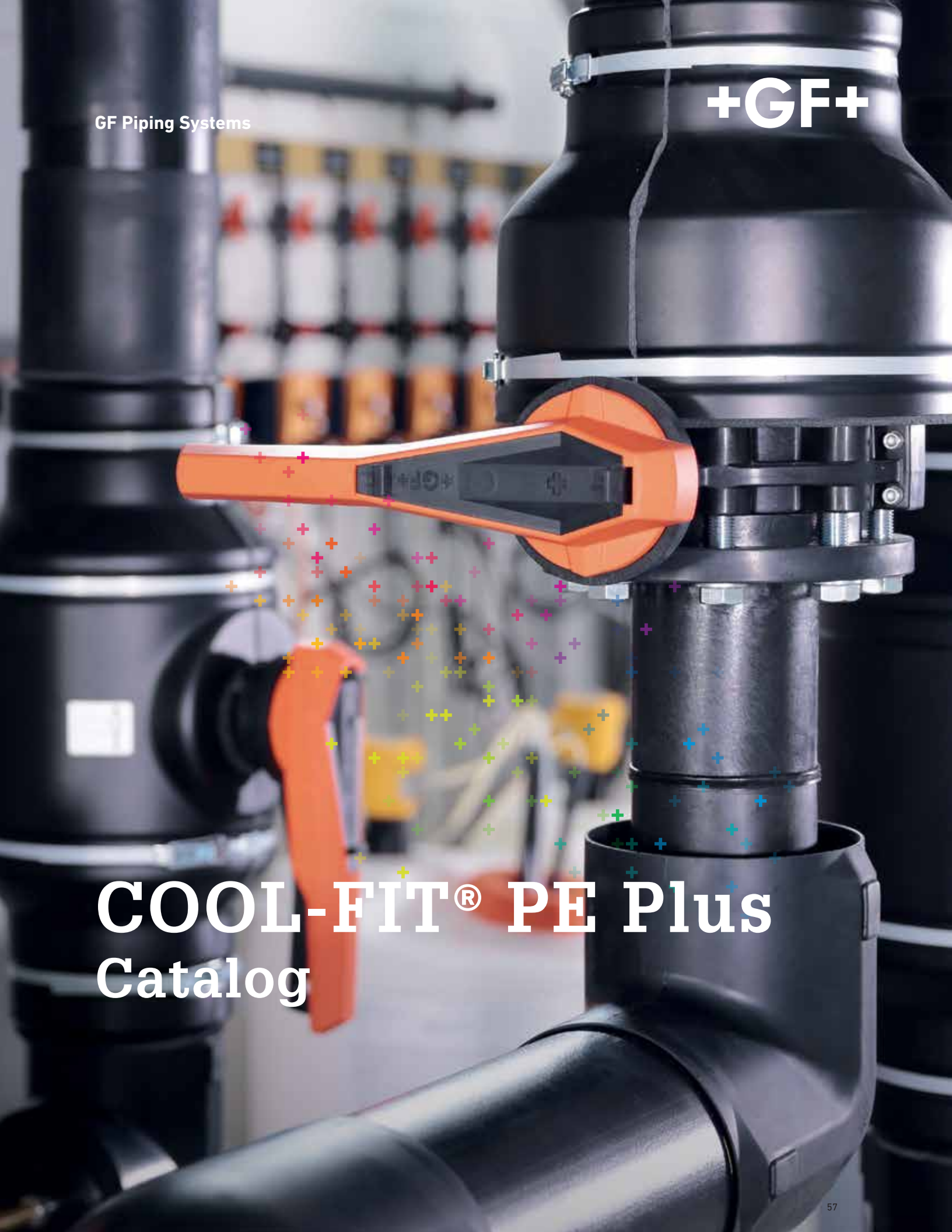
All plastic pipe including pre-insulated plastic pipe such as COOL-FIT PE Plus must be stacked on a flat surface with no sharp edges. During handling, care must be taken to avoid damage to the external surface of the pipe (i.e. by dragging along the ground). Pipe should not cross over each other in storage as this is likely to cause bending.



6.3 Environment

The materials used for COOL-FIT PE Plus are suitable for recycling. Georg Fischer Piping Systems aims to satisfy its customer's wishes concerning environmental aspects. TEWI, ODP and GWP values and test reports are available for COOL-FIT PE Plus.

For more information at www.gfps.com



GF Piping Systems

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COOL-FIT® PE Plus
Catalog

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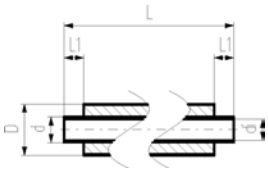
COOL-FIT PE Plus

COOL-FIT PE Plus Pipes

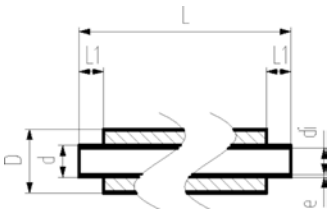


COOL-FIT PE Plus Pipe, d32 - d225

Model:

- Pre-insulated PE100 **SDR11/17** metric
- Insulation: PUR
- Outer Jacket: Impact and UV resistant
- Length: 16.4 ft (5 m)
- With free ends for electrofusion
- Color: black

d/D (mm)	SDR	PN (bar)	Part No.	weight (lbs/ft)	di (mm)	L1 (mm)	closest inch (inch)
32/90	11	16	**738 173 108**	0.948	26.2	36	1
40/110	11	16	**738 173 109**	1.380	32.6	40	1 ¼
50/110	11	16	**738 173 110**	1.492	40.8	44	1 ½
63/125	11	16	**738 173 111**	2.007	51.4	48	2
75/140	11	16	**738 173 112**	2.525	61.4	55	2 ½
90/160	11	16	**738 173 113**	3.238	73.6	62	3
110/180	11	16	**738 173 114**	4.166	90.0	72	4
160/250	17	10	**738 173 117**	6.667	141.0	90	6
225/315	17	10	**738 173 120**	11.168	198.2	110	8



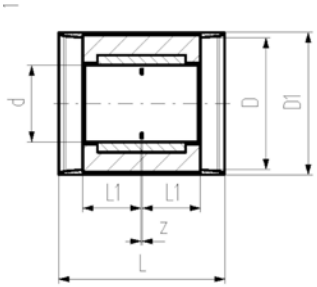
COOL-FIT PE Plus Pipe, d280-d450

Model:

- Pre-Insulated PE100 **SDR17** metric
- Insulation: PUR
- Outer jacket impact resistant.
- Length: 19.36 ft (5.9m)
- With free ends for electrofusion
- Color: black

d/D (mm)	PN (bar)	Part No.	weight (lbs/ft)	di (mm)	L1 (mm)	closest inch (inch)
280/400	10	**738 173 022**	15.21	246.8	126	10
315/450	10	**738 173 023**	19.09	277.6	133	12
355/500	10	**738 173 024**	23.76	312.8	148	14
400/560	10	**738 173 125**	29.61	352.6	150	16
450/630	10	**738 173 126**	37.29	396.6	165	18

COOL-FIT PE Plus Fittings

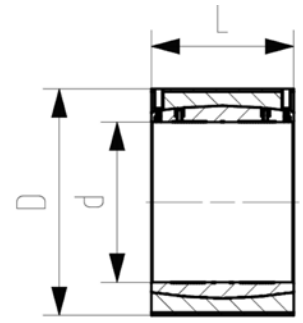


COOL-FIT PE Plus Coupler, d32-d225

Model:

- Pre-insulated PE100 SDR 11 metric
- Insulation: PUR
- Outer Jacket: Impact and UV resistant
- Color: black

d/D (mm)	Part No.	weight (lb)	D1 (mm)	L (mm)	L1 (mm)	z (mm)	closest inch (inch)
32/90	**738 913 108**	0.196	97	127	36	5	1
40/110	**738 913 109**	0.284	117	133	40	3	1 ¼
50/110	**738 913 110**	0.373	117	141	44	3	1 ½
63/125	**738 913 111**	0.529	132	149	48	3	2
75/140	**738 913 112**	1.146	147	163	55	3	2 ½
90/160	**738 913 113**	1.653	168	178	62	4	3
110/180	**738 913 114**	1.832	188	198	72	4	4
160/250	**738 913 117**	3.805	258	233	90	3	6
225/315	**738 913 120**	8.340	324	275	110	5	8

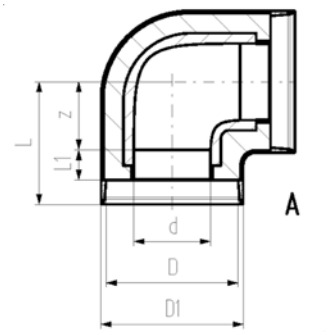


COOL-FIT PE Plus Coupler, d280-d315

Model:

- Pre-Insulated PE100 **SDR17** metric
- Insulation: PUR
- Outer Jacket: Impact and UV resistant
- Color: black

d/D (mm)	PN (bar)	Part No.	weight (lb)	L (mm)	closest inch (inch)
280/400	10	**738 911 822**	17.681	252	10
315/450	10	**738 911 823**	20.084	267	12
355/500	10	**738 911 824**	30.380	290	14
400/560	10	**738 911 875**	51.698	294	16
450/630	10	**738 911 876**	49.802	326	18

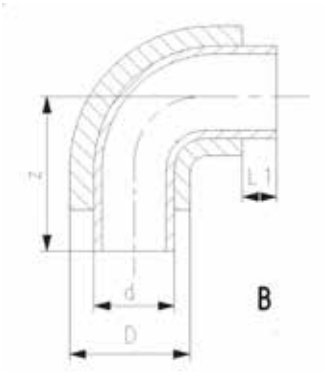


COOL-FIT PE Plus Elbow 90°, d32-d225

Model:

- Pre-insulated PE100 **SDR11**, metric
- Insulation: PUR
- Outer jacket impact resistant.
- Color: black

d/D (mm)	Part No.	weight (lb)	D1 (mm)	L (mm)	L1 (mm)	z (mm)	closest inch (inch)	Type
32/90	**738 103 108**	0.562	97	81	36	20	1	A
40/110	**738 103 109**	0.390	117	88	40	23	1 ¼	A
50/110	**738 103 110**	0.551	117	99	44	30	1 ½	A
63/125	**738 103 111**	0.820	132	107	48	34	2	A
75/140	**738 103 112**	1.764	147	120	55	40	2 ½	A
90/160	**738 103 113**	3.307	168	150	62	63	3	A
110/180	**738 103 114**	4.299	188	174	72	77	4	A
160/250	**738 103 117**	11.464	258	220	90	105	6	A
225/315	**738 103 120**	27.337	324	345	110	210	8	A

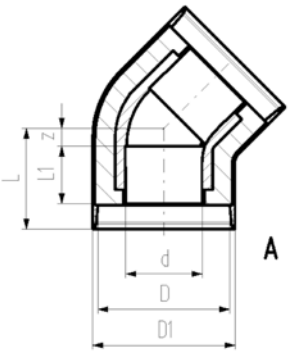


COOL-FIT PE Plus Bend 90°, d280-d450

Model:

- Pre-Insulated PE100 **SDR17** metric
- Insulation: PUR
- Outer jacket impact resistant.
- Color: black
- Type B: Spigot fitting with free ends (2 Electrofusion Couplers needed for joining)

d/D (mm)	PN (bar)	Part No.	weight (lb)	z (mm)	L1 (mm)	closest inch (inch)	Type
280/400	10	**738 003 122**	36.509	430	126	10	B
315/450	10	**738 003 123**	63.493	470	133	12	B
355/500	10	**738 003 124**	55.116	900	148	14	B
400/560	10	**738 003 175**	131.484	980	150	16	B
450/630	10	**738 003 176**	174.606	1070	165	18	B



COOL-FIT PE Plus Elbow 45°, d32-d225

Model:

- Pre-insulated PE100 **SDR11**, metric
- Insulation: PUR
- Outer jacket impact resistant.
- Color: black

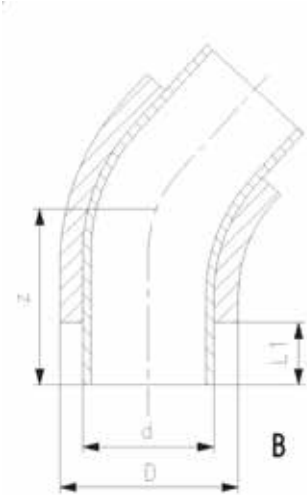
d/D (mm)	Part No.	weight (lb)	D1 (mm)	L (mm)	L1 (mm)	z (mm)	closest inch (inch)	Type
32/90	**738 153 108**	0.238	97	72	36	11	1	A
40/110	**738 153 109**	0.357	117	76	40	11	1 ¼	A
50/110	**738 153 110**	0.481	117	82	44	13	1 ½	A
63/125	**738 153 111**	0.694	132	89	48	16	2	A
75/140	**738 153 112**	1.433	147	98	55	18	2 ½	A
90/160	**738 153 113**	2.271	168	117	62	30	3	A
110/180	**738 153 114**	2.800	188	138	72	41	4	A
160/250	**738 153 117**	9.039	258	161	90	46	6	A
225/315	**738 153 120**	38.808	324	278	110	143	8	A

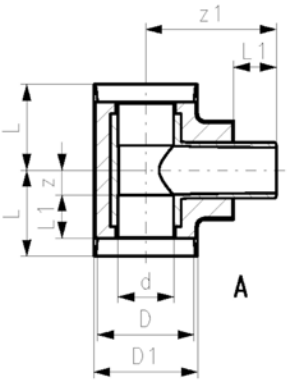
COOL-FIT PE Plus Bend 45°, d280-d450

Model:

- Pre-Insulated PE100 **SDR17** metric
- Insulation: PUR
- Outer jacket impact resistant.
- Color: black
- Type B: Spigot fitting with free ends (2 Electrofusion Couplers needed for joining)

d/D (mm)	PN (bar)	Part No.	weight (lb)	L (mm)	L1 (mm)	z (mm)	closest inch (inch)	Type
280/400	10	**738 053 122**	39.683	460	126	460	10	B
315/450	10	**738 053 123**	47.091	535	133	535	12	B
355/500	10	**738 053 124**	41.271	620	148	620	14	B
400/560	10	**738 053 175**	96.827	650	150	650	16	B
450/630	10	**738 053 176**	119.843	680	165	680	18	B



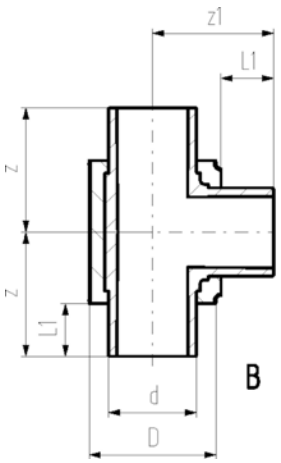


COOL-FIT PE Plus Tee, d32-d225

Model:

- Pre-insulated PE100 **SDR11**, metric
- Insulation: PUR
- Outer jacket impact resistant.
- Color: black

d/D (mm)	PN (bar)	Part No.	weight (lb)	D1 (mm)	L (mm)	L1 (mm)	z (mm)	z1 (mm)	closest inch (inch)	Type
32/90	16	**738 203 108**	0.355	97	79	36	18	118	1	A
40/110	16	**738 203 109**	0.567	117	87	40	22	132	1 ¼	A
50/110	16	**738 203 110**	0.754	117	94	44	25	138	1 ½	A
63/125	16	**738 203 111**	1.133	132	103	48	30	154	2	A
75/140	16	**738 203 112**	2.205	147	116	55	36	168	2 ½	A
90/160	16	**738 203 113**	3.086	1668	130	62	43	187	3	A
110/180	16	**738 203 114**	5.512	188	154	72	57	207	4	A
160/250	16	**738 203 117**	12.346	258	192	90	77	263	6	A
225/315	16	**738 203 120**	36.923	324	355	110	220	337	8	A

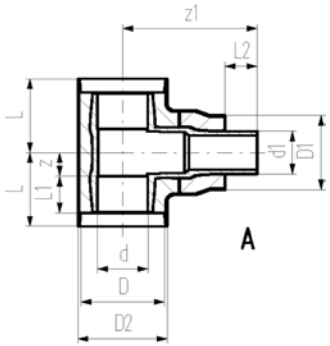


COOL-FIT PE Plus T90° equal, d280-d450

Model:

- Pre-Insulated PE100 **SDR17** metric
- Insulation: PUR
- Outer jacket impact resistant.
- Color: black
- Type B: Spigot fitting with free ends (3 Electrofusion Couplers needed for joining)

d/D (mm)	d (mm)	D (mm)	PN (bar)	Part No.	weight (lb)	L1 (mm)	z (mm)	z1 (mm)	closest inch (inch)	Type
250/355	250	355	10	**738 203 121**	26.455	123	500	500	10	B
280/400	280	400	10	**738 203 122**	49.163	126	500	500	10	B
315/450	315	450	10	**738 203 123**	47.355	133	500	500	12	B
355/500	355	500	10	**738 203 124**	67.461	148	650	700	14	B
400/560	400	560	10	**738 203 175**	92.594	150	650	700	16	B
450/630	450	630	10	**738 203 176**	148.151	165	700	750	18	B



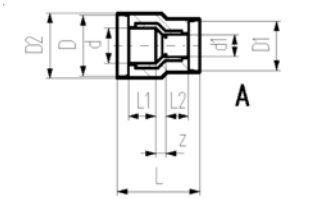
COOL-FIT PE Plus T90° reduced, d32-d225

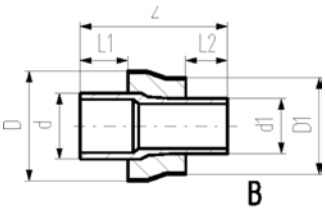
Model:

- Pre-insulated PE100 **SDR11**, metric
- Insulation: PUR
- Outer jacket impact resistant.
- Color: black

d/D (mm)	d1/D1 (mm)	PN (bar)	Part No.	weight (lb)
75/140	63/125	16	**738 203 218**	1.903
90/160	63/125	16	**738 203 222**	2.716
90/160	75/140	16	**738 203 223**	2.851
110/180	63/125	16	**738 203 227**	4.348
110/180	75/140	16	**738 203 228**	4.297
110/180	90/160	16	**738 203 229**	4.491
160/250	63/125	16	**738 203 247**	11.354
160/250	90/160	16	**738 203 249**	11.347
160/250	110/180	16	**738 203 250**	11.508
225/315	63/125	16	**738 203 264**	37.108
225/315	90/160	16	**738 203 266**	37.234
225/315	110/180	16	**738 203 267**	37.049
225/315	160/250	16	**738 203 269**	40.786

d/D (mm)	d1/D1 (mm)	D2 (mm)	L (mm)	L1 (mm)	L2 (mm)	z (mm)	z1 (mm)	closest inch (inch)	Type
75/140	63/125	147	116	55	48	36	228	2 ½ - 2	A
90/160	63/125	168	130	62	48	43	253	3 - 2	A
90/160	75/140	168	130	62	55	43	252	3 - 2 ½	A
110/180	63/125	188	154	72	48	57	267	4 - 2	A
110/180	75/140	188	154	72	55	57	268	4 - 2 ½	A
110/180	90/160	188	154	72	62	57	268	4 - 3	A
160/250	63/125	258	192	90	48	77	327	6 - 2	A
160/250	90/160	258	192	90	62	77	327	6 - 3	A
160/250	110/180	258	192	90	72	77	325	6 - 5	A
225/315	63/125	324	355	110	48	220	412	8 - 2	A
225/315	90/160	324	355	110	62	220	412	8 - 3	A
225/315	110/180	324	355	110	72	220	412	8 - 4	A
225/315	160/250	324	355	110	90	220	396	8 - 6	A





COOL-FIT PE Plus Reducer, d32-d225

Model:

- Pre-insulated PE100 **SDR11**, metric
- Insulation: PUR
- Outer jacket impact resistant.
- Color: black
- Type B: Spigot Fitting with free ends

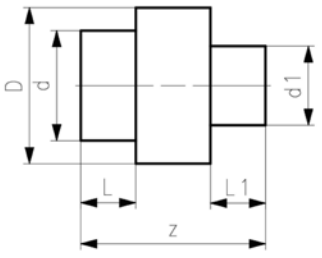
d/D (mm)	d1/D1 (mm)	PN (bar)	Part No.	weight (lb)	D2 (mm)	L (mm)	L1 (mm)	L2 (mm)	z (mm)	closest inch (inch)	Type
40/110	32/90	16	**738 903 206**	0.551	117	143	40	36	17	1 ¼ - 1	A
50/110	32/90	16	**738 903 209**	0.617	117	151	44	36	21	1 ½ - 1	A
50/110	40/110	16	**738 903 210**	0.705	117	149	44	40	15	1 ½ - 1 ¼	A
63/125	32/90	16	**738 903 212**	0.478	132	160	48	36	26	2 - 1	A
63/125	40/110	16	**738 903 213**	0.511	132	159	48	40	21	2 - 1 ¼	A
63/125	50/110	16	**738 903 214**	0.536	132	159	48	44	17	2 - 1 ½	A
75/140	63/125	16	**738 903 318**	0.582			55	48	170	2 ½ - 2	B
90/160	63/125	16	**738 903 322**	0.853			62	48	190	3 - 2	B
90/160	75/140	16	**738 903 323**	0.917			62	55	189	3 - 2 ½	B
110/180	63/125	16	**738 903 327**	1.248			72	48	204	4 - 2	B
110/180	75/140	16	**738 903 328**	1.272			72	55	205	4 - 2 ½	B
110/180	90/160	16	**738 903 329**	1.420			72	62	205	4 - 3	B
160/250	63/125	16	**738 903 347**	2.862			90	48	244	6 - 2	B
160/250	90/160	16	**738 903 349**	2.917			90	62	244	6 - 3	B
160/250	110/180	16	**738 903 350**	3.003			90	72	242	6 - 4	B
225/315	63/125	16	**738 903 364**	6.526			110	48	295	8 - 2	B
225/315	90/160	16	**738 903 366**	6.654			110	62	295	8 - 3	B
225/315	110/180	16	**738 903 367**	6.788			110	72	295	8 - 4	B
225/315	160/250	16	**738 903 369**	7.826			110	90	279	8 - 6	B

COOL-FIT PE Plus Reducer, d280-d450

Model:

- Pre-Insulated PE100 **SDR17** metric
- Insulation: PUR
- Outer jacket impact resistant.
- Color: black
- Type B: Spigot fitting with free ends (2 Electrofusion Couplers needed for joining)

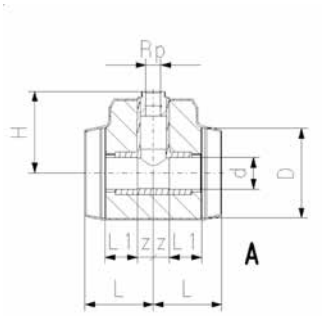
d (mm)	D (mm)	PN	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	Type
280	400	PN 10	**738 903 899**	10.362	225	126	110	335	B
315	450	PN 10	**738 903 807**	15.653	225	133	110	365	B
315	450	PN 10	**738 903 806**	14.991	280	133	126	365	B
355	500	PN 10	**738 903 809**	16.976	280	145	126	390	B
355	500	PN 10	**738 903 810**	18.298	315	145	133	390	B
400	560	PN 10	**738 903 871**	20.062	280	147	126	415	B
400	560	PN 10	**738 903 872**	25.133	315	147	133	415	B
400	560	PN 10	**738 903 873**	24.251	355	147	145	420	B
450	630	PN 10	**738 903 874**	29.101	280	163	126	389	B
450	630	PN 10	**738 903 875**	29.983	315	163	133	390	B
450	630	PN 10	**738 903 876**	30.203	355	163	145	393	B
450	630	PN 10	**738 903 877**	32.628	400	163	147	395	B

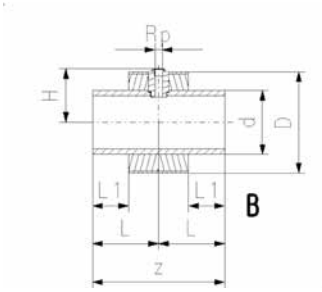


COOL-FIT PE Plus Instrument fitting type 313, d32-d225

Model:

- Pre-insulated, PE100, SDR11, metric
- Insulation: PUR
- Outer Jacket: Impact and UV resistant
- Color: black
- With threaded branch for sensors (i.e temperature, pressure)



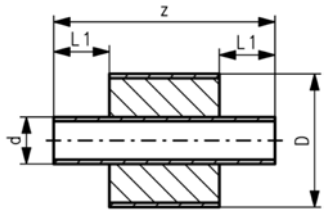


d/D (mm)	NPT (inch)	PN (bar)	Code	Weight (kg)	H (mm)	L (mm)	L1 (mm)	z (mm)	Type
32/90	½	16	**738 313 508**	0.169	95	79	36	18	A
40/110	½	16	**738 313 509**	0.267	105	87	40	22	A
40/110	¾	16	**738 313 559**	0.269	108	87	40	22	A
50/110	½	16	**738 313 510**	0.354	107	94	44	25	A
50/110	¾	16	**738 313 560**	0.356	110	94	44	25	A
63/125	½	16	**738 313 511**	0.537	120	103	48	30	A
63/125	¾	16	**738 313 561**	0.539	123	103	48	30	A
75/140	½	16	**738 313 512**	0.773	127	116	55	36	A
75/140	¾	16	**738 313 562**	0.774	130	116	55	36	A
90/160	½	16	**738 313 513**	1.164	139	130	62	43	A
90/160	¾	16	**738 313 563**	1.165	142	130	62	43	A
110/180	½	16	**738 313 514**	1.944	151	154	72	57	A
110/180	¾	16	**738 313 564**	1.944	154	154	72	57	A
160/250	½	16	**738 313 517**	2.496	134	165	90	330	B
160/250	¾	16	**738 313 567**	2.489	134	165	90	330	B
225/315	½	16	**738 313 520**	5.155	166	185	110	370	B
225/315	¾	16	**738 313 570**	5.146	169	185	110	370	B

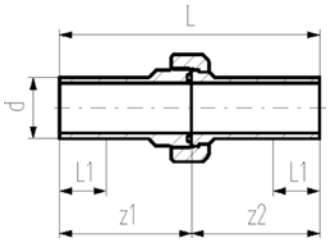
COOL-FIT PE Plus Barrel nipple with insulation, d32-d225

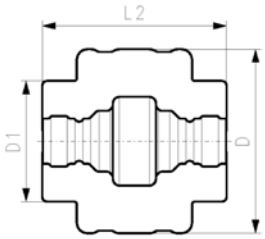
Model:

- Pre-insulated PE100 **SDR11/17** metric
- Insulation: PUR
- Outer Jacket: Impact and UV resistant
- Color: black
- For short connections between COOL-FIT PE Plus Fittings Typ A



d/D (mm)	PN (bar)	SDR	Part No.	weight (lb)	L1 (mm)	z (mm)	closest inch (inch)
32/90	16	11	**738 913 408**	0.278	36	151	1
40/110	16	11	**738 913 409**	0.414	40	155	1 ¼
50/110	16	11	**738 913 410**	0.498	44	163	1 ½
63/125	16	11	**738 913 411**	0.723	48	171	2
75/140	16	11	**738 913 412**	0.985	55	185	2 ½
90/160	16	11	**738 913 413**	1.391	62	199	3
110/180	16	11	**738 913 414**	2.048	72	219	4
160/250	10	17	**738 913 417**	3.474	90	255	6
225/315	10	17	**738 913 420**	7.174	110	295	8



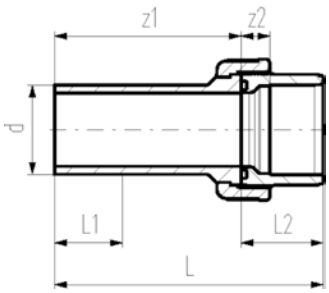


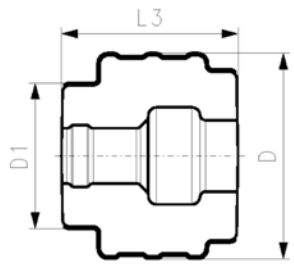
COOL-FIT PE Plus Union PE/PE

Model:

- Union bush: Spigot fitting PE100 SDR11
- Union End: Spigot fitting PE100 SDR11
- Gasket: O-ring EPDM Nr. 748 410 008-014
- Union Nut: Glass-Filled
- Including insulation half shells

d (mm)	PN (bar)	Part No.	weight (lb)	D (mm)	D1 (mm)	L (mm)	L1 (mm)	L2 (mm)	z1 (mm)	z2 (mm)	closest inch (inch)
32	16	**738 513 608**	0.492	139	90	211	36	139	107	104	1
40	16	**738 513 609**	0.800	153	110	234	40	158	118	116	1 ¼
50	16	**738 513 610**	1.032	165	110	247	44	163	124	123	1 ½
63	16	**738 513 611**	1.287	185	125	268	48	176	136	132	2





COOL-FIT PE Plus Adaptor Union PE/ABS

Model:

- Union bush: ABS Solvent cement socket
- Union End: Spigot fitting PE100 SDR11
- Gasket: O-ring EPDM Nr. 748 410 008-014
- Union Nut: ABS
- Including insulation half shells

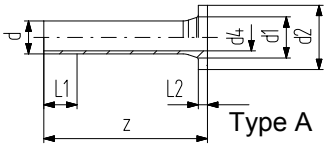
d (mm)	PN (bar)	Part No.	weight (lb)	D (mm)	D1 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	z1 (mm)	z2 (mm)	closest inch (inch)
32	10	**738 513 708**	0.373	134	90	137	36	33	109	104	11	1
40	10	**738 513 709**	0.564	143	110	156	40	39	126	117	13	1 ¼
50	10	**738 513 710**	0.736	154	110	169	44	46	135	123	15	1 ½
63	10	**738 513 711**	1.151	172	125	190	48	58	152	132	21	2
75	10	**738 513 712**	2.196	210	140	211	55	62	170	149	18	2 ½
90	10	**738 513 713**	2.945	233	160	215	62	69	167	146	18	3
110	10	**738 513 714**	4.189	263	180	235	72	72	177	163	11	4

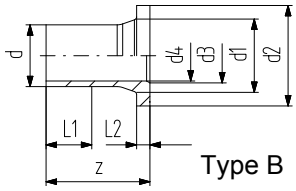
COOL-FIT PE Plus Flange adaptor

Model:

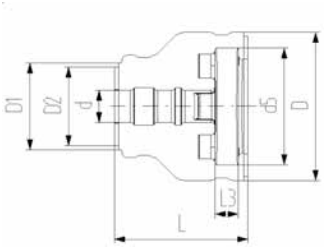
- PE100 **SDR11**, metric
- Type 1 without chamfer, Type 2 with chamfer
- Separate Fittings type A needed for joining

Note:
Backing ring and gasket not included





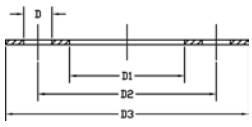
d (mm)	DN (mm)	PN	Part No.	weight (lb)
32	25	16	**738 710 108**	0.112
40	32	16	**738 710 109**	0.165
50	40	16	**738 710 110**	1.984
63	50	16	**738 710 011**	0.381
75	65	16	**738 710 012**	2.668
90	80	16	**738 710 113**	2.630
110	100	16	**738 710 014**	3.470
160	150	16	**738 710 017**	3.854
225	200	16	**738 710 020**	23.016



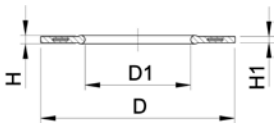
d (mm)	DN (mm)	D (mm)	D1 (mm)	D2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	z (mm)	d1 (mm)	d2 (mm)	d3 (mm)	d4 (mm)	d5 (mm)	Type
32	25	135	90	75	162	36	10	26	190	40	68		26	121	A
40	32	170	110	90	165	40	11	28	197	50	78		32	146	A
50	40	180	110	90	178	44	12	30	214	61	88		40	156	A
63	50	200	125	110	230	48	14	32	270	75	102		51	171	A
75	65	220	140	125	232	55	16	34	279	89	122		61	191	B
90	80	240	160	140	245	62	17	35	299	105	138	78	73	206	B
110	100	270	180	160	254	72	18	36	320	125	158	100	90	235	B
160	150	358	259		332	90	25	34	412	174	213	151	131	295	B
225	200	423	325		383	110	32	37	483	233	268	209	184	354	B

Full Face, Flange Gasket EPDM

- Full Face Flange Gasket EPDM
- Connecting dimension: ANSI/ASME B 16.5 class 150 and BS 1560
- Bolt circle class 150
- AL: Number of holes



Size (inch)	Part No.	weight (lb)	D (inch)	D1 (inch)	D2 (inch)	D3 (inch)	AL
1/2	**150 400 306**	0.002	0.63	0.84	2.38	3.50	4
3/4	**150 400 307**	0.066	0.63	1.06	2.75	3.88	4
1	**150 400 308**	0.077	0.63	1.31	3.13	4.25	4
1 1/4	**150 400 309**	0.088	0.63	1.66	3.50	4.63	4
1 1/2	**150 400 310**	0.088	0.63	1.90	3.88	5.00	4
2	**150 400 311**	0.141	0.75	2.38	4.75	6.00	4
2 1/2	**150 400 312**	0.194	0.75	2.88	5.50	7.00	4
3	**150 400 313**	0.216	0.75	3.50	6.00	7.50	4
4	**150 400 314**	0.278	0.75	4.50	7.50	9.00	8
5	**150 400 316**	0.002	0.88	5.56	8.50	10.00	8
6	**150 400 317**	0.348	0.88	6.63	9.50	11.00	8
8 & 9	**150 400 319**	0.549	0.88	8.63	11.75	13.50	8
10	**150 400 321**	0.002	1.00	10.75	14.25	16.00	12
12	**150 400 323**	0.002	1.00	12.75	17.00	19.00	12

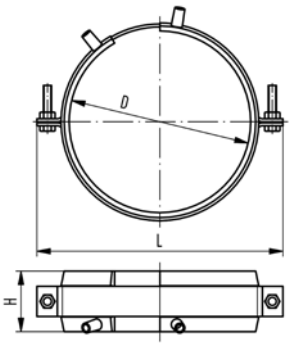


Profile Gasket ANSI with Steel Reinforcement Ring

Model:

- Suitable for flange adaptors PP/PE
- Hardness: 70° Shore **EPDM**
- The seal is designed so that it is centered by the flange bolts. The dimension D is in accordance with the centering on the inner diameter of the bolt circle.
- Dimension D is in accordance with the inner diameter of the bolt circle.

d (mm)	EPDM Part No.	D (mm)	D1 (mm)	H (mm)	H1 (mm)
25	**748 440 502**	54	27	4	3
32	**748 440 503**	64	33	4	3
50	**748 440 505**	83	48	4	3
63	**748 440 506**	102	60	5	4
90	**748 440 508**	133	89	5	4
110	**748 440 509**	171	115	6	5
160 / 180	**748 440 717**	218	160	8	6
225	**748 440 720**	273	220	8	6
250	**748 440 517**	337	273	8	6
315	**748 440 518**	406	325	8	6
355	**748 440 519**	448	356	10	7
400	**748 440 520**	512	406	10	7
450	**748 440 521**	547	457	10	7



COOL-FIT PE Plus fixed point

Model:

- The product consists of two components namely electrofusion tapes and pipe brackets.
- Electrofusion welded tape as permanent connection to transmit the forces that occur in the pipe to the fixed point.
- The delivered pipe brackets are needed to deliver welding pressure during installtion and give stability during operation.
- For welding capability, use an MSA2.x, MSA4.x, MSA250, 300, 350, or 400
- When using an MSA fusion machine from Georg Fischer Piping Systems, the 799 350 339 fusion adapter is needed
- Please take note of the maximum allowable forces for this fixed point fitting noted below
- **Fixed point brackets and cross braces have to be calculated and obtained by the installer. They are not included in the fixed point set from GF.**

D (mm)	d (mm)	Part No.	weight (lb)	L (mm)	H (mm)	max Force (kN)	closest inch (inch)
90	32	**738 912 013**	1.973	170	60	2.0	1 ¼ - 1 ½
110	40 - 50	**738 912 014**	1.993	180	60	3.0 / 5.0	2
125	63	**738 912 015**	2.432	215	60	8.0	2 ½
140	75	**738 912 016**	2.619	220	60	10.0	3
160	90	**738 912 017**	2.595	255	60	10.0	4
180	110	**738 912 018**	3.373	255	60	10.0	4
315	225	**738 912 023**	5.265	400	60	10.0	8
355	250	**738 912 024**	5.265	420	60	10.0	10

COOL-FIT PE Plus Accessories

COOL-FIT PE Plus Assembly Aid-Kit

Model:

- For mounting of COOL-FIT PE Plus Fitting on COOL-FIT PE Plus Pipe

d (mm)	D (mm)	Part No.	weight (lb)	pieces/kit
32 - 225	90 - 315	**799 738 501**	12.346	2 / Dimension
32	90	**799 738 511**	0.847	6
40 - 50	110	**799 738 512**	1.005	6
63	125	**799 738 513**	1.111	6
75	140	**799 738 514**	1.243	6
90	160	**799 738 515**	1.402	6
110	180	**799 738 516**	1.561	6
160	250	**799 738 519**	1.367	4
225	315	**799 738 522**	1.676	4

COOL-FIT PE Plus Insulation for welding indicator-kit

Model:

- Type A suitable for COOL-FIT PE Plus Fittings d32-d110
- Type B suitable for COOL-FIT PE Plus Fittings d160 and coupler d225
- Type C suitable for COOL-FIT PE Plus Fittings d225 except coupler
- Optional: Each fitting comes with the necessary insulation plugs

d (mm)	Part No.	weight (lb)	Type	pieces/kit
32 - 110	**738 010 052**	0.198	A	20
160 - 225	**738 010 053**	0.441	B	10
225	**738 010 054**	0.073	C	10

COOL-FIT PE Plus adhesive ring

Model:

- Double sided, for sealing compact connections between fittings, where sealing lip has been removed

d (mm)	D (mm)	Part No.	weight (lb)
32	90	**738 010 013**	0.004
40, 50	110	**738 010 014**	0.007
63	125	**738 010 015**	0.007
75	140	**738 010 016**	0.007
90	160	**738 010 017**	0.011
110	180	**738 010 018**	0.011
160	250	**738 010 021**	0.020
225	315	**738 010 023**	0.060

COOL-FIT PE Plus Sealing tape

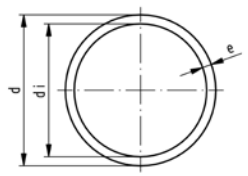
Model:

- 30m on a roll, 25mm width, buthylene rubber-based

d (mm)	D (mm)	Part No.	weight (lb)
32 - 225	90 - 315	**738 013 031**	3.086

COOL-FIT PE Uninsulated

COOL-FIT PE Pipe

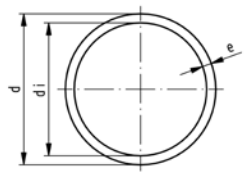


Polyethylene pipe SDR11/PN16/S5

Model:

- Material: PE100
- Dimension: acc. to DIN 8074/75
- Color: black
- Pipe length: 16ft (5m), with plain ends

d (mm)	Part No.	weight (lbs/ft)	e (mm)	di (mm)
20	**193 017 156**	0.079	2.0	16.2
25	**193 017 157**	0.116	2.3	20.4
32	**193 017 158**	0.189	3.0	26.2
40	**193 017 159**	0.292	3.7	32.6
50	**193 017 160**	0.452	4.6	40.8
63	**193 017 161**	0.712	5.8	51.4
75	**193 017 162**	0.995	6.8	61.4
90	**193 017 163**	1.438	8.2	73.6
110	**193 017 164**	2.137	10.0	90.0



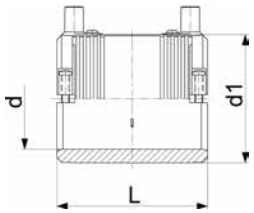
Polyethylene pipe SDR17,6/PN10/S8,3

Model:

- Material: PE100
- Dimension: acc. to DIN 8074/75
- Color: black
- Pipe length: 16ft (5m), with plain ends

d (mm)	PN (bar)	Part No.	weight (lbs/ft)	e (mm)	di (mm)
160	10	**193 017 117**	2.957	9.1	141.8
225	10	**193 017 120**	5.806	12.8	199.4
280	10	**193 017 122**	8.937	15.9	248.2
315	10	**193 017 123**	11.356	17.9	279.2
355	10	**193 017 124**	14.380	20.1	314.8
400	10	**193 017 125**	18.278	22.7	354.6
450	10	**193 017 126**	23.049	25.5	400.0

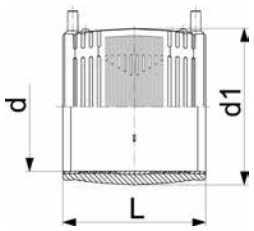
COOL-FIT PE Electrofusion Fittings



Coupler
With integral pipe fixation

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators
- Removable center stop

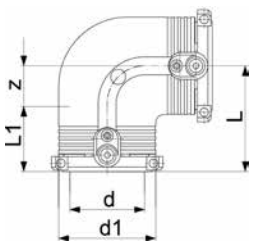
d (mm)	Part No.	d1 (mm)	L (mm)	SDR pipe
32	**753 911 608**	44	72	9-11
40	**753 911 609**	54	80	9-11
50	**753 911 610**	66	88	9-11
63	**753 911 611**	81	96	9-17.6



Coupler

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators
- Removable centre stop up to d160

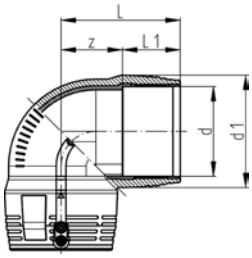
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	SDR pipe
75	**753 911 612**	0.622	96	110	9-17.6
90	**753 911 613**	0.895	113	125	9-17.6
110	**753 911 614**	1.526	138	145	9-17.6
160	**753 911 617**	3.003	196	180	9-17.6
225	**753 911 620**	7.339	273	225	9-17.6
280	**753 911 622**	16.535	340	252	9-17.6
315	**753 911 623**	17.950	382	267	9-17.6



Elbow 90°
With integral pipe fixation

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

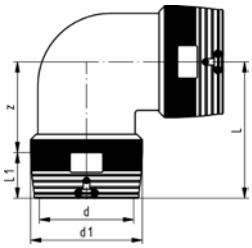
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	SDR pipe
32	**753 101 608**	0.207	44	53	36	17	9-11
40	**753 101 609**	0.282	54	62	39	23	9-11
50	**753 101 610**	0.432	66	71	43	28	9-11
63	**753 101 611**	0.688	81	81	48	32	9-17.6



Elbow 90°

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

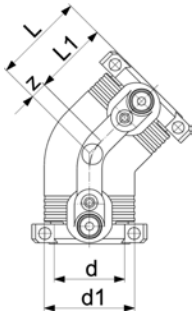
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	SDR pipe
75	**753 101 612**	0.915	97	94	54	40	9-11
90	**753 101 813**	1.825	115	122	62	60	9-17.6
110	**753 101 814**	2.698	140	147	72	76	9-17.6
160	**753 101 817**	8.444	196	191	92	103	11-17.6



Elbow 90°

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators
- Two separate fusion zones

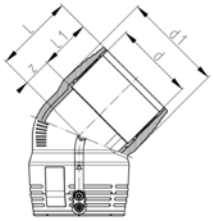
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	SDR pipe
225	**753 101 820**	29.145	280	318	112	206	11-26



Elbow 45°
With integral pipe fixation

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

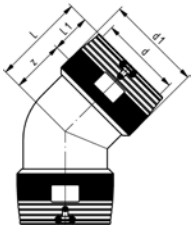
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	SDR pipe
32	**753 151 608**	0.165	44	44	36	8	9-11
40	**753 151 609**	0.234	54	50	39	11	9-11
50	**753 151 610**	0.377	66	56	43	13	9-11
63	**753 151 611**	0.556	81	63	48	15	9-17.6



Elbow 45°

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

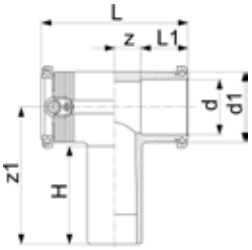
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	SDR pipe
75	**753 151 612**	0.732	97	71	54	17	9-11
90	**753 151 813**	1.285	115	91	62	29	9-11
110	**753 151 814**	2.172	140	112	72	40	9-17.6
160	**753 151 817**	6.735	196	135	92	42	11-17.6



Elbow 45°

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators
- Two separate fusion zones

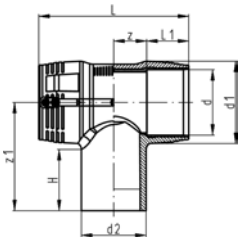
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	SDR pipe
225	**753 151 820**	24.912	280	247	112	135	11-26



Tee 90° equal
With integral pipe fixation

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

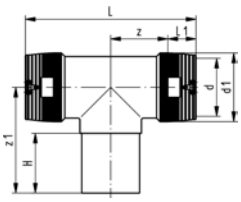
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	z1 (mm)	H (mm)	SDR pipe
32	**753 211 608**	0.260	44	102	34	15	100	74	9-11
40	**753 211 609**	0.386	54	119	39	21	114	82	9-11
50	**753 211 610**	0.556	66	135	42	24	126	90	9-11
63	**753 211 611**	0.897	81	151	46	28	150	102	9-17.6



Tee 90° equal

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

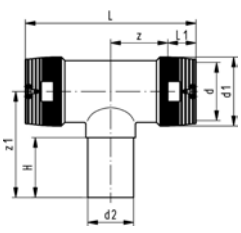
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	z1 (mm)	H (mm)	SDR pipe
75	**753 211 612**	1.254	97	178	54	35	143	87	9-17.6
90	**753 201 813**	1.964	115	205	62	41	161	94	9-17.6
110	**753 201 814**	3.474	140	255	72	56	184	104	9-17.6
160	**753 201 817**	9.669	196	325	92	71	206	103	11-17.6



Tee 90° equal

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators
- Two separate fusion zones

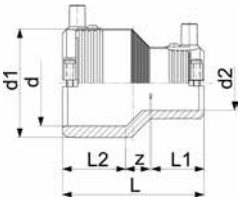
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	z1 (mm)	H (mm)	SDR pipe
225	**753 201 820**	35.053	280	636	112	206	270	122	11-26



Tee 90° reduced

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators
- Two separate fusion zones

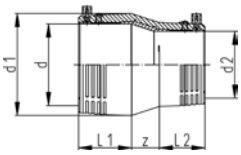
d (mm)	d2 (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	z (mm)	z1 (mm)	H (mm)	SDR pipe
110	90	**753 211 034**	3.642	140	255	72	56	245	80	9-17.6
160	63	**753 211 037**	12.478	200	493	90	127	174	65	11-17.6
160	90	**753 211 039**	12.143	200	492	90	158	190	79	11-17.6
160	110	**753 211 040**	11.369	200	491	90	158	200	85	11-17.6
225	90	**753 211 069**	28.881	280	666	112	217	228	80	11-26
225	110	**753 211 070**	28.881	280	670	112	217	238	85	11-26
225	160	**753 211 073**	29.983	280	667	112	217	258	105	11-26



Reducer
With integral pipe fixation

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

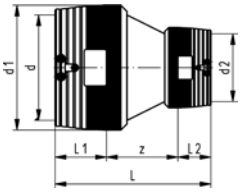
d (mm)	d2 (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	L2 (mm)	z (mm)	SDR pipe
40	32	**753 901 646**	0.209	54	88	33	39	13	9-11
50	32	**753 901 651**	0.273	66	96	35	43	18	9-11
50	40	**753 901 652**	0.262	66	96	39	43	14	9-11
63	32	**753 901 656**	0.348	81	105	35	48	23	9-11
63	40	**753 901 657**	0.388	81	105	39	48	19	9-11
63	50	**753 901 658**	0.388	81	105	43	48	15	9-11



Reducer

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

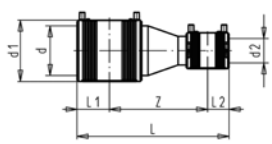
d (mm)	d2 (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	L2 (mm)	z (mm)	SDR pipe
90	63	**753 901 831**	0.849	113	146	63	47	36	9-17.6
110	63	**753 901 832**	1.420	140	184	71	58	55	9-11
110	90	**753 901 833**	1.543	138	173	73	63	38	9-17.6
160	90	**753 901 839**	3.527	202	227	90	72	65	9-17.6



Reducer

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators
- Two separate fusion zones

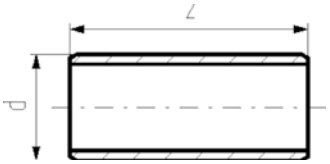
d (mm)	d2 (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	L2 (mm)	z (mm)	SDR pipe
225	160	**753 901 838**	13.228	280	385	112	90	183	11-26



Reducer (kit)

- **PE 100 SDR 11** (ISO S5)
- Integral pipe fixation (up to d63)
- 4mm pin connectors
- Limited path fusion indicators
- Supplied as kit including ELGEF® Plus Coupler and Spigot Reducer

d (mm)	d2 (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	L2 (mm)	z (mm)
75	40	**193 280 992**	1.265	96	265	55	40	170
75	50	**193 280 993**	1.373	96	269	55	44	170
75	63	**193 280 994**	1.543	96	273	55	48	170
90	50	**193 280 958**	1.889	113	297	63	44	190
90	75	**193 280 995**	2.361	113	308	63	55	190
110	75	**193 280 996**	3.298	138	333	73	55	205
160	125	**193 280 952**	7.169	196	414	90	79	245

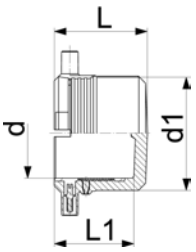


COOL-FIT PE Plus Barrel nipple

Model:

- PE100, SDR11/17
- For the shortest possible connection between fittings

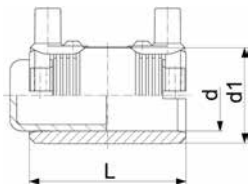
d (mm)	SDR	PN	Part No.	weight (lb)	z (mm)	closest inch (inch)
32	11	16	**738 910 408**	0.044	72	1
40	11	16	**738 910 409**	0.075	80	1 ¼
50	11	16	**738 910 410**	0.130	88	1 ½
63	11	16	**738 910 411**	0.223	96	2
75	11	16	**738 910 412**	0.357	110	2 ½
90	11	16	**738 910 413**	0.582	124	3
110	11	16	**738 910 414**	1.001	144	4
160	17	10	**738 910 417**	1.759	180	6
225	17	10	**738 910 420**	4.156	220	8



End cap
With integral pipe fixation

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

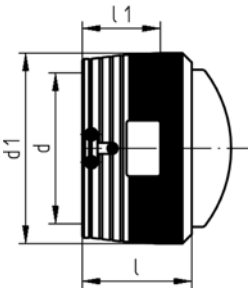
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	SDR pipe
32	**753 961 608**	0.128	44	52	44	9-11
40	**753 961 609**	0.141	54	56	47	9-11
50	**753 961 610**	0.340	66	60	49	9-11
63	**753 961 611**	0.313	81	66	54	9-17.6



End cap (kit)

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators
- Supplied as kit including ELGEF® Plus Coupler

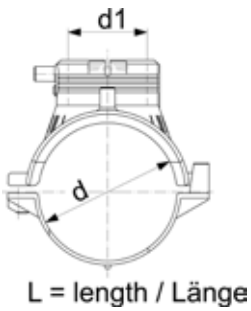
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)
75	**753 961 712**	0.983	96	110
90	**753 961 713**	1.462	113	125
110	**753 961 714**	2.403	133	145
160	**753 961 717**	5.251	197	180
225	**753 961 720**	12.901	296	224



End cap

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

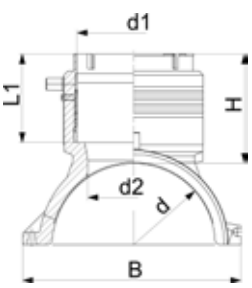
d (mm)	Part No.	weight (lb)	d1 (mm)	L (mm)	L1 (mm)	SDR pipe
160	**753 961 617**	3.929	200	143	90	11-17.6
225	**753 961 620**	9.921	280	170	112	11-26



Branch saddle outlet 63mm

- **PE 100 SDR 11** (ISO S5)
- Complete with lower part
- 4mm pin connectors
- Limited path fusion indicators

d (mm)	d1 (mm)	SDR pipe	Part No.	weight (lb)	L (mm)
63	63	9 - 11	**193 131 037**	0.717	165
75	63	9 - 11	**193 131 047**	1.003	165
90	63	9 - 17.6	**193 131 057**	0.915	165
110	63	9 - 17.6	**193 133 067**	1.080	182
125	63	9 - 17.6	**193 131 077**	1.107	165
160	63	9 - 17.6	**193 133 097**	1.197	182
180	63	9 - 26	**193 131 107**	1.323	165
200	63	9 - 26	**193 131 117**	1.398	165
225	63	9 - 26	**193 131 127**	1.362	165
280	63	9 - 26	**193 131 147**	0.791	165
315-355	63	9 - 33	**193 131 157**	0.822	165
400	63	9 - 33	**193 131 177**	0.785	165

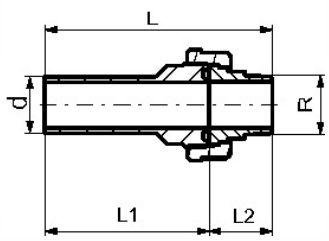


Branch saddle outlet 90 - 110mm

- **PE 100 SDR 11** (ISO S5)
- 4mm pin connectors
- Limited path fusion indicators

* Delivered without lower part. Pipe fixation with multiple use assembly toolno.193.281.027

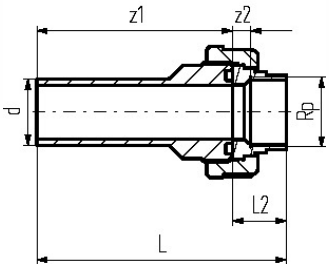
d (mm)	d1 (mm)	Part No.	weight (lb)	H (mm)	L (mm)	L1 (mm)	B (mm)	d2 (mm)	SDR pipe
110	90	**193 135 009**	2.478	101	220	82	164	65	9-17.6
110	110	**193 135 010**	2.698	107	220	88	164	65	9-17.6
160	90	**193 135 039**	3.194	102	240	82	215	65	9-17.6
160	110	**193 135 040**	3.488	108	240	88	215	86	9-17.6
180	90	**193 135 049**	3.686	102	260	82	237	65	9-17.6
225	90	**193 135 069**	4.422	102	260	82	287	65	9-17.6
225	110	**193 135 070**	5.291	108	260	88	287	86	9-17.6



Adapter Union PE100 Long Spigot x Stainless Steel Male NPT

- *PE 100 SDR 11 (ISO S5)
- Only for ELGEF Plus Couplers and Fittings

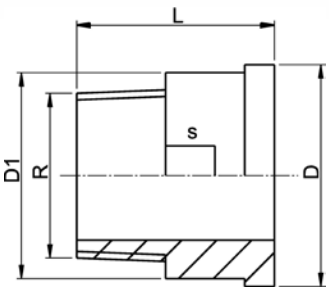
d (mm)	NPT (inch)	D (mm)	EPDM Part No.	L (mm)	L1 (mm)	L2 (mm)
32	¾	65	**153 541 007**	105.0	60.0	45.0
32	1	65	**153 541 008**	105.0	60.0	45.0
40	1 ¼	79	**153 541 009**	112.5	63.0	51.5
50	1 ½	91	**153 541 010**	117.5	65.0	53.5
63	2	111	**153 541 011**	126.5	69.0	57.5



Adapter Union PE100 Long Spigot x Stainless Steel Female NPT

- *PE 100 SDR 11 (ISO S5)
- Only for ELGEF Plus Couplers and Fittings

d (mm)	NPT (inch)	D (mm)	Part No.	L (mm)	L1 (mm)	L2 (mm)	z1 (mm)	z2 (mm)
32	¾	65	**153 541 707**	89.0	60.0	40.0	60.0	29.0
32	1	65	**153 541 708**	89.0	60.0	40.0	60.0	29.0
40	1 ¼	79	**153 541 709**	102.0	63.0	40.0	63.0	39.0
50	1 ½	91	**153 541 710**	102.0	63.0	40.0	63.0	38.0
63	2	111	**153 541 711**	110.0	69.0	45.0	69.0	42.0



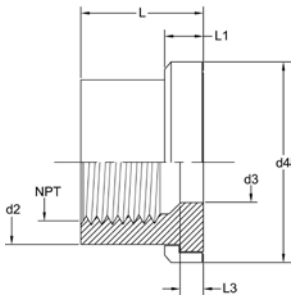
Union End Stainless Steel Male NPT with Adapter Ring for 546 Ball Valve

- This set has to be used in combination with the 546 ball valve
- Stainless Steel (304L) union end with NPT thread
- Perfect transition from 546 ball valve to NPT

d (mm)	R (inch)	Part No.	weight (lb)	D (mm)	D1 (mm)	L (mm)
25	¾	**150 481 725**	0.375	38.8	36.0	40.50
32	1	**150 481 732**	0.531	44.7	41.5	45.00
40	1 ¼	**150 481 740**	0.941	56.5	53.0	51.50
50	1 ½	**150 481 750**	1.111	62.6	59.0	53.50
63	2	**150 481 763**	1.821	78.4	74.0	57.50

Union End Stainless Steel Female NPT with Adapter Ring for 546 Ball Valve

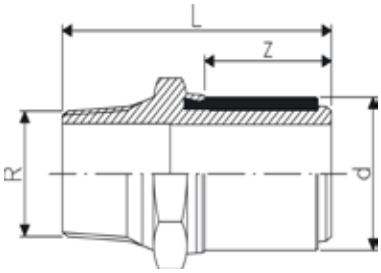
- This set has to be used in combination with the 546 ball valve
- Stainless Steel (304L) union end with NPT thread
- Perfect transition from 546 ball valve to NPT



NPT (inch)	d (mm)	Part No.	weight (lb)	d2 (mm)	d3 (mm)	d4 (mm)	L (mm)	L1 (mm)	L3 (mm)	Refrigeration size (inch)
¾	25	**150 481 025**	0.243	36.07	21.08	43.94	25.91	6.09	5.08	⅞
1	32	**150 481 032**	0.320	40.89	25.91	53.09	28.97	7.87	6.09	1 ⅛
1 ¼	40	**150 481 040**	0.595	52.80	32.70	56.40	30.50	6.50	5.50	1 ⅜
1 ½	50	**150 481 050**	0.728	58.00	40.10	62.20	34.20	7.10	5.90	1 ½
2	63	**150 481 063**	1.124	73.30	53.80	78.30	33.50	8.20	7.20	2

Transition Adaptor PE/SS Male thread NPT

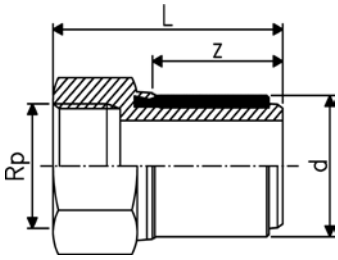
- **PE 100 SDR 11** (ISO S5)
- Only for ELGEF Plus Couplers and Fittings



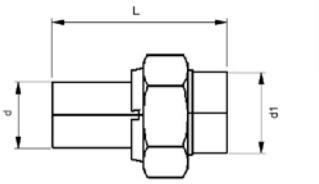
d (mm)	NPT (inch)	Part No.	weight (lb)	L (mm)	z (mm)
25	¾	**153 924 707**	0.320	76	33
32	1	**153 924 708**	0.485	80	35
40	1 ¼	**153 924 709**	0.849	86	39
50	1 ½	**153 924 710**	1.146	90	43
63	2	**153 924 711**	1.543	98	47

Transition Adaptor PE/SS Female thread NPT

- **PE 100 SDR 11** (ISO S5)
- Only for ELGEF Plus Couplers and Fittings



d (mm)	NPT (inch)	Part No.	weight (lb)	L (mm)	z (mm)
32	1	**153 924 208**	0.408	71	35
40	1 ¼	**153 924 209**	0.606	77	39
50	1 ½	**153 924 210**	0.805	81	43
63	2	**153 924 211**	1.213	89	47

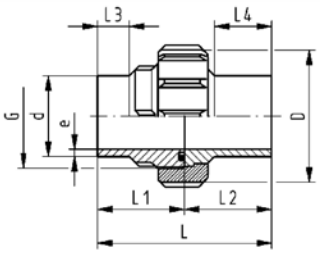


Adapter Union
Copper for sweating
PE100 long spigot ends

Model:

- Gasket: O-ring EPDM Nr. 748 410 008-014
- Union End: Copper Inch size socket
- Union Nut: brass
- Union bush: Spigot fitting PE100 SDR11

d (mm)	d1 (inch)	Refrigeration Size (inch)	PN (bar)	EPDM Part No.	L (mm)	closest inch (inch)
32	¾	⅞	10	**153 512 207**	86.4	¾
32	1	1 ⅛	10	**153 512 208**	86.4	1
40	1 ¼	1 ⅜	10	**153 512 209**	99.1	1 ¼
50	1 ½	1 ⅝	10	**153 512 210**	111.8	1 ½
63	2	2 ⅛	10	**153 512 211**	127.0	2

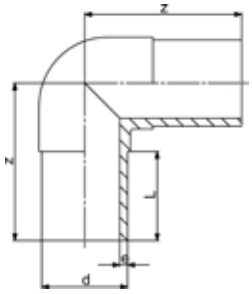


Transition adaptor PE/ABS PE100 SDR11 long spigot end

Model:

- PE100 **SDR11**, metric
- Gasket: O-Ring EPDM or FKM
- IR = Infrared-(IR Plus®) compatible.
- Union End: Solvent cement socket metric

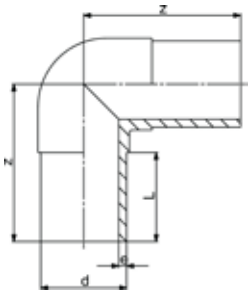
d (mm)	PN (bar)	EPDM Part No.	D (mm)	e (mm)	G (inch)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
32	10	**153 518 608**	60	3.0	1 ½	87	60	27	40
40	10	**153 518 609**	74	3.7	2	94	63	31	40
50	10	**153 518 610**	83	4.6	2 ¼	98	65	33	40
63	10	**153 518 611**	103	5.8	2 ¾	109	69	40	40



Elbow 90° PE100 SDR11

- Long spigot version

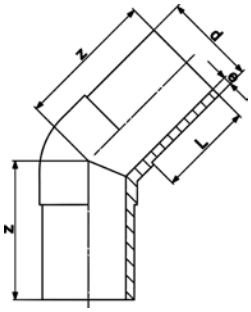
d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	z (mm)
32	**753 101 008**	0.123	3.0	54	85
40	**753 101 009**	0.196	3.7	57	95
50	**753 101 010**	0.344	4.6	63	105
63	**753 101 011**	0.604	5.8	65	115
75	**753 101 012**	0.913	6.8	72	130
90	**753 101 013**	1.552	8.2	81	150
110	**753 101 014**	2.553	10.0	86	165



Elbow 90° PE100 SDR17/17,6

- Long spigot version

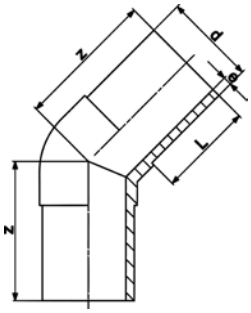
d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	z (mm)
160	**753 100 817**	5.258	9.5	102	210
225	**753 100 820**	12.928	13.4	120	270
280	**753 100 822**	24.974	16.6	140	320
315	**753 100 823**	35.003	18.7	150	370



Elbow 45° PE100 SDR11

- Long spigot version

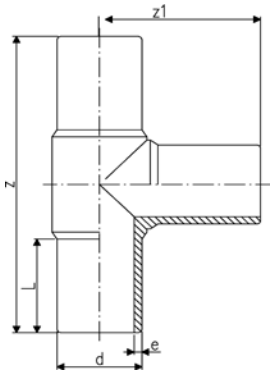
d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	z (mm)
32	**753 151 008**	0.110	3.0	54	80
40	**753 151 009**	0.190	3.7	57	85
50	**753 151 010**	0.293	4.6	63	90
63	**753 151 011**	0.500	5.8	65	95
75	**753 151 012**	0.772	6.8	72	105
90	**753 151 013**	1.246	8.2	81	120
110	**753 151 014**	2.030	10.0	86	130



Elbow 45° PE100 SDR17/17,6

- Long spigot version

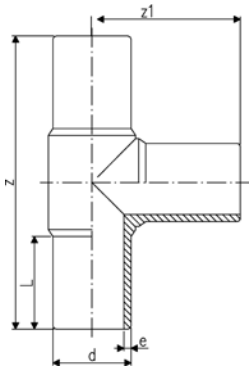
d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	z (mm)
160	**753 150 817**	4.191	9.5	102	162
225	**753 150 820**	9.791	13.4	123	205
280	**753 150 822**	16.510	16.6	140	230
315	**753 150 823**	22.317	18.7	150	250



Tee 90° equal PE100 SDR11

- Long spigot version

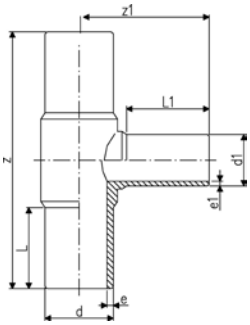
d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	z (mm)	z1 (mm)
32	**753 201 008**	0.170	3.0	54	170	85
40	**753 201 009**	0.287	3.7	57	190	95
50	**753 201 010**	0.472	4.6	63	210	105
63	**753 201 011**	0.829	5.8	65	230	115
75	**753 201 012**	1.321	6.8	72	264	132
90	**753 201 013**	2.251	8.2	81	300	150
110	**753 201 014**	3.554	10.0	86	330	165



Tee 90° equal PE100 SDR17/17,6

- Long spigot version

d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	z (mm)	z1 (mm)
160	**753 200 817**	7.057	9.5	104	428	214
225	**753 200 820**	17.386	13.4	122	540	270
280	**753 200 802**	29.432	16.6	139	615	308
315	**753 200 803**	39.650	18.7	150	695	346
355	**753 200 124**	57.541	21.1	170	820	410
400	**753 200 125**	78.705	23.7	190	900	450
450	**753 200 126**	108.908	26.7	200	980	490

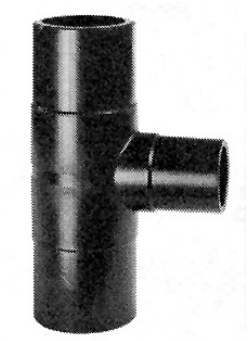


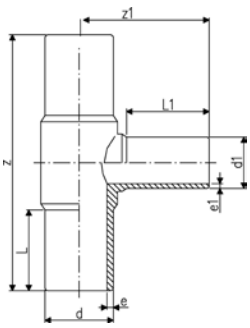
Tee 90° reduced PE100 SDR11

Model:

- Molded
- Long spigot version

d (mm)	d1 (mm)	Part No.	weight (lb)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	z (mm)	z1 (mm)
63	40	**753 201 026**	0.688	5.8	3.7	67	58	230	107
63	50	**753 201 021**	0.661	5.8	4.6	65	59	218	100
75	32	**753 201 023**	1.003	6.8	3.0	73	46	248	98
75	50	**753 201 024**	1.069	6.8	4.6	73	58	248	109
75	63	**753 201 025**	1.146	6.8	5.8	73	65	248	118
90	50	**753 201 027**	1.750	8.2	4.6	79	55	280	120
90	63	**753 201 029**	1.709	8.2	5.8	79	63	282	127
90	75	**753 201 055**	1.764	8.2	6.8	80	75	286	132
110	63	**753 201 028**	3.106	10.0	5.8	87	63	322	148
110	75	**753 201 031**	2.692	10.0	6.8	83	68	305	148
110	90	**753 201 032**	2.811	10.0	8.2	86	79	322	164





Tee 90° reduced PE100 SDR17/17.6

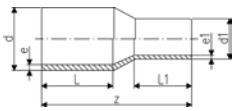
Model:

- Molded
- Long spigot version
- See general information for maximum allowable operating pressure
- **PE 100 SDR 17** (ISO S8)

* With welded reducer

d (mm)	d1 (mm)	Part No.	weight (lb)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	z (mm)	z1 (mm)
160	63	**753 200 834**	5.631	9.5	3.8	86	63	330	130
160	75	**753 200 835**	4.259	9.5	4.5	98	74	343	180
160	90	**753 200 836**	4.348	9.5	5.4	98	79	410	188
160	110	**753 200 837**	5.988	9.5	6.6	98	82	410	195
225	75	**753 200 839**	15.715	13.4	4.5	120	70	555	277
225	90	**753 200 840**	10.432	13.4	5.4	127	80	555	226
225	110	**753 200 841**	10.362	13.4	6.6	127	82	555	235
225	160	**753 200 842**	13.056	13.4	9.5	127	98	555	253
315	110	**753 200 851**	34.438	18.7	6.6	150	82	695	277
315	160	**753 200 852**	26.896	18.7	9.5	150	102	695	296
315	225	**753 200 853**	32.781	18.7	13.4	170	145	650	335

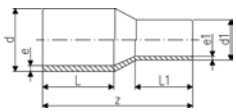
Reducer PE100 SDR11



- Long spigot version

d (mm)	d1 (mm)	Part No.	weight (lb)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	z (mm)
32	20	**753 901 042**	0.060	3.0	3,0	55	53	122
32	25	**753 901 041**	0.073	3.0	3,0	55	53	122
40	20	**753 901 048**	0.095	3.7	3,0	56	50	127
40	25	**753 901 047**	0.099	3.7	3,0	55	50	128
40	32	**753 901 046**	0.104	3.7	3,0	55	52	128
50	20	**753 901 055**	0.141	4.6	3,0	62	50	147
50	25	**753 901 054**	0.152	4.6	3,0	62	50	139
50	32	**753 901 053**	0.148	4.6	3,0	62	54	140
50	40	**753 901 052**	0.174	4.6	3,7	62	55	138
63	32	**753 901 060**	0.249	5.8	3,0	65	53	150
63	40	**753 901 059**	0.269	5.8	3,7	65	57	150
63	50	**753 901 058**	0.282	5.8	4,6	65	62	150
75	40	**753 901 063**	0.408	6.8	3,7	72	51	170
75	50	**753 901 064**	0.414	6.8	4,6	72	65	170
75	63	**753 901 065**	0.461	6.8	5,8	72	65	170
90	50	**753 901 072**	0.637	8.2	4,6	81	61	190
90	63	**753 901 071**	0.697	8.2	5,8	81	65	190
90	75	**753 901 070**	0.728	8.2	6,8	81	72	190
110	63	**753 901 078**	1.074	10.0	5,8	85	65	205
110	75	**753 901 077**	1.105	10.0	6,8	84	72	205
110	90	**753 901 076**	1.210	10.0	8,2	85	81	205

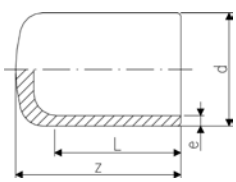
Reducer PE100 SDR17/17,6



- Long spigot version

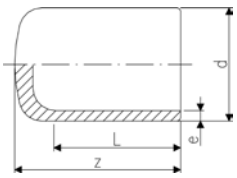
d (mm)	d1 (mm)	Part No.	weight (lb)	e (mm)	e1 (mm)	L (mm)	L1 (mm)	z (mm)
160	90	**753 900 888**	1.658	9.5	5,4	120	85	248
160	110	**753 900 890**	2.050	9.5	6,6	100	85	245
225	160	**753 900 896**	4.453	13.4	9,5	120	100	280
280	225	**753 900 899**	8.955	16.6	13,4	140	120	335
315	225	**753 900 807**	13.669	18.7	13,4	150	120	365
315	280	**753 900 806**	13.095	18.7	16,6	150	140	365
355	280	**753 900 809**	14.833	21.1	16,6	165	140	390
355	315	**753 900 810**	15.961	21.1	18,7	165	150	390
400	280	**753 900 811**	17.483	23.7	16,6	180	140	415
400	315	**753 900 812**	21.934	23.7	18,7	180	150	415
400	355	**753 900 813**	21.208	23.7	21,1	180	165	420
450	280	**753 900 814**	25.353	26.7	16,6	195	140	389
450	315	**753 900 815**	26.026	26.7	18,7	195	150	390
450	355	**753 900 816**	26.235	26.7	21,1	195	164	393
450	400	**753 900 817**	28.581	26.7	23,7	195	179	395

Cap PE100 SDR11



- Long spigot version

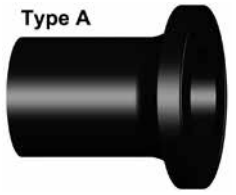
d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	z (mm)
32	**753 961 008**	0.044	3.0	54	54
40	**753 961 009**	0.073	3.7	57	57
50	**753 961 010**	0.119	4.6	63	63
63	**753 961 011**	0.190	5.8	65	65
75	**753 961 012**	0.322	6.8	72	80
90	**753 961 013**	0.529	8.2	81	90
110	**753 961 014**	0.822	10.0	86	98

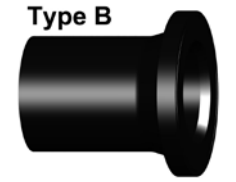


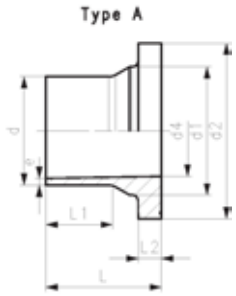
Cap PE100 SDR17/17,6

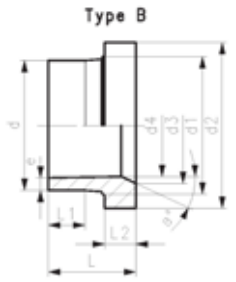
- Long spigot version

d (mm)	Part No.	weight (lb)	e (mm)	L (mm)	z (mm)
160	**753 960 817**	2.028	9.5	102	120
225	**753 960 820**	4.993	13.4	122	148
280	**753 960 822**	7.767	16.6	139	235
315	**753 960 823**	10.490	18.7	150	255
355	**753 960 824**	14.352	21.1	165	280
400	**753 960 825**	20.607	23.7	180	310
450	**753 960 826**	39.238	26.7	195	265







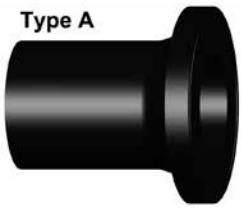


Flange adaptor SDR11 ANSI
Combined jointing face: flat and serrated

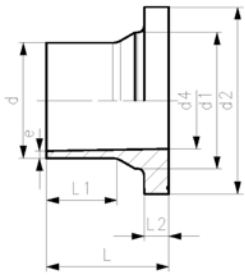
Model:

- Material: PE100
- Long spigot for Butt fusion or Electrofusion
- Suitable for flange connections to **ANSI/ASME B 16.5**
- Gasket d20-d630: Profile flange gasket NBR No. 45 44 07, EPDM No. 48 44 07
- Type A without chamfer, Type B with chamfer

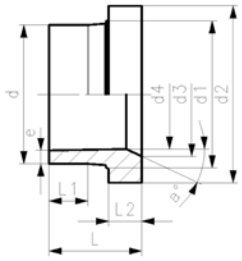
d (mm)	FM	Part No.	weight (lb)	d1 (mm)	d2 (mm)	d3 (mm)	d4 (mm)	e (mm)	L (mm)	L1 (mm)	L2 (mm)	Type
32	IR	**753 800 058**	0.101	40	63		26	3.0	91.5	61.0	10	A
40	IR	**753 800 059**	0.154	50	73		32	3.7	94.5	61.5	11	A
50	IR	**753 800 060**	0.216	61	82		40	4.6	105.0	55.0	12	A
63	IR	**753 800 011**	0.412	75	102		51	5.8	98.0	69.0	14	A
75	IR	**753 800 012**	0.692	89	122	66	61	6.8	125.0	89.0	16	B
90	IR	**753 800 063**	0.933	105	133		73	8.2	140.0	85.0	17	B
110	IR	**753 800 014**	1.583	125	158	100	90	10.0	160.0	114.0	18	B



Type A



Type B

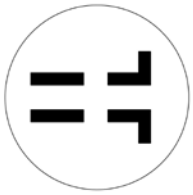


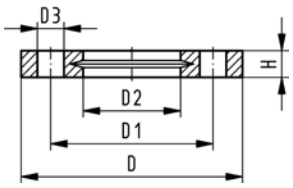
Flange Adaptor PE100 SDR17/17.6

Model:

- Material: PE100
- Long spigot for Butt fusion or Electrofusion
- Suitable for flange connections to metric (from d110 also to ANSI/ASME B16.5)
- Gasket d20-d630: Profile flange gasket NBR No. 45 44 07, EPDM No. 48 44 07
- Type A without chamfer, Type B with chamfer

d (mm)	Part No.	weight (lb)	d1 (mm)	d2 (mm)	d3 (mm)	d4 (mm)	e (mm)	L (mm)	L1 (mm)	L2 (mm)	Type
160	**753 800 092**	2.959	175	212	151	141	9.5	200	147	25	B
225	**753 800 095**	5.415	235	268	210	198	13.4	200	138	32	B
280	**753 800 097**	8.333	291	320	265	246	16.6	230	154	35	B
315	**753 800 098**	12.059	335	370	300	277	18.7	242	166	36	B
355	**753 800 299**	15.653	373	430	346	310	21.1	260	170	33	B
400	**753 800 300**	21.164	427	482	395	350	23.7	282	185	36	B
450	**753 800 301**	36.156	514	585		400	26.7	316	205	46	A





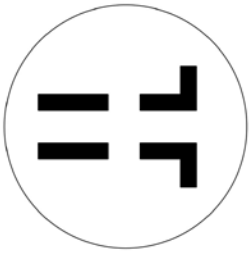
V-Flange Ring
For Butt Fusion Systems

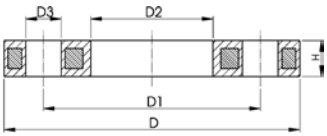
Model:

- 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
10	280	**727 701 522**	406	362	294	26	38	12	M20
12	315	**727 701 523**	483	432	338	26	42	12	M20





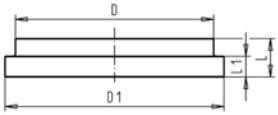
Backing flange PP-Steel For butt fusion systems Inch/ANSI

Model:

- UV-resistant.
- **Bolt circle class 150**

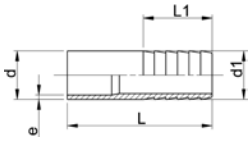
AL: number of holes

d (mm)	d (inch)	PN (bar)	Part No.	weight (lb)	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	H (mm)	AL	SC
20	1/2	16	**727 701 206**	0.470	95	60	28	16	12	4	M12
25	3/4	16	**727 701 207**	0.573	105	70	34	16	12	4	M12
32	1	16	**727 701 208**	0.917	115	79	42	16	16	4	M12
40	1 1/4	16	**727 701 209**	1.609	140	89	51	16	16	4	M16
50	1 1/2	16	**727 701 210**	1.784	150	98	62	16	18	4	M16
63	2	16	**727 701 211**	1.909	165	121	78	19	18	4	M16
75	2 1/2	16	**727 701 212**	2.463	185	140	92	19	18	4	M16
90	3	16	**727 701 213**	3.289	200	152	110	19	20	4	M16
110	4	16	**727 701 214**	3.737	229	190	133	19	20	8	M16
160	6	16	**727 700 717**	7.696	285	241	178	22	26	8	M20
200	8	16	**727 700 719**	12.346	340	297	235	22	29	8	M20
225	8	16	**727 700 720**	12.198	340	297	238	22	29	8	M20
250/280	10	10	**727 701 321**	13.228	406	362	293	25	30	12	M24
315	12	10	**727 701 322**	26.015	483	432	338	25	34	12	M24
355	14	10	**727 701 323**	39.463	540	476	376	29	42	12	M27
400	16	10	**727 701 324**	54.013	597	539	429	29	44	16	M27
450/500	20	10	**727 701 325**	74.075	712	635	540	32	53	20	M30



Blind Flange PE Metric

d (mm)	DN (mm)	PN (bar)	Part No.	weight (lb)	D (mm)	D1 (mm)	L (mm)	L1 (mm)
63	50	16	**753 960 611**	0.340	75	102	30	14
75	65	16	**753 960 612**	0.591	89	122	30	16
90	80	16	**753 960 613**	0.800	105	138	30	17
110	100	16	**753 960 614**	1.080	125	158	30	18
160	150	16	**753 960 617**	2.637	175	212	40	25
225	200	16	**753 960 620**	4.506	235	268	50	32
280	250	16	**753 960 622**	9.165	291	320	60	35
315	300	16	**753 960 623**	11.572	335	370	65	35
355	350	16	**753 960 624**	16.971	373	430	70	40
400	400	16	**753 960 625**	26.863	427	482	75	46
450	500	10	**753 960 626**	43.252	510	585	80	60



Hose connector PE100 SDR11 metric

Model:

- Material: PE100
- With butt fusion spigot SDR11 and parallel hose connection

d (mm)	d1 (mm)	FM	Part No.	weight (lb)	e (mm)	L (mm)	L1 (mm)
32	32	IR	**753 968 608**	0.051	2.9	82	36
40	40	IR	**753 968 609**	0.075	3.7	84	42
50	50	IR	**753 968 610**	0.126	4.6	90	48
63	60	IR	**753 968 611**	0.209	5.8	100	50

Machines for PE
MSA Electrofusion

MSA 2.0 Automatic Electrofusion Unit (230V)

The MSA 2.0 automatic electro fusion unit combines light weight and high efficiency, thanks to its inverter technology. The unit is extremely fast and simple, with three basic operations required to operator: connect, scan, start the fusion.
The MSA 2.0 has 350 protocols permanently stored in the internal memory.
It is robust, safe and ergonomic.
All is meant to simplify the job: the barcode scanner, for long distance reading, the cooling system to joint in series, the icon system, to keep the interaction between user and machine intuitive.
The entire welding process is controlled and regulated with energy output compensation depending on ambient temperature and the indication of cooling time.
Scope of delivery includes: transport box, 1 pair of angle adapter clips 4.0 mm and operating instructions.

Technical Data:

- Operating temperature: -20°C to +50°C
- Mains frequency: 50-60 Hz
- Mains voltage: 230V (190V - 265V)
- Fusion current: 90 A (max)
- Suggested power generators: 3.5 kVA
- Welding technique: Voltage controlled
- Fusion voltage: 8-42 V (48 V)
- Fittings range: d16-1200 mm
- Fusion data input mode: bar code, manual
- Internal memory capacity: 350 protocols
- USB Port: Type A
- Protection factor: Class 1 / IP 65
- Mains cable: 13.1 ft (4 m)
- Fusion cable: 3 m
- Dimensions: 280 x 420 x 280 mm
- Weight: ca. 26.2 lbs (11.9 kg)
- Display: Graphical LCD, adjustable contrast
- Languages support: all

Type	Part No.	SP	weight lb
Barcode scanner, transport case	**790 156 001**	1	44.093

MSA 2 CF @ 115V - Automatic Electrofusion Unit with protocols retrieval

The MSA 2 CF electro fusion unit combines light weight and high efficiency, thanks to its power switching technology and furthermore provides fusion documentation in PDF. The unit is extremely fast and simple, like COOL-FIT installations, with three basic operations required to the operator: connect, scan, start the fusion.
It is robust, safe and ergonomic.
All is meant to simplify the job: the barcode scanner, for long distance reading, the cooling system to joint in series, the icon system, to keep the interaction between user and machine intuitive.
The entire welding process is controlled and regulated with energy output compensation depending on ambient temperature and the indication of cooling time.
The unit has 1000 protocols permanently stored in the internal memory. The user can copy the fusion reports in an USB stick to print them out in PDF format.
Scope of delivery includes: transport box, standard and long angle adapters (4.0 mm), operating instructions, START/STOP badge and USB memory stick with PC applications.

Technical Data:

- Operating temperature: -20°C to +50°C
- Mains voltage: 90V - 135V AC
- Mains frequency: 50-60 Hz
- Fusion voltage: 8-42 V
- Fusion data input mode: bar code, manual
- Fusion current: 90 A (max)
- Suggested power generators: 3.5 kVA
- Fittings range: d20-d450 (inner diameter) COOL-FIT 2.0/4.0
- Protocols format: PDF and binary (compatible with mini Welding Book)
- USB Port: Type A
- Protection factor: Class 1 / IP 65
- Mains cable: 13.1 ft (4 m)
- Fusion cable: 13.1 ft (4 m)
- Weight: ca 12.5 kg
- Display: Graphical LCD, adjustable contrast
- Languages support: all

	Type	Part No.	weight lb
Barcode scanner, transport case, mini Welding Book		**790 156 023**	39.652

COOL-FIT Y cables kit

- The COOL-FIT Y cables are used to speed up the installation of the fixed points electrofusion tapes. The Y cables allow the welding in parallel of 2 E-Tapes, halving the total duration of the fusion process.
- Compatible with MSA 210-230, MSA 330-340, MSA 250 – 400, MSA 250 – 400 PLUS

	Type	Part No.	weight (lb)
4 leads cable with 2mm plugs in output		**790 156 032**	0.849

Long adapters

- Required adapters for Electrofusion units with 4 mm connectors.
- Longer version, suitable for all COOL-FIT PE Plus dimensions.

Type	Part No.	weight (lb)	Description
4,0 mm	**790 128 035**	0.128	Angle adapter, black

COOL-FIT PE Plus Foam removal and peeling tool

Model:

- Optional: Manual tool required for foam removal and peeling of COOL-FIT PE Plus pipes
- Rental tools available, contact factory

d (mm)	Part No.	weight (lb)
32-90	**799 738 001**	23.149
110-225	**799 738 003**	36.376
250-450	**799 738 004**	156.528

COOL-FIT PE Plus Powered foam removal and peeling tool

Model:

- Optional: Manual tool required for foam removal and peeling of COOL-FIT PE Plus pipes
- For usage in combination with drill drivers (not included)
- Rental tools available, contact factory

d (mm)	Part No.	weight (lb)
32-63	**799 738 201**	23.149

Double clamp with universal link

- Recommended for the installation of fittings COOL-FIT PE Plus and ELGEF
- The clamping allows installation without tension and avoids movement during fusion and cooling time
- The centrally located adjustable universal link allows installation of electrofusion couplers, elbows and reducers
- Universal use; works above, below and alongside the joint
- Adaptor for use with Tee-pieces available (see accessories)

d (mm)	d1 (mm)	Part No.	weight (lb)	Description	B (mm)	H (mm)	L (mm)
40	200	**799 301 490**	9.259	Scope of delivery: 2 x V-block, 2 x Straight bar, 1 x Universal link, Transport bag (600x380x250)	290	230	960
160	630	**799 301 496**	31.085	Scope of delivery: 2 x V-block, 2 x Straight bar, 1 x Universal link, Transport bag (780x780x580)	670	550	1300

Quadruple clamp with universal link

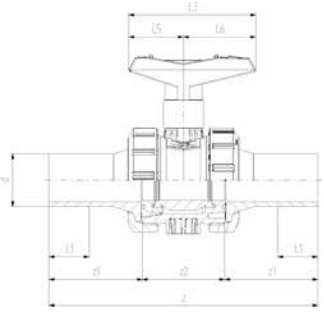
- Recommended for the installation of fittings COOL-FIT PE Plus and ELGEF
- The clamping allows installation without tension and avoids movement during fusion and cooling time
- The centrally located adjustable universal link allows installation of electrofusion couplers, elbows and reducers
- Universal use; works above, below and alongside the joint
- Adaptor for use with Tee-pieces available (see accessories)

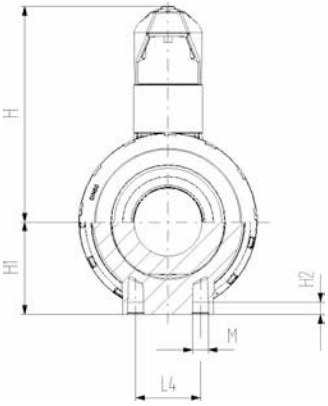
d (mm)	d1 (mm)	Part No.	weight (lb)	Description	B (mm)	H (mm)	L (mm)
40	200	**799 301 489**	18.298	Scope of delivery: 4 x V-block, 2 x Straight bar, 1 x Universal link, Transport bag (600x380x250)	290	230	960
160	630	**799 301 495**	51.368	Scope of delivery: 4 x V-block, 2 x Straight bar, 1 x Universal link, Transport bag (780x780x580)	670	550	1300

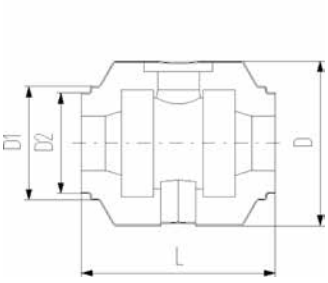
Valves

COOL-FIT PE Plus Valves

Manual Valve







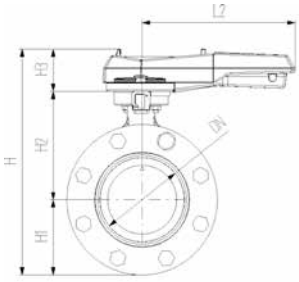
COOL-FIT PE Plus Ball valve type 546

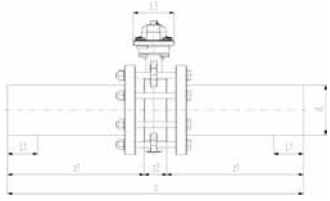
Model:

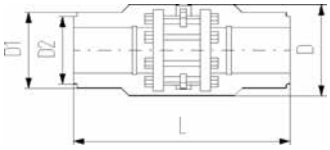
- Material: ABS with spigot PE100 SDR11, metric
- Ball seals PTFE
- Integrated stainless steel mounting inserts
- Including insulation half shells

d (mm)	closest inch (inch)	DN (mm)	PN	EPDM Part No.	weight (lb)
32	1	25	10	**138 546 108**	1.195
40	1 ¼	32	10	**138 546 109**	1.956
50	1 ½	40	10	**138 546 110**	2.568
63	2	50	10	**138 546 111**	4.630
75	2 ½	65	10	**138 546 112**	11.299
90	3	80	10	**138 546 113**	15.814

d (mm)	closest inch (inch)	DN (mm)	D (mm)	D1 (mm)	D2 (mm)	L (mm)	L1 (mm)	L3 (mm)	H (mm)	H1 (mm)	H2 (mm)	z (mm)	z1 (mm)	z2 (mm)
32	1	25	135	97	82	152	36	97	98	36	12	223	76	76
40	1 ¼	32	157	117	97	170	40	128	119	44	15	249	82	82
50	1 ½	40	169	117	97	184	44	128	125	51	15	271	91	91
63	2	50	204	132	117	227	48	152	150	64	15	321	110	110
75	2 ½	65	235	147	132	276	55	270	194	85	15	386	125	125
90	3	80	255	168	147	297	62	270	200	105	15	421	140	140







COOL-FIT PE Plus Insulate Butterfly valve type 567

Model:

- Material: ABS with spigot PE100 SDR11, metric
- Including valve, flange adaptors, backing flanges PP-Steel, hardware and insulation half shells

d (mm)	closest inch (inch)	DN (mm)	PN	EPDM Part No.	weight (lb)
110	4	100	10	**138 567 114**	19.731
160	5	150	10	**138 567 117**	39.628
225	8	200	10	**138 567 120**	62.426

d (mm)	closest inch (inch)	DN (mm)	D (mm)	D1 (mm)	D2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	z (mm)
110	4	100	310	188	168	556	72	255	106	325	104	167	55	696
160	5	150	358	259		720	90	255	115	143	143	203	55	895
225	8	200	409	325		776	110	408	149	465	170	210	85	996

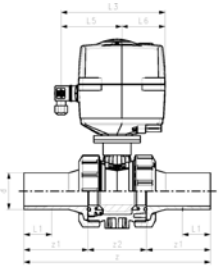
d (mm)	closest inch (inch)	DN (mm)	z1 (mm)	z2 (mm)
110	4	100	320	56
160	5	150	412	72
225	8	200	462	73

Actuated Valve

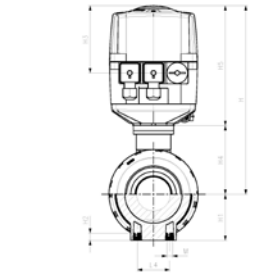
COOL-FIT PE Plus Electric Actuated Insulated Ball valve type 179

Model:

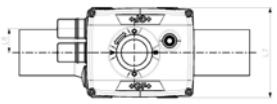
- Material: ABS with spigot PE100 SDR11, metric
- Ball seals PTFE
- Integrated stainless steel mounting inserts
- Voltage 100-230V, 50-60Hz
- Factory set control range 90°
- Including insulation half shells



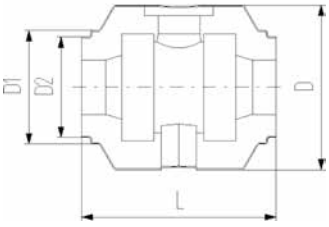
d (mm)	closest inch (inch)	DN (mm)	PN (bar)	Part No.	weight (lb)
32	1	25	10	**138 546 208**	6.257
40	1 ¼	32	10	**138 546 209**	6.997
50	1 ½	40	10	**138 546 210**	7.610
63	2	50	10	**138 546 211**	9.866
75	2 ½	65	10	**138 546 212**	15.776
90	3	80	10	**138 546 213**	28.660

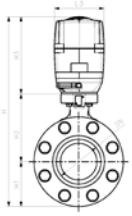


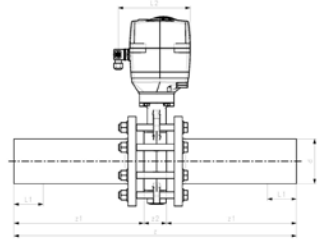
d (mm)	closest inch (inch)	DN (mm)	D (mm)	D1 (mm)	D2 (mm)	L (mm)	L1 (mm)	L3 (mm)	L4 (mm)	H (mm)	H1 (mm)	H2 (mm)	z (mm)	z1 (mm)
32	1	25	135	97	82	152	36	190	25	228	36	12	223	76
40	1 ¼	32	157	117	97	170	40	190	45	240	44	15	249	82
50	1 ½	40	169	117	97	184	44	190	45	246	51	15	271	91
63	2	50	204	132	117	227	48	190	45	263	64	15	321	110
75	2 ½	65	235	147	132	276	55	190	70	322	85	15	386	125
90	3	80	255	168	147	297	62	190	70	357	105	15	421	140

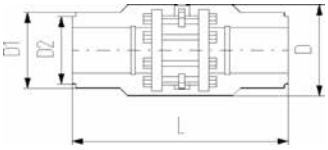


d (mm)	closest inch (inch)	DN (mm)	z2 (mm)	M
32	1	25	71	M6
40	1 ¼	32	85	M8
50	1 ½	40	89	M8
63	2	50	101	M8
75	2 ½	65	136	M8
90	3	80	141	M8









COOL-FIT PE Plus Electric Actuated Insulated Butterfly valve type 145

Model:

- Material: ABS with spigot PE100 SDR11, metric
- Voltage 100-230V, 50-60Hz
- Factory set control range 90°
- Including valve, flange adaptors, backing flanges PP-Steel, hardware and insulation half shells

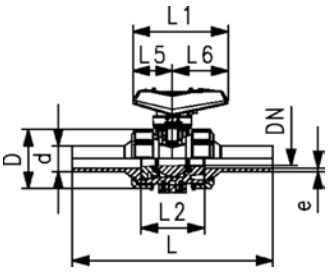
d (mm)	closest inch (inch)	DN (mm)	PN	EPDM Part No.	weight (lb)
110	4	100	10	**138 567 214**	29.366
160	6	150	10	**138 567 217**	49.264
225	8	200	10	**138 567 220**	79.448

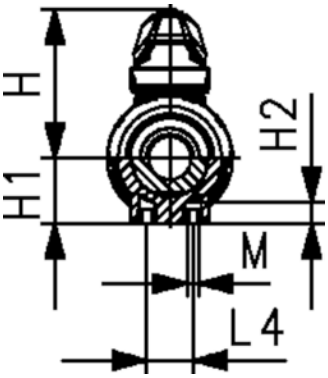
d (mm)	closest inch (inch)	DN (mm)	D (mm)	D1 (mm)	D2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	z (mm)
110	4	100	310	188	168	552	72	179	122	460	104	167	190	696
160	6	150	358	259		720	90	179	122	535	143	203	190	895
225	8	200	409	325		776	110	179	122	580	170	210	200	996

d (mm)	closest inch (inch)	DN (mm)	z1 (mm)	z2 (mm)
110	4	100	320	56
160	6	150	412	72
225	8	200	462	73

Uninsulated Valves

Manual valves





Ball valve type 546 pro
With butt fusion spigots long
PE100 SDR11 metric

Model:

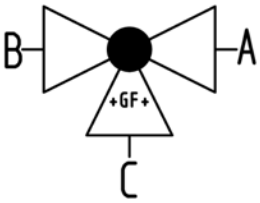
- Lockable lever as standard (DN10-DN50)
- Designed for easy installation and removal
- Ball seals PTFE
- Integrated stainless steel mounting inserts
- Z-dimension, valve end and union nut **are compatible** with type 546 (1st Generation)

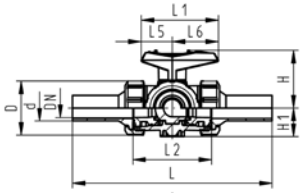
Option:

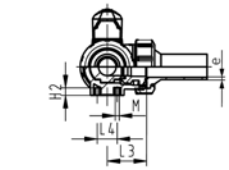
- Interface-module with position feedback sensor, incl. LED feedback (DN10-50)
- Manual spring return lever ("Dead man") (DN10-50)
- Pneumatic or electric actuators from GF
- Contact customer services for customization
- Multifunctional module with integrated limit switches (DN65-100)

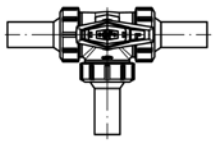
d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
32	1	25	10	**800 015 141**	0.683
40	1 ¼	32	10	**800 015 142**	1.168
50	1 ½	40	10	**800 015 179**	1.631
63	2	50	10	**800 015 143**	3.020
75	2 ½	65	10	**800 045 326**	8.598
90	3	80	10	**800 045 327**	8.598
110	4	100	10	**800 045 328**	8.598

d (mm)	closest inch (inch)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	M	e (mm)
32	1	68	80	36	12	223	105	71	25	44	62	M6	2.9
40	1 ¼	84	95	44	15	249	131	85	45	57	74	M8	3.7
50	1 ½	97	102	51	15	271	131	89	45	57	74	M8	4.6
63	2	124	117	64	15	320	152	101	45	66	86	M8	5.8
75	2 ½	166	150	85	15	387	269	136	70	64	206	M8	6.8
90	3	200	161	105	15	421	269	141	70	64	206	M8	8.2
110	4	238	178	123	22	484	319	164	120	64	256	M12	10.0









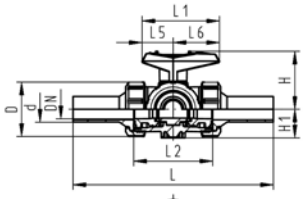
ecoFIT
3-Way Ball Valve Type 543 ABS
Horizontal/L-port
With butt fusion spigots long
PE100 SDR11 metric

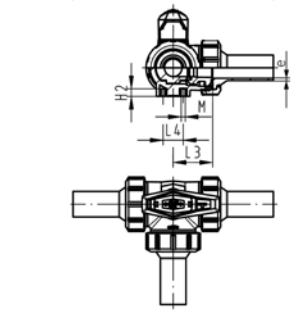
Model:

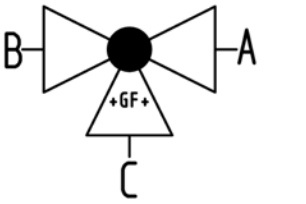
- Ball seals PTFE
- Pneumatic or electric actuator available separately
- Angle of operation 360° without turn limiter
- Turn limiter 90° enclosed, in different positions usable as a clip-on ring
- Integrated stainless steel mounting inserts
- Delivery status A-C opened, see flow scheme

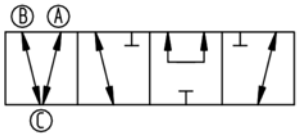
d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
32	1	25	10	**169 543 304**	0.992
40	1 ¼	32	10	**169 543 305**	1.680
50	1 ½	40	10	**169 543 306**	2.560
63	2	50	10	**169 543 307**	5.531

d (mm)	closest inch (inch)	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)
32	1	68	251	97	99	50	25	39	58	73	36	8	6	2.9
40	1 ¼	84	283	128	120	60	45	54	74	90	45	9	8	3.7
50	1 ½	97	319	128	137	69	45	54	74	97	51	9	8	4.6
63	2	124	399	152	179	89	45	66	87	116	65	9	8	5.8









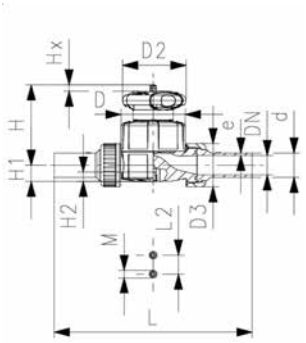
ecoFIT 3-Way Ball Valve Type 543 ABS with long spigot PE100 SDR11 metric ends Horizontal/T-Port for Butt fusion or Electrofusion

Model:

- Ball seals PTFE
- Pneumatic or electric actuator available separately
- Angle of operation 360° without turn limiter
- Turn limiter 90° enclosed, in different positions usable as a clip-on ring
- Integrated stainless steel mounting inserts
- Delivery status A-B-C opened, see flow scheme

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
32	1	25	10	**169 543 324**	0.992
40	1 ¼	32	10	**169 543 325**	1.680
50	1 ½	40	10	**169 543 326**	2.560
63	2	50	10	**169 543 327**	5.531

d (mm)	closest inch (inch)	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)
32	1	68	251	97	99	50	25	39	58	73	36	8	6	2.9
40	1 ¼	84	283	128	120	60	45	54	74	90	45	9	8	3.7
50	1 ½	97	319	128	137	69	45	54	74	97	51	9	8	4.6
63	2	124	399	152	179	89	45	66	87	116	65	9	8	5.8



Diaphragm Valve Type 514 ABS with long spigot PE 100 SDR 11 metric True Union Ends for Electrofusion

Model:

- Material: ABS metric
- One housing nut replaces four screws
- Handwheel with built-in locking mechanism

Option:

- Self adjusting multifunctional module with integrated limit switches

d (mm)	closest inch (inch)	PN (bar)	Part No.	weight (lb)
32	1	10	**169 514 314**	1.517
40	1 ¼	10	**169 514 315**	2.937
50	1 ½	10	**169 514 316**	5.324
63	2	10	**169 514 317**	7.097

D (mm)	D2 (mm)	D3 (mm)	L (mm)	L2 (mm)	H (mm)	H1 (mm)	H2 (mm)	M	Lift = Hx (mm)
88	87	58	234	25	107	22	12	6	13
101	87	72	260	45	115	26	15	8	15
117	135	85	284	45	148	32	15	8	19
144	135	100	321	45	166	39	15	8	25

Lugstyle butterfly valve type 578 ABS
Hand lever with ratchet settings

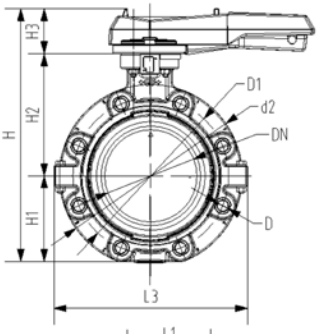
Model:

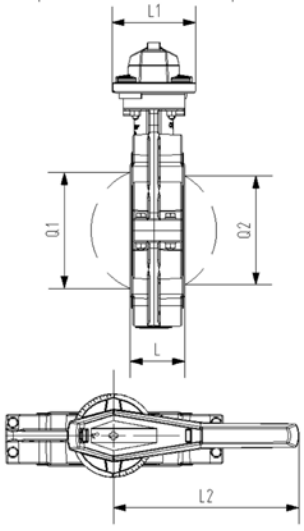
- Housing material: PP-GF30 with 316SS lug inserts
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759

Option:

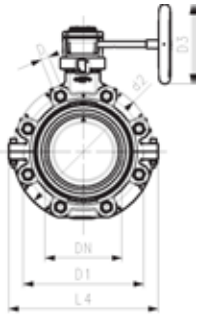
- Optional accessory: Integrated position feedback with limit switches (sold separately)

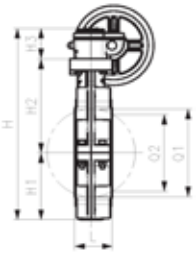
d (mm)	Size (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
63	2	50	10	**169 578 102**	3.968
75	2 ½	65	10	**169 578 103**	4.178
90	3	80	10	**169 578 104**	4.963
110	4	100	10	**169 578 105**	6.936
140	5	125	10	**169 578 106**	10.274
160	6	150	10	**169 578 107**	14.176
225	8	200	10	**169 578 108**	19.015
280	10	250	10	**169 578 109**	43.052
315	12	300	10	**169 578 110**	57.554

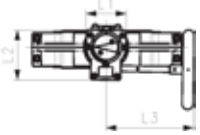




d (mm)	Size (inch)	d2 (mm)	D	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Q1 (mm)	Q2 (mm)
63	2	160	UNC 5/8	120.6	265	77	134	54	45	106	205	165	40	
75	2 ½	180	UNC 5/8	139.7	277	83	140	54	46	106	205	182	54	35
90	3	195	UNC 5/8	152.4	289	89	146	54	49	106	205	210	67	50
110	4	226	UNC 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	113	140	408	440	210	207
315	12	482	UNC 7/8	431.8	586	234	285	67	113	140	408	510	256	253







Lugstyle butterfly valve type 578 ABS
Reduction gear with handwheel

Model:

- Housing material: PP-GF30 with 316SS lug inserts
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759

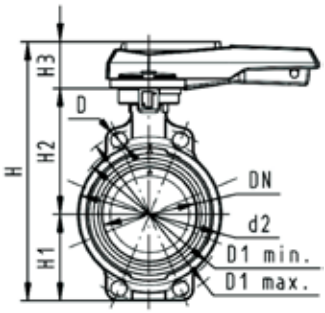
Option:

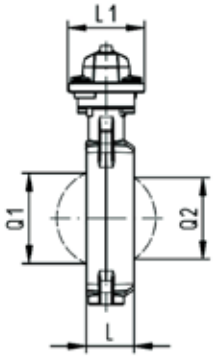
- Optional accessory: Integrated position feedback with limit switches (sold separately)

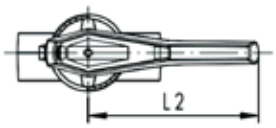
d (mm)	Size (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
63	2	50	10	**169 578 122**	7.643
75	2 ½	65	10	**169 578 123**	7.959
90	3	80	10	**169 578 124**	8.662
110	4	100	10	**169 578 125**	10.657
140	5	125	10	**169 578 126**	13.995
160	6	150	10	**169 578 127**	17.877
225	8	200	10	**169 578 128**	20.620
280	10	250	10	**169 578 129**	43.052
315	12	300	10	**169 578 130**	57.554

d (mm)	Size (inch)	d2 (mm)	D	D1 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
63	2	160	UNC 5/8	120.6	150	273	77	134	62	23	45	78	112	179
75	2 ½	180	UNC 5/8	139.7	150	285	83	140	62	23	46	78	112	179
90	3	195	UNC 5/8	152.4	150	297	89	146	62	23	49	78	112	179
110	4	226	UNC 5/8	190.5	150	335	106	167	62	23	56	78	112	179
140	5	258	UNC 3/4	215.9	150	364	121	181	62	23	64	78	112	179
160	6	284	UNC 3/4	241.3	160	384	133	189	62	23	72	78	112	179
225	8	341	UNC 3/4	298.4	160	431	159	210	62	23	73	78	112	179
280	10	412	UNC 7/8	362.0	200	524	205	264	55	23	113	130	140	440
315	12	482	UNC 7/8	431.8	200	574	234	285	55	23	113	130	140	510

d (mm)	Size (inch)	L4 (mm)	Q1 (mm)	Q2 (mm)
63	2	165	40	
75	2 ½	182	54	35
90	3	210	67	50
110	4	240	88	74
140	5	272	113	97
160	6	300	139	123
225	8	360	178	169
280	10	200	210	207
315	12	200	256	253







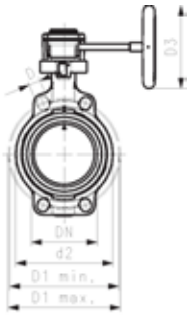
Butterfly valve type 567 ABS
Hand lever with ratchet settings

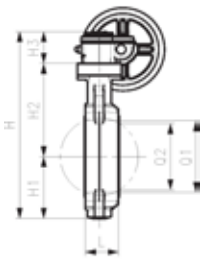
Model:

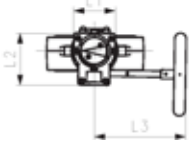
- Connecting dimension: ISO 7005 PN 10, EN 1092 PN 10, DIN 2501 PN 10, ANSI/ASME B 16.5 Class 150, BS 1560: 1989, BS 4504, JIS B 2220

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
63	2	50	10	**169 567 002**	2.617
75	2 ½	65	10	**169 567 003**	2.826
90	3	80	10	**169 567 004**	3.131
110	4	100	10	**169 567 005**	4.453
140	5	125	10	**169 567 006**	5.591
160	6	150	10	**169 567 007**	7.357
225	8	200	10	**169 567 008**	12.804
280	10	250	10	**169 567 009**	31.588
315	12	300	10	**169 567 010**	41.665

d (mm)	closest inch (inch)	d2 (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	Q1 (mm)	Q2 (mm)
63	2	104	19	120.0	125.0	265	77	134	54	45	106	205	40	
75	2 ½	115	19	139.7	145.0	277	83	140	54	46	106	205	54	35
90	3	131	19	150.0	160.0	289	89	146	54	49	106	205	67	50
110	4	161	19	175.0	190.5	326	104	167	55	56	106	255	88	74
140	5	187	23	210.0	215.9	353	117	181	55	64	106	255	113	97
160	6	215	24	241.3	241.3	374	130	189	55	72	106	255	139	123
225	8	267	23	290.0	295.0	435	158	210	67	73	140	408	178	169
280	10	329	25	353.0	362.0	554	205	264	85	113	149	408	210	207
315	12	379	25	400.0	432.0	598	228	285	85	113	149	408	256	253







Butterfly valve type 567 ABS
Reduction gear with handwheel

Model:

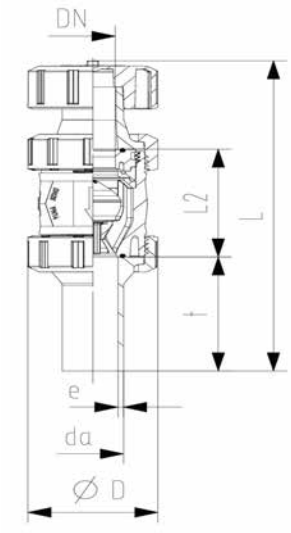
- Connecting dimension: ISO 7005 PN 10, EN 1092 PN 10, DIN 2501 PN 10, ANSI/ASME B 16.5 Class 150, BS 1560: 1989, BS 4504, JIS B 2220

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
63	2	50	10	**169 567 022**	6.786
75	2 ½	65	10	**169 567 023**	7.057
90	3	80	10	**169 567 024**	7.185
110	4	100	10	**169 567 025**	7.701
140	5	125	10	**169 567 026**	9.978
160	6	150	10	**169 567 027**	11.283
225	8	200	10	**169 567 028**	14.085
280	10	250	10	**169 567 029**	28.656
315	12	300	10	**169 567 030**	42.194

d (mm)	closest inch (inch)	d2 (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
63	2	104	19	120	125	160	273	77	134	62	45	78	112	179
75	2 ½	115	19	140	145	150	285	83	140	62	46	78	112	179
90	3	131	19	150	160	150	297	89	146	62	49	78	112	179
110	4	160	19	175	191	150	333	104	167	62	56	78	112	179
140	5	187	23	210	216	150	360	117	181	62	64	78	112	179
160	6	215	24	241	241	160	381	130	189	62	72	78	112	179
225	8	267	23	290	295	160	430	158	210	62	73	78	112	179
280	10	329	25	353	362	200	538	205	264	69	113	97	130	198
315	12	379	25	400	432	200	582	228	285	69	113	97	130	198

d (mm)	closest inch (inch)	Q1 (mm)	Q2 (mm)
63	2	40	
75	2 ½	54	35
90	3	67	50
110	4	88	74
140	5	113	97
160	6	139	123
225	8	178	169
280	10	210	207
315	12	256	253

ABS Base Valve

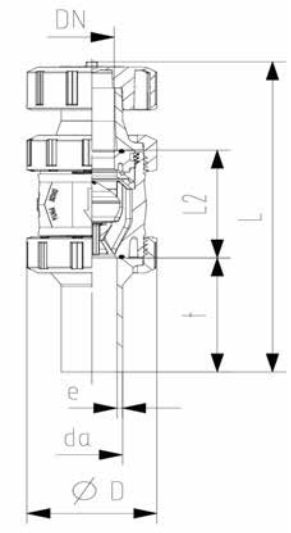


Ventilating and bleed valve type 591
With PE100 SDR11 long spigot ends

Model:

- Material: ABS with spigot PE100 SDR11, metric
- With protection cap up to DN50 made from PP-GF, DN65-100 made from POM
- Floater made of PP-H
- Designed for easy installation and removal
- Compact installation length

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	t (mm)	e (mm)
32	1	25	16	**150 591 204**	0.564	68	207	71	76	2.90
40	1 ¼	32	16	**150 591 205**	0.968	84	230	85	82	3.70
50	1 ½	40	16	**150 591 206**	1.512	97	254	89	91	4.60
63	2	50	16	**150 591 207**	2.641	124	298	101	110	5.80
75	2 ½	65	16	**150 591 208**	5.644	166	334	136	125	6.80
90	3	80	16	**150 591 209**	9.028	200	360	141	140	8.20
110	4	100	16	**150 591 210**	14.288	238	411	164	160	10.00

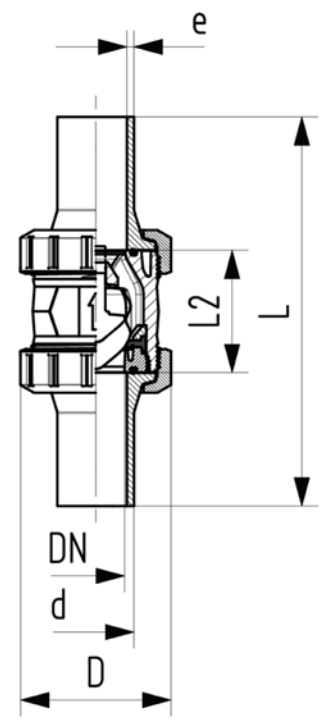


Ventilating valve type 595
With PE100 SDR11 long spigot ends

Model:

- Material: ABS with spigot PE100 SDR11, metric
- With protection cap up to DN50 made from PP-GF, DN65-100 made from POM
- Floater made of PP-H
- Designed for easy installation and removal
- Compact installation length

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	t (mm)	e (mm)
32	1	25	16	**150 595 204**	0.564	68	207	71	76	2.90
40	1 ¼	32	16	**150 595 205**	0.968	84	230	85	82	3.70
50	1 ½	40	16	**150 595 206**	1.512	97	254	89	91	4.60
63	2	50	16	**150 595 207**	2.641	124	298	101	110	5.80
75	2 ½	65	16	**150 595 208**	5.644	166	334	136	125	6.80
90	3	80	16	**150 595 209**	9.028	200	360	141	140	8.20
110	4	100	16	**150 595 210**	14.288	238	411	164	160	10.00



Check valve type 561
With PE100 SDR11 long spigot ends

Model:

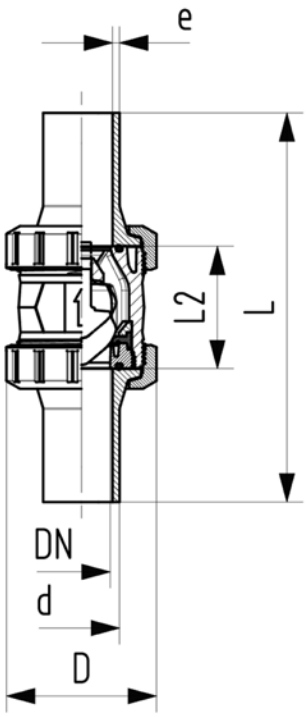
- Material: ABS with spigot PE100 SDR11, metric
- Designed for easy installation and removal
- Vibration free even at high flow velocity
- Flow-optimized return cone, double guided
- Compact installation length, same as ball valve type 546
- For vertical installation

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	e (mm)
32	1	25	16	**169 561 304**	0.538	68	223	71	3.00
40	1 ¼	32	16	**169 561 305**	0.913	84	249	85	3.70
50	1 ½	40	16	**169 561 306**	1.442	97	271	89	4.60
63	2	50	16	**169 561 307**	2.588	124	321	101	5.80
75	2 ½	65	16	**169 561 308**	5.952	166	386	136	6.80
90	3	80	16	**169 561 309**	9.436	200	421	141	8.20
110	4	100	16	**169 561 310**	15.260	238	484	164	10.00

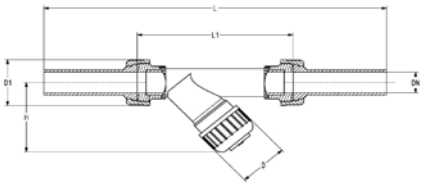
Check valve type 562 With butt fusion spigots long PE100 SDR11 metric

Model:

- Material: ABS with spigot PE100 SDR11, metric
- Designed for easy installation and removal
- Spring loaded, spring made of stainless steel (1.4310)
- Vibration free even at high flow velocity
- Flow-optimized return cone, double guided
- Compact installation length, same as ball valve type 546
- For horizontal or vertical installation



d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)	D (mm)	L (mm)	L2 (mm)	e (mm)
32	1	25	16	**169 562 304**	0.538	68	223	71	3.00
40	1 ¼	32	16	**169 562 305**	0.913	84	249	85	3.70
50	1 ½	40	16	**169 562 306**	1.442	97	271	89	4.60
63	2	50	16	**169 562 307**	2.588	124	321	101	5.80
75	2 ½	65	16	**169 562 308**	5.952	166	386	136	6.80
90	3	80	16	**169 562 309**	9.436	200	421	141	8.20
110	4	100	16	**169 562 310**	15.260	238	484	164	10.00



Line Strainer type 305
With PE100 SDR11 long spigot ends

Model:

- Protects valves, pumps, etc. from becoming damaged
- Easy dismantling to clean or replace the screen
- Screen in stainless steel operable temperature range up to -40°F to 140°F (-40°C to 60°C)
- Union Nut: ABS
- Gasket: O-ring EPDM Nr. 748 410 008-014

d (mm)	closest inch (inch)	DN (mm)	Part No.	weight (lb)	D (mm)	D1 (mm)	H (mm)	L (mm)	L1 (mm)
32	1	25	**150 305 904**	0.732	62	65	90	306	174
40	1 ¼	32	**150 305 905**	1.274	71	77	104	352	188
50	1 ½	40	**150 305 906**	1.953	88	84	124	380	222
63	2	50	**150 305 907**	3.263	103	105	148	429	264

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

Model:

- Stainless Steel A4 Quality (AISI 316)
- For line strainers Type 306/305

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

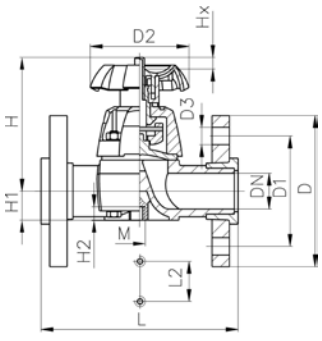
Diaphragm valve type 317 ABS
With flanges

Model:

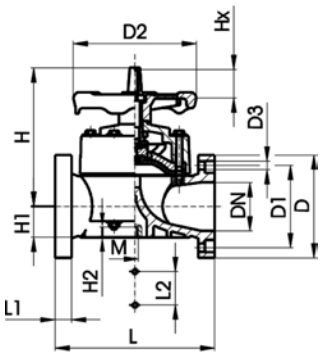
- Flat sealing faces
- DN 80-150 with fixed flange

	d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
	75	2 ½	65	10	**169 317 423**	10.430
*	90	3	80	10	**169 317 024**	18.409
	110	4	100	10	**169 317 025**	25.726

	d (mm)	closest inch (inch)	D (mm)	D1 (mm)	D2 (mm)	D3 (mm)	H (mm)	H1 (mm)	H2 (mm)	L (mm)	L1 (mm)	L2 (mm)	M	Lift = Hx (mm)
	75	2 ½	185	145	152	18	201	46	15	290		70	M8	30
*	90	3	200	160	270	18	265	57	23	310	35	120	M12	40
	110	4	225	180	270	18	304	69	23	350	35	120	M12	50

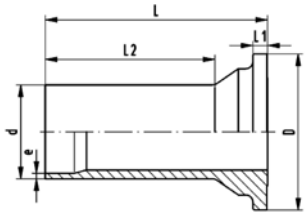


DN 15–65



DN 80-100

Spare Parts

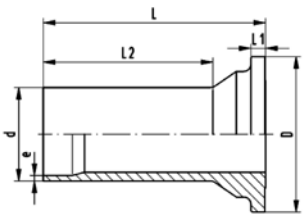


COOL-FIT PE Valve End Type 546 and 543 PE100 SDR11 metric long spigots

Model:

- Material: PE100

d (mm)	PN (bar)	Part No.	weight (lb)	D (mm)	e (mm)	L (mm)	L1 (mm)	L2 (mm)
32	16	**193 480 154**	0.071	53	2.9	76	5	58
40	16	**193 480 155**	0.119	65	3.7	82	5	61
50	16	**193 480 156**	0.190	77	4.6	91	6	63
63	16	**193 480 157**	0.364	99	5.8	110	7	77
75	16	**193 480 158**	0.617	125	6.8	125	9	89
90	16	**193 480 159**	0.985	150	8.2	140	10	103
110	16	**193 480 160**	1.612	180	10.0	160	11	117



ecoFIT Valve End Type 546 and 543 PE100 SDR17.6 metric long spigots

Model:

- Material: PE100

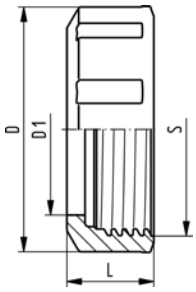
d (mm)	PN (bar)	Part No.	weight (lb)	D (mm)	e (mm)	L1 (mm)	L (mm)	L2 (mm)
75	16	**193 480 168**	0.573	125	4.3	9	125	89
90	16	**193 480 169**	0.915	150	5.1	10	140	103
110	16	**193 480 170**	1.506	180	6.3	11	160	117

Spare parts for valve body type 514 PE100 metric long spigot

Model:

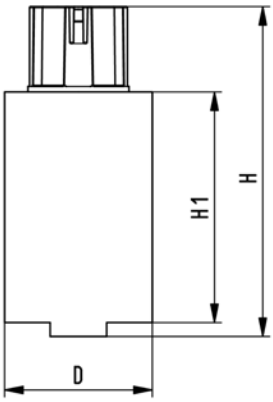
- Material: PE100

d (mm)	PN (bar)	PE100 long Part No.	weight (lb)
32	16	**721 500 408**	0.060
40	16	**721 500 409**	0.106
50	16	**721 500 410**	0.152
63	16	**721 500 411**	0.265



Union nut 546 and 543 ABS

d (mm)	DN (mm)	Part No.	weight (lb)	D (mm)	D1 (mm)	L (mm)	S (mm)
32	25	**169 480 715**	0.066	68	47	24	58
40	32	**169 480 716**	0.104	84	57	27	71
50	40	**169 480 717**	0.148	97	65	30	84
63	50	**169 480 718**	0.306	124	79	36	106
75	65	**169 480 719**	0.959	166	94	48	135
90	80	**169 480 720**	1.506	200	113	54	135
110	100	**169 480 721**	2.310	238	137	60	198



Handle extension for Ball valve type 546, 75-110mm

Model:

- Height Variable
- Multiple use in succession possible.

d-d (mm)	Part No.	SP	weight (lb)	H (mm)	D (mm)	H1 (mm)
75 - 90	**161 490 920**	1	0.712	143	58	100
- - 110	**161 490 921**	1	0.911	143	64	100

COOL-FIT PE Plus Insulation for Ball valve type 546

Model:

- Set consisting of half shells and clamps

d (mm)	Part No.	weight (lb)
32	**738 990 308**	0.353
40	**738 990 309**	0.503
50	**738 990 310**	0.622
63	**738 990 311**	1.098
75	**738 990 312**	2.061
90	**738 990 313**	2.277

COOL-FIT PE Plus Insulation for Butterfly valve type 567

Model:

- Set consisting of half shells and clamps

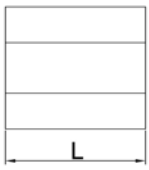
d (mm)	Part No.	weight (lb)
110	**738 990 324**	4.528
160	**738 990 327**	8.101
225	**738 990 330**	10.606

546 Ball Valve Insulation Kit

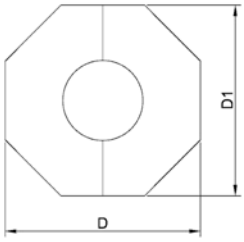
Model:

- Insulation made from PE
- Outer jacket UV resistant
- For Ball Valve Type 546

* handle extension for ball valve recommended, d75/90 161.490.920, d110 161.490.921



	d (mm)	Part No.	SP	weight (lb)	L (mm)	D (mm)	closest inch (inch)	D1 (mm)
	32	**738 990 139**	1	0.220	121	96	1	94
	40	**738 990 140**	1	0.220	143	110	1 ¼	110
	50	**738 990 141**	1	0.220	156	122	1 ½	120
	63	**738 990 142**	1	0.220	181	150	2	147
*	75	**738 990 143**	1	0.220	235	190	2 ½	185
*	90	**738 990 144**	1	0.220	255	226	3	221
*	110	**738 990 145**	1	2.425	300	268	4	262



Actuated Valves

Ball valve type 127 ABS 100-230V
With manual emergency override
With PE100 SDR11 long spigot ends

Model:

- Built with electric actuator EA15
- Voltage 100-230V, 50-60Hz
- Factory set control range 90°<)
- Heating element, position feedback (Open/Close)
- Integrated stainless steel mounting inserts

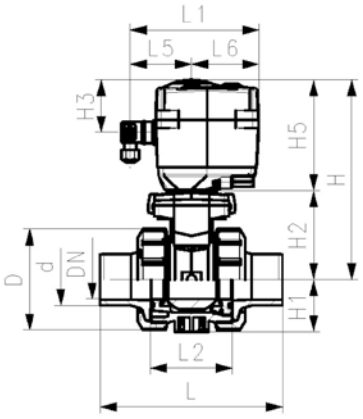
Option:

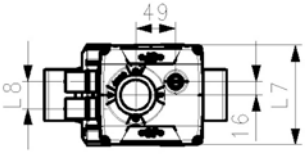
- Fail-safe return unit

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
32	1	25	10	**199 127 385**	5.020
40	1 ¼	32	10	**199 127 386**	5.789
50	1 ½	40	10	**199 127 387**	6.632
63	2	50	10	**199 127 388**	7.480

d (mm)	closest inch (inch)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H5 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)
32	1	68	209	36	73	64	137	223	161	71	160	25	77	83
40	1 ¼	84	220	44	84	64	137	249	161	85	180	45	77	83
50	1 ½	97	220	51	84	64	137	271	161	89	200	45	77	83
63	2	124	243	64	106	64	137	320	161	101	230	45	77	83

d (mm)	closest inch (inch)	L7 (mm)	L8 (mm)	z (mm)
32	1	122	33	79
40	1 ¼	122	33	94
50	1 ½	122	33	95
63	2	122	33	107





Ball valve type 127 ABS 24V
With manual emergency override
With PE100 SDR11 long spigot ends

Model:

- Built with electric actuator EA15
- Voltage 24V AC/DC
- Factory set control range 90°<)
- Heating element, position feedback (Open/Close)
- Integrated stainless steel mounting inserts

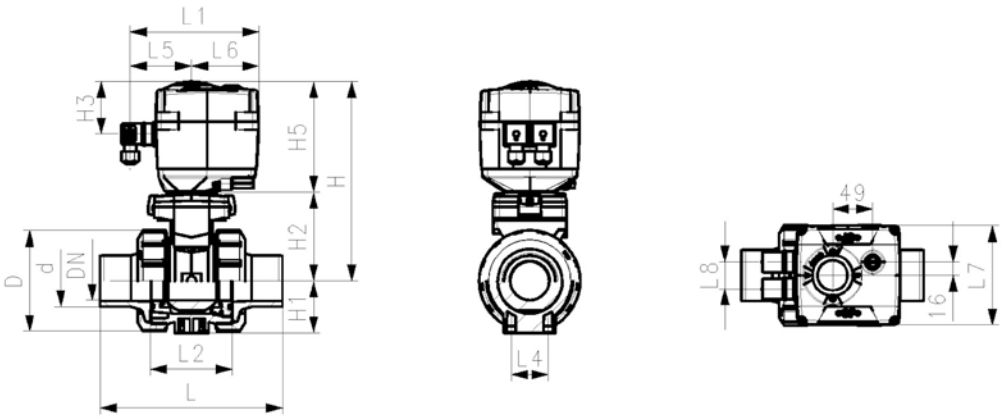
Option:

- Fail-safe return unit

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
32	1	25	10	**199 127 395**	5.020
40	1 ¼	32	10	**199 127 396**	5.789
50	1 ½	40	10	**199 127 397**	6.632
63	2	50	10	**199 127 398**	7.480

d (mm)	closest inch (inch)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H5 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)
32	1	68	209	36	73	64	137	223	161	71	160	25	77	83
40	1 ¼	84	220	44	84	64	137	249	161	85	180	45	77	83
50	1 ½	97	220	51	84	64	137	271	161	89	200	45	77	83
63	2	124	243	64	106	64	137	321	161	101	230	45	77	83

d (mm)	closest inch (inch)	L7 (mm)	L8 (mm)	z (mm)
32	1	122	33	79
40	1 ¼	122	33	94
50	1 ½	122	33	95
63	2	122	33	107



Ball valve type 179 ABS 100-230V
With manual emergency override
With PE100 SDR11 long spigot ends

Model:

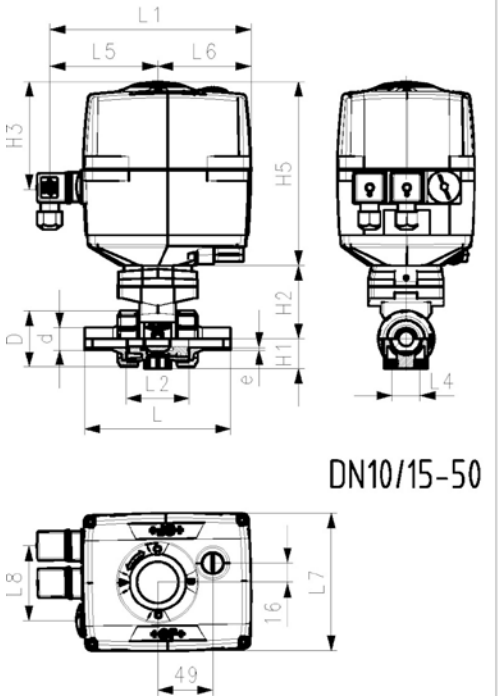
- Voltage 100-230V, 50-60Hz
- Factory set control range 90°<)
- Integrated stainless steel mounting inserts

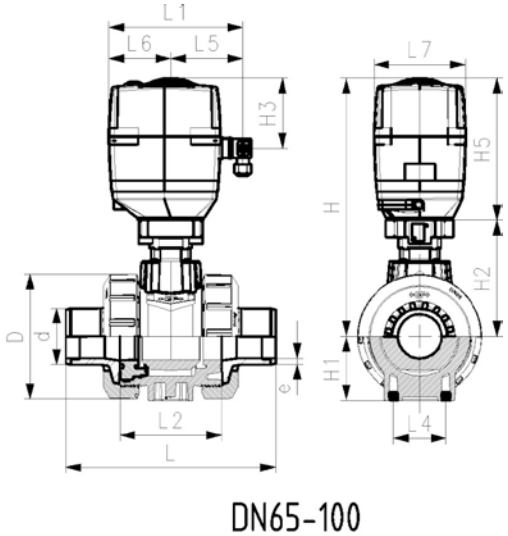
Option:

- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

d (mm)	closest inch (inch)	D (mm)	DN (mm)	PN (bar)	EA	EPDM Part No.	weight (lb)
32	1	68	25	10	EA25	**150 179 205**	5.884
40	1 ¼	84	32	10	EA25	**150 179 206**	6.479
50	1 ½	97	40	10	EA25	**150 179 207**	6.821
63	2	124	50	10	EA25	**150 179 208**	8.960
75	2 ½	166	65	10	EA45	**150 179 209**	17.220
90	3	200	80	10	EA120	**150 179 210**	22.509
110	4	238	100	10	EA120	**150 179 211**	32.589

d (mm)	closest inch (inch)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H5 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L7 (mm)	z (mm)
32	1	209	36	73	64	137	223	161	71	25	77	122	79
40	1 ¼	251	44	84	94	167	249	180	85	45	97	122	94
50	1 ½	251	51	84	94	167	271	180	89	45	97	122	95
63	2	273	64	106	94	167	321	180	101	45	97	122	107
75	2 ½	346	85	156	94	190	386	180	136	70	98	122	144
90	3	358	105	168	94	190	421	180	141	70	98	122	151
110	4	365	123	175	94	190	484	180	164	120	98	122	174





Ball valve type 179 ABS 24V
With manual emergency override
With PE100 SDR11 long spigot ends

Model:

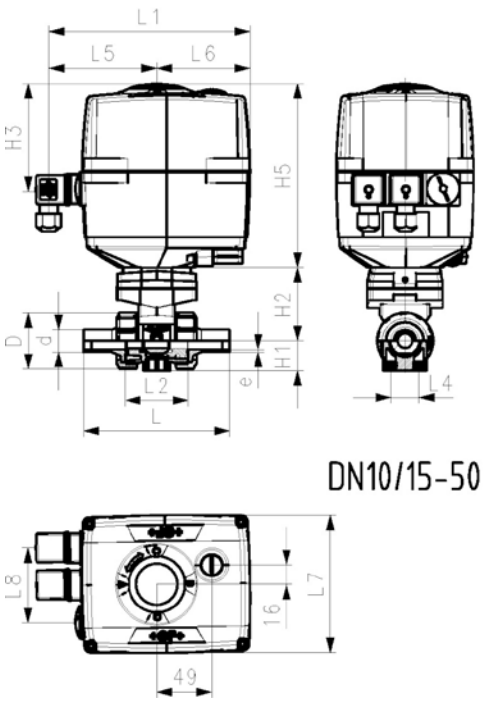
- Voltage 24V AC/DC
- Factory set control range 90°<)
- Integrated stainless steel mounting inserts

Option:

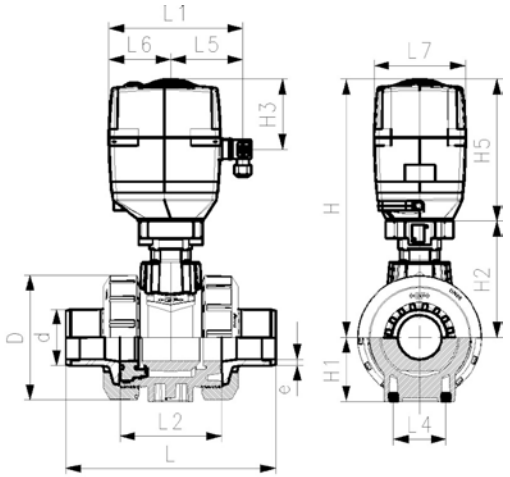
- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

d (mm)	closest inch (inch)	D (mm)	DN (mm)	PN (bar)	EA	EPDM Part No.	weight (lb)
32	1	68	25	10	EA25	**150 179 245**	5.884
40	1 ¼	84	32	10	EA25	**150 179 246**	6.479
50	1 ½	97	40	10	EA25	**150 179 247**	6.821
63	2	124	50	10	EA25	**150 179 248**	8.960
75	2 ½	166	65	10	EA45	**150 179 249**	17.220
90	3	200	80	10	EA120	**150 179 250**	22.509
110	4	238	100	10	EA120	**150 179 251**	32.589

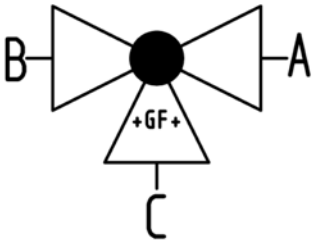
d (mm)	closest inch (inch)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H5 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L7 (mm)	z (mm)
32	1	240	36	73	94	167	233	180	71	25	97	122	79
40	1 ¼	251	44	84	94	167	249	180	85	45	97	122	94
50	1 ½	251	51	84	94	167	271	180	89	45	97	122	95
63	2	273	64	106	94	167	321	180	101	45	97	122	107
75	2 ½	346	85	156	94	190	386	180	136	70	98	122	144
90	3	358	105	168	94	190	421	180	141	70	98	122	151
110	4	365	123	175	94	190	484	180	164	120	98	122	174



DN10/15-50



DN65-100



Ball valve type 167 ABS
Horizontal/L-port 100-230V
With manual emergency override
With PE100 SDR11 long spigot ends

Model:

- Voltage 100-230V, 50-60Hz
- Integrated stainless steel mounting inserts

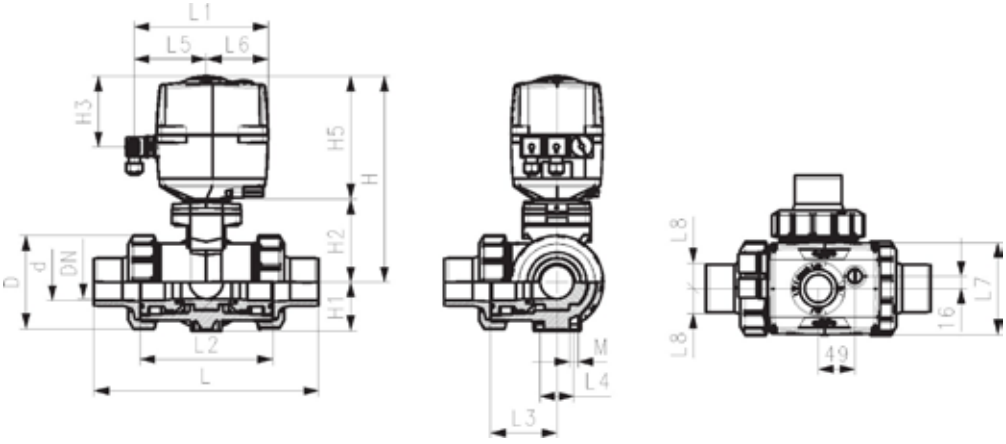
Option:

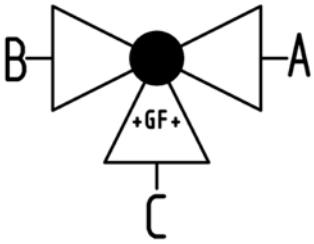
- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

d (mm)	closest inch (inch)	D (mm)	DN (mm)	PN (bar)	EA	EPDM Part No.	weight (lb)
32	1	68	25	10	EA25	**150 167 205**	6.014
40	1 ¼	84	32	10	EA25	**150 167 206**	8.190
50	1 ½	97	40	10	EA25	**150 167 207**	7.637
63	2	124	50	10	EA25	**150 167 208**	9.317

d (mm)	closest inch (inch)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H5 (mm)	H6 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	L7 (mm)
32	1	240	36	73	94	167	8	251	180	99	25	97	83	122
40	1 ¼	251	44	84	94	167	9	283	180	120	45	97	83	122
50	1 ½	251	51	84	94	167	9	319	180	137	45	97	83	122
63	2	273	65	106	94	167	9	399	180	179	45	97	83	122

d (mm)	closest inch (inch)	L8 (mm)	M (mm)	z (mm)	z1 (mm)
32	1	33	6	79	54
40	1 ¼	33	8	94	65
50	1 ½	33	8	95	72
63	2	33	8	107	92





Ball valve type 167 ABS
Horizontal/L-port 24V
With manual emergency override
With PE100 SDR11 long spigot ends

Model:

- Voltage 24V AC/DC
- Integrated stainless steel mounting inserts

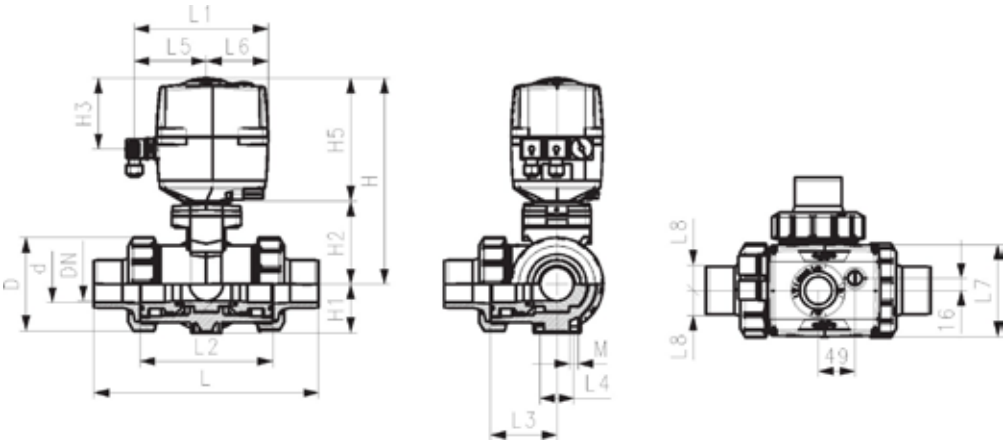
Option:

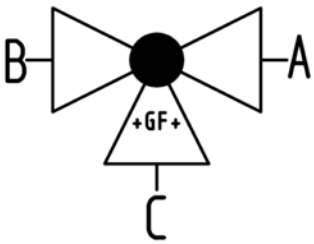
- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

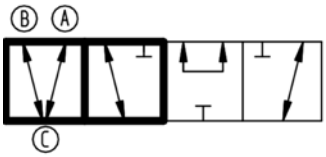
d (mm)	closest inch (inch)	D (mm)	DN (mm)	PN (bar)	EA	EPDM Part No.	weight (lb)
32	1	68	25	10	EA25	**150 167 245**	6.014
40	1 ¼	84	32	10	EA25	**150 167 246**	8.190
50	1 ½	97	40	10	EA25	**150 167 247**	7.637
63	2	124	50	10	EA25	**150 167 248**	9.317

d (mm)	closest inch (inch)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H5 (mm)	H6 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	L7 (mm)
32	1	240	36	73	94	167	8	251	180	99	25	97	83	122
40	1 ¼	251	44	84	94	167	9	283	180	120	45	97	83	122
50	1 ½	251	51	84	94	167	9	319	180	137	45	97	83	122
63	2	273	65	106	94	167	9	399	180	179	45	97	83	122

d (mm)	closest inch (inch)	L8 (mm)	M (mm)	z (mm)	z1 (mm)
32	1	33	6	79	54
40	1 ¼	33	8	94	65
50	1 ½	33	8	95	72
63	2	33	8	107	92







Ball valve type 167 ABS
Horizontal/T-port 100-230V
With manual emergency override
With PE100 SDR11 long spigot ends

Model:

- Voltage 100-230V, 50-60Hz
- Integrated stainless steel mounting inserts

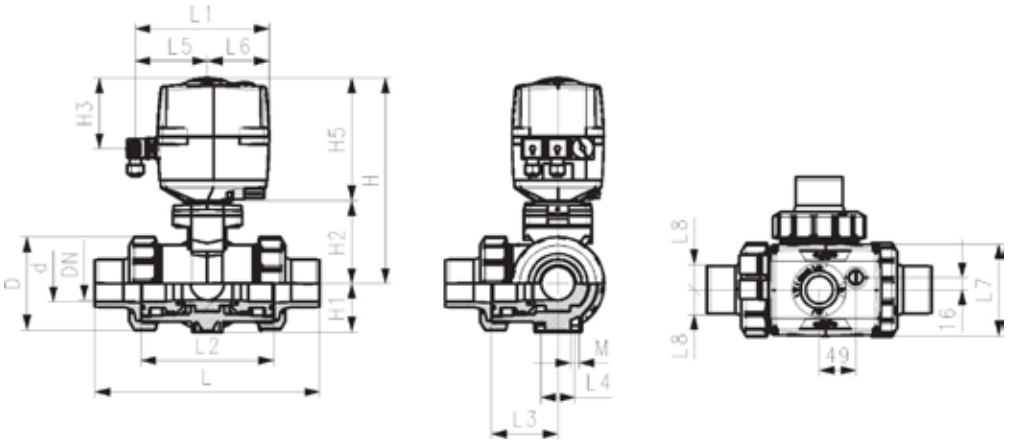
Option:

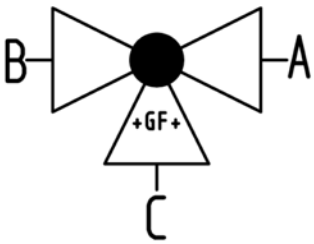
- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

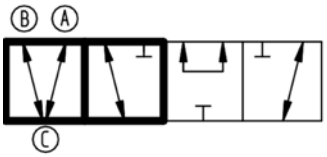
d (mm)	closest inch (inch)	D (mm)	DN (mm)	PN (bar)	EA	EPDM Part No.	weight (lb)
32	1	68	25	10	EA25	**150 167 215**	5.148
40	1 ¼	84	32	10	EA25	**150 167 216**	5.895
50	1 ½	97	40	10	EA25	**150 167 217**	6.770
63	2	124	50	10	EA25	**150 167 218**	9.242

d (mm)	closest inch (inch)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H5 (mm)	H6 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	L7 (mm)
32	1	240	36	73	94	167	8	251	180	99	25	97	83	122
40	1 ¼	251	44	84	94	167	9	283	180	120	45	97	83	122
50	1 ½	251	51	84	94	167	9	319	180	137	45	97	83	122
63	2	273	65	106	94	167	9	399	180	179	45	97	83	122

d (mm)	closest inch (inch)	L8 (mm)	M (mm)	z (mm)	z1 (mm)
32	1	33	6	79	54
40	1 ¼	33	8	94	65
50	1 ½	33	8	95	72
63	2	33	8	107	92







Ball valve type 167 ABS
Horizontal/T-port 24V
With manual emergency override
With PE100 SDR11 long spigot ends

Model:

- Voltage 24V AC/DC
- Integrated stainless steel mounting inserts

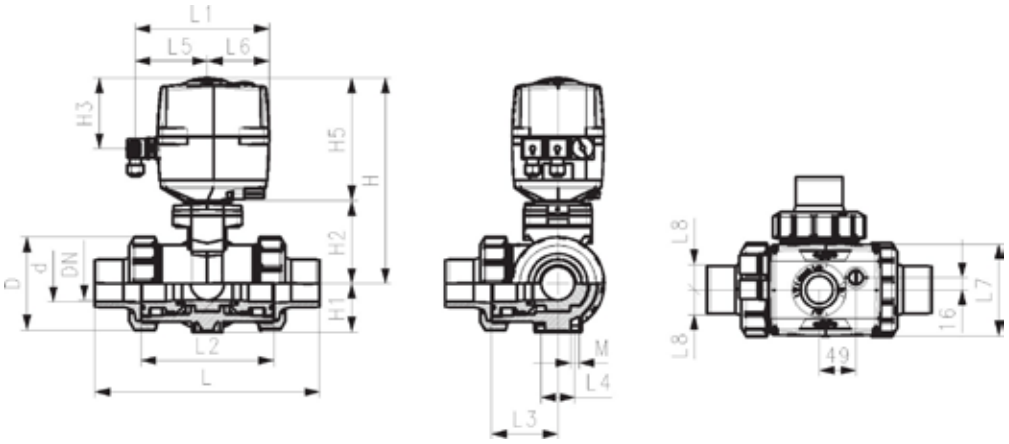
Option:

- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

d (mm)	closest inch (inch)	D (mm)	DN (mm)	PN (bar)	EA	EPDM Part No.	weight (lb)
32	1	68	25	10	EA25	**150 167 255**	5.148
40	1 ¼	84	32	10	EA25	**150 167 256**	5.895
50	1 ½	97	40	10	EA25	**150 167 257**	6.770
63	2	124	50	10	EA25	**150 167 258**	9.242

d (mm)	closest inch (inch)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H5 (mm)	H6 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	L7 (mm)
32	1	240	36	73	94	167	8	251	180	99	25	97	83	122
40	1 ¼	251	44	84	94	167	9	283	180	120	45	97	83	122
50	1 ½	251	51	84	94	167	9	319	180	137	45	97	83	122
63	2	273	65	106	94	167	9	399	180	179	45	97	83	122

d (mm)	closest inch (inch)	L8 (mm)	M (mm)	z (mm)	z1 (mm)
32	1	33	6	79	54
40	1 ¼	33	8	94	65
50	1 ½	33	8	95	72
63	2	33	8	107	92



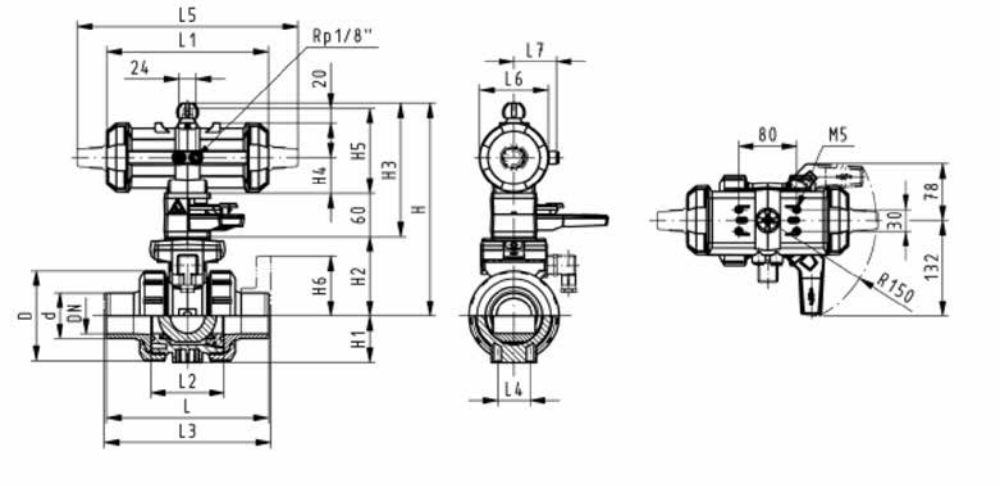
Ball valve type 230 ABS (Fail safe to close)
With manual emergency override
With PE100 SDR11 long spigot ends

Model:

- Built on with pneumatic actuator PA11 (DN10/15-25), PA21 (DN32-50)
- Control time 90°<) 1-2s
- Integrated stainless steel mounting inserts

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	Part No.	weight (lb)
32	1	25	10	**199 230 985**	3.258
40	1 ¼	32	10	**199 230 986**	5.445
50	1 ½	40	10	**199 230 987**	6.080
63	2	50	10	**199 230 988**	7.982

d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	H5 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	L7 (mm)
32	68	239	36	71	168	40	77	223	194	71	25	261	76	48
40	84	271	44	84	187	51	99	249	224	85	45	305	95	59
50	97	271	51	84	187	51	99	271	224	89	45	305	95	59
63	124	293	64	106	187	51	99	321	224	101	45	305	95	59



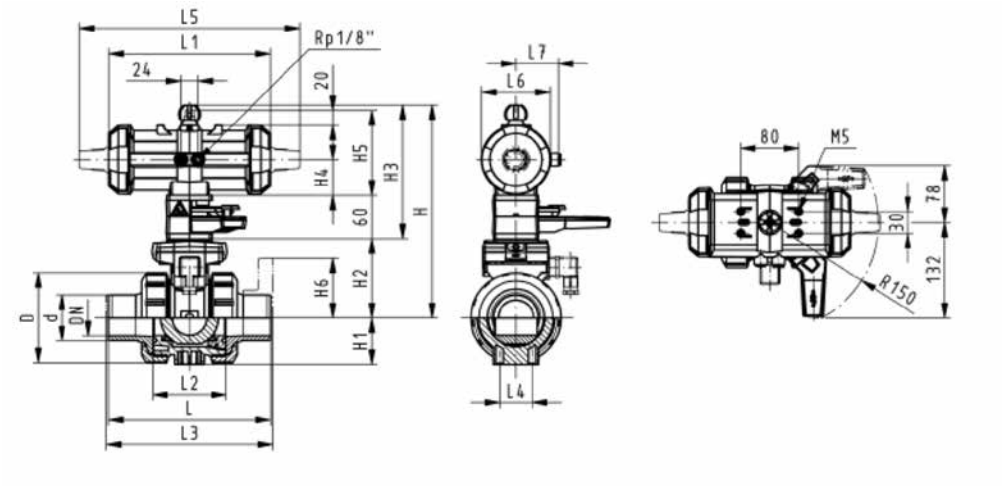
Ball valve type 230 ABS (Fail safe to close)
PE100 SDR11 metric long spigot ends

Model:

- Built on with pneumatic actuator PA11 (DN10/15-25), PA21 (DN32-50)
- Control time 90°<) 1-2s
- Integrated stainless steel mounting inserts

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	Part No.	weight (lb)
32	1	25	10	**150 230 225**	3.801
50	1 ¼	40	10	**150 230 227**	6.140
40	1 ½	32	10	**150 230 226**	6.982
63	2	50	10	**150 230 228**	9.072
75	2 ½	65	10	**150 230 229**	15.388
90	3	80	10	**150 230 230**	19.864
110	4	100	10	**150 230 231**	29.943

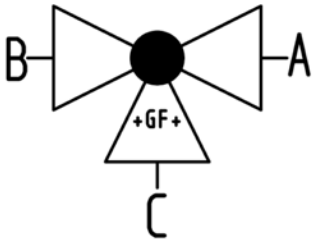
d (mm)	H (mm)	H1 (mm)	H2 (mm)	H5 (mm)	L (mm)	L1 (mm)	L2 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	L7 (mm)	z (mm)
32	168	36	71	77	223	194	71	25	261	76	48	79
50	202	51	84	99	271	224	89	45	305	95	59	95
40	271	44	84	99	249	224	85	45	305	95	59	94
63	293	64	106	99	321	244	101	45	305	95	59	107
75	262	85	156	70	386		136	70	276	65		144
90	281	105	168	78	421		141	70	341	72		151
110	292	123	175	86	484		164	120	369	80		174

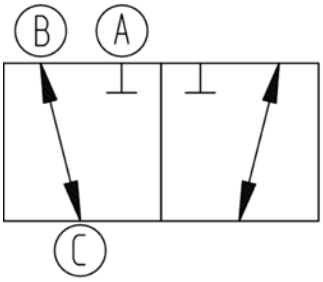


3-Way ball valve type 285 ABS
Horizontal/L-port FC (Fail safe to close)
With PE100 SDR11 long spigot ends

Model:

- Ball seals PTFE
- Built on with pneumatic actuator PA11 (DN10/15-25), PA21 (DN32-50)
- Integrated stainless steel mounting inserts
- Control time 90° 1-3 s

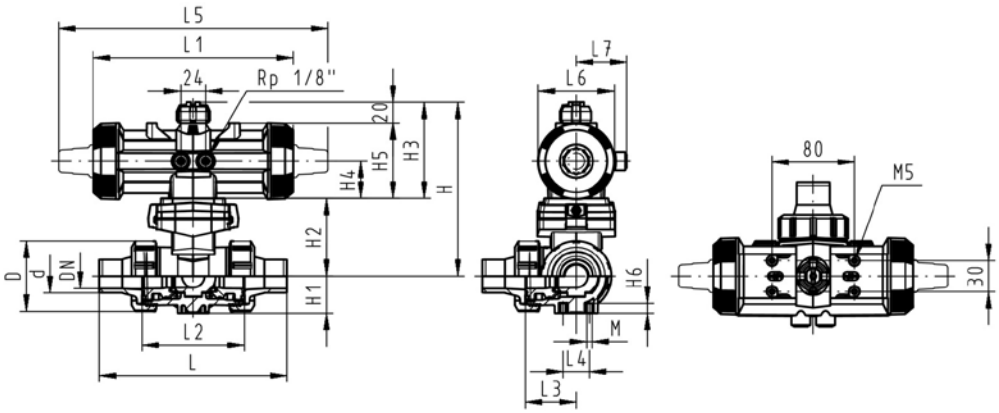


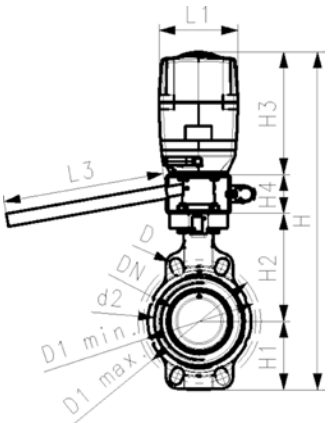


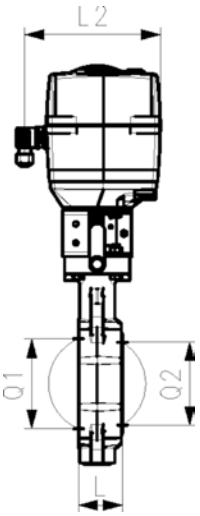
d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
32	1	25	10	**199 285 635**	3.168
40	1 ¼	32	10	**199 285 636**	5.672
50	1 ½	40	10	**199 285 637**	6.801
63	2	50	10	**199 285 638**	10.000

d (mm)	D (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	H5 (mm)	H6 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)
32	68	168	36	71	97	40	77	8	182	194	99	50	25	261	76
40	84	203	45	84	119	51	99	9	209	224	120	60	45	305	95
63	124	225	65	106	119	51	99	9	242	224	179	89	45	305	95
50	97	203	51	84	119	51	99	9	302	224	137	69	45	305	95

d (mm)	L7 (mm)	M (mm)
32	48	6
40	59	8
63	59	8
50	59	8







Butterfly valve type 145 ABS 100-230V
With manual override

Model:

- Voltage 100-230V, 50-60Hz
- Factory set control range 90°<)
- Connecting dimension: ISO 7005 PN 10, EN 1092 PN 10, DIN 2501 PN 10, ANSI/ASME B 16.5 Class 150, BS 1560: 1989, BS 4504, JIS B 2220

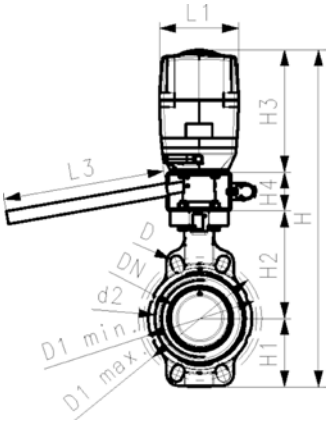
Option:

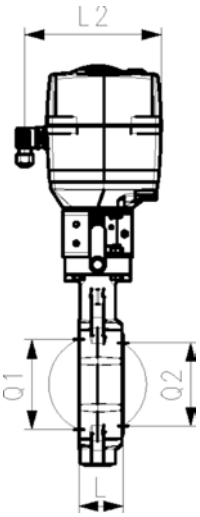
- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
63	2	50	10	**199 145 482**	12.518
75	2 ½	65	10	**199 145 483**	12.745
90	3	80	10	**199 145 484**	12.917
110	4	100	10	**199 145 485**	14.099
140	5	125	10	**199 145 486**	11.881
160	6	150	10	**199 145 487**	17.015
225	8	200	10	**199 145 488**	29.826

d (mm)	closest inch (inch)	Actuator unit type	d2 (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	L (mm)	L1 (mm)
63	2	EA-120	104	19	120	125	475	77	134	188	75	45	122
75	2 ½	EA-120	115	19	140	145	488	83	140	188	75	46	122
90	3	EA-120	131	19	150	160	488	89	146	188	60	49	122
110	4	EA-120	161	19	175	191	520	104	167	188	60	56	122
140	5	EA-120	187	23	210	216	547	117	181	188	60	64	122
160	6	EA-120	215	24	241	241	568	130	189	188	60	72	122
225	8	EA-250	267	23	290	295	635	158	210	208	60	73	122

d (mm)	closest inch (inch)	L2 (mm)	L3 (mm)	Q1 (mm)	Q2 (mm)
63	2	180	250	40	
75	2 ½	180	250	54	35
90	3	180	250	67	50
110	4	180	250	88	74
140	5	180	250	113	97
160	6	180	250	139	123
225	8	180	250	178	169





Butterfly valve type 145 ABS 24V
With manual override

Model:

- Voltage 24V AC/DC
- Factory set control range 90°<)
- Connecting dimension: ISO 7005 PN 10, EN 1092 PN 10, DIN 2501 PN 10, ANSI/ASME B 16.5 Class 150, BS 1560: 1989, BS 4504, JIS B 2220

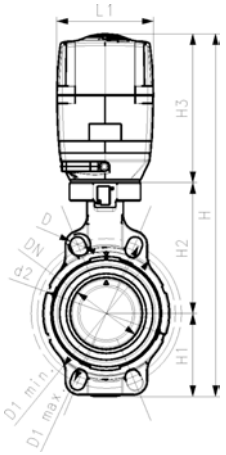
Option:

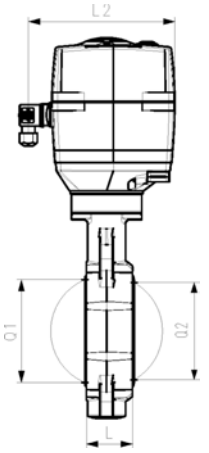
- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
63	2	50	10	**199 145 522**	9.173
75	2 ½	65	10	**199 145 523**	9.385
90	3	80	10	**199 145 524**	12.917
110	4	100	10	**199 145 525**	14.099
140	5	125	10	**199 145 526**	11.881
160	6	150	10	**199 145 527**	21.848
225	8	200	10	**199 145 528**	29.826

d (mm)	closest inch (inch)	Actuator unit type	d2 (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	L (mm)	L1 (mm)
63	2	EA-120	104	19	120	125	475	77	134	188	75	45	122
75	2 ½	EA-120	115	19	140	145	488	83	140	188	75	46	122
90	3	EA-120	131	19	150	160	488	89	146	188	60	49	122
110	4	EA-120	161	19	175	191	520	104	167	188	60	56	122
140	5	EA-120	187	23	210	216	547	117	181	188	60	64	122
160	6	EA-120	215	24	241	241	568	130	189	188	60	72	122
225	8	EA-250	267	23	290	295	635	158	210	208	60	73	122

d (mm)	closest inch (inch)	L2 (mm)	L3 (mm)	Q1 (mm)	Q2 (mm)
63	2	180	250	40	
75	2 ½	180	250	54	35
90	3	180	250	67	50
110	4	180	250	88	74
140	5	180	250	113	97
160	6	180	250	139	123
225	8	180	250	178	169





Butterfly valve type 145 ABS 24V
Without manual override

Model:

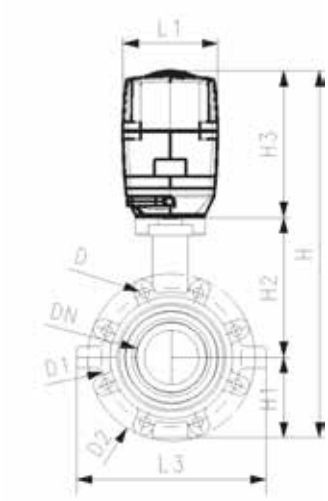
- Voltage 24V AC/DC
- Factory set control range 90°<)
- Connecting dimension: ISO 7005 PN 10, EN 1092 PN 10, DIN 2501 PN 10, ANSI/ASME B 16.5 Class 150, BS 1560: 1989, BS 4504, JIS B 2220

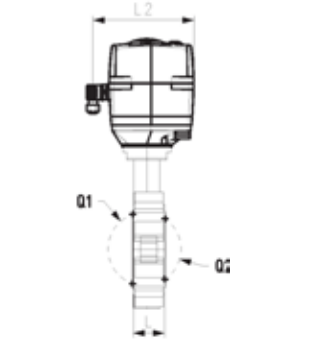
Option:

- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

d (mm)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
63	50	10	**199 145 542**	9.211
75	65	10	**199 145 543**	7.092
90	80	10	**199 145 544**	9.610
110	100	10	**199 145 545**	10.792
140	125	10	**199 145 546**	9.647
160	150	10	**199 145 547**	13.708
225	200	10	**199 145 548**	26.519
280	250	6	**199 145 549**	31.601
315	300	6	**199 145 550**	43.092

d (mm)	Actuator unit type	d2 (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	Q1 (mm)	Q2 (mm)
63	EA-45	104	19	120	125	415	77	134	188	45	122	180	40	
75	EA-45	115	19	140	145	428	83	140	188	46	122	180	54	35
90	EA-120	131	19	150	160	428	89	146	188	49	122	180	67	50
110	EA-120	161	19	175	191	460	104	167	188	56	122	180	88	74
140	EA-120	187	23	210	216	487	117	181	188	64	122	180	113	97
160	EA-120	215	24	241	241	508	130	189	188	72	122	180	139	123
225	EA-250	267	23	290	295	575	158	210	208	73	122	180	178	169
280	EA-250	329	25	353	362	677	205	264	208	113	122	180	210	207
315	EA-250	329	25	353	362	677	205	264	208	113	122	180	210	207





Lugstyle butterfly valve type 147 ABS 24V Without manual override

Model:

- Voltage 24V AC/DC
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759
- Factory set control range 90°<)

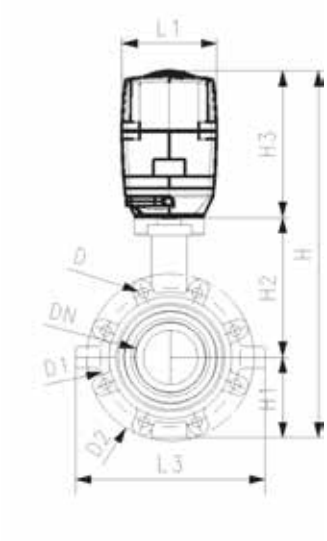
Option:

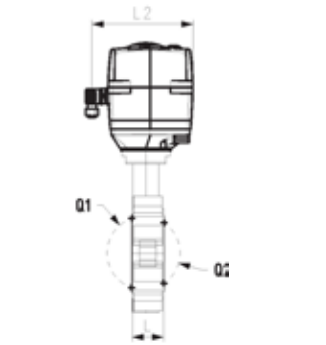
- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

Size (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
2	50	10	**199 147 542**	9.478
2 ½	65	10	**199 147 543**	9.824
3	80	10	**199 147 544**	10.364
4	100	10	**199 147 545**	12.359
5	125	10	**199 147 546**	15.697
6	150	10	**199 147 547**	19.579
8	200	10	**199 147 548**	30.038
10	250	6	**199 147 549**	53.760
12	300	4	**199 147 550**	68.158

Size (inch)	Actuator unit type	d2 (mm)	D	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Q1 (mm)
2	EA-45	160	UNC 5/8	121.0	399	77	134	188	45	122	180	165	40
2 ½	EA-45	180	UNC 5/8	139.7	411	83	140	188	46	122	180	182	54
3	EA-120	195	UNC 5/8	152.4	423	89	146	188	49	122	180	210	67
4	EA-120	226	UNC 5/8	190.5	461	106	167	188	56	122	180	240	88
5	EA-120	258	UNC 3/4	215.9	490	121	181	188	64	122	180	272	113
6	EA-120	284	UNC 3/4	241.3	510	133	189	188	72	122	180	300	139
8	EA-250	341	UNC 3/4	298.4	577	159	210	208	73	122	180	360	178
10	EA-250	329	UNC 7/8	362.0	677	205	264	208	113	122	180	440	210
12	EA-250	412	UNC 7/8	431.8	727	205	285	208	113	122	180	510	256

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





Lugstyle butterfly valve type 147 ABS 100-230V Without manual override

Model:

- Voltage 100-230V, 50-60Hz
- Factory set control range 90°<)
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759

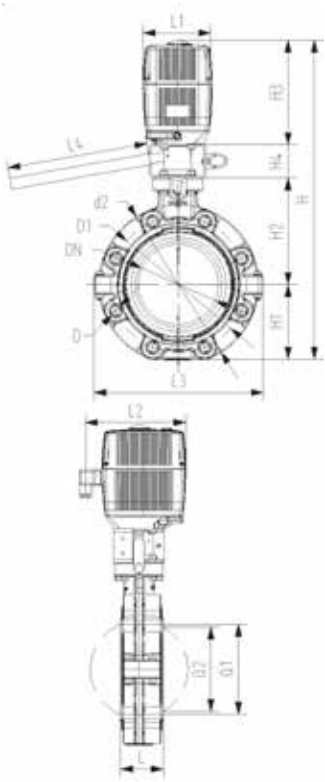
Option:

- Fail-safe return unit, Monitoring board, Position controller, Profibus DP board

Size (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
2	50	10	**150 147 502**	9.478
2 ½	65	10	**150 147 503**	9.824
3	80	10	**150 147 504**	10.364
4	100	10	**150 147 505**	12.359
5	125	10	**150 147 506**	15.697
6	150	10	**150 147 507**	19.579
8	200	10	**150 147 508**	30.038
10	250	6	**150 147 509**	53.760
12	300	4	**150 147 510**	68.158

Size (inch)	Actuator unit type	d2 (mm)	D	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Q1 (mm)
2	EA-45	160	UNC 5/8	121.0	399	77	134	188	45	122	180	165	40
2 ½	EA-45	180	UNC 5/8	139.7	411	83	140	188	46	122	180	182	54
3	EA-120	195	UNC 5/8	152.4	423	89	146	188	49	122	180	210	67
4	EA-120	226	UNC 5/8	190.5	461	106	167	188	56	122	180	240	88
5	EA-120	258	UNC 3/4	215.9	490	121	181	188	64	122	180	272	113
6	EA-120	284	UNC 3/4	241.3	510	133	189	188	72	122	180	300	139
8	EA-250	341	UNC 3/4	298.4	577	159	210	208	73	122	180	360	178
10	EA-250	329	UNC 7/8	362.0	677	205	264	208	113	122	180	440	210
12	EA-250	412	UNC 7/8	362.0	677	205	264	208	113	122	180	440	210

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



Lugstyle butterfly valve type 147 ABS 24V With manual override

Model:

- Voltage 24V AC/DC
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759
- Factory set control range 90°<)

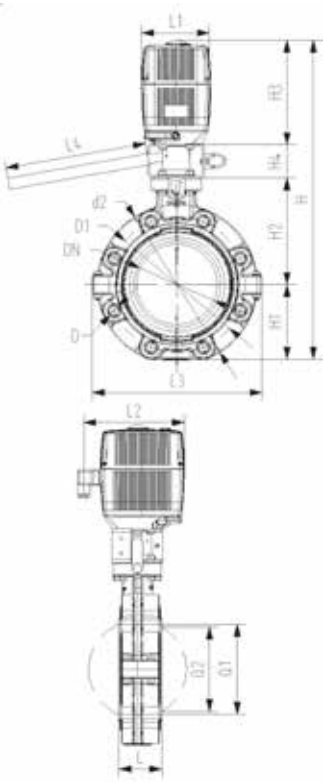
Option:

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

Size (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
2	50	10	**150 147 522**	12.785
2 ½	65	10	**150 147 523**	13.131
3	80	10	**150 147 524**	13.671
4	100	10	**150 147 525**	15.666
5	125	10	**150 147 526**	19.004
6	150	10	**150 147 527**	22.886
8	200	10	**150 147 528**	33.345

Size (inch)	Actuator unit type	d2 (mm)	D	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
2	EA-120	160	UNC 5/8	121	459	77	134	188	60	45	122	180	165
2 ½	EA-120	180	UNC 5/8	140	471	83	140	188	60	46	122	180	182
3	EA-120	195	UNC 5/8	152	483	89	146	188	60	49	122	180	210
4	EA-120	226	UNC 5/8	191	521	106	167	188	60	56	122	180	240
5	EA-120	258	UNC 3/4	216	550	121	181	188	60	64	122	180	272
6	EA-120	284	UNC 3/4	241	570	133	189	188	60	72	122	180	300
8	EA-250	341	UNC 3/4	298	637	159	210	208	60	73	122	180	360

Size (inch)	L4 (mm)	Q1 (mm)	Q2 (mm)
2	200	40	
2 ½	200	54	35
3	200	67	50
4	250	88	74
5	250	113	97
6	250	139	123
8	250	178	169



Lugstyle butterfly valve type 147 ABS 100-230V With manual override

Model:

- Voltage 100-230V, 50-60Hz
- Factory set control range 90°<)
- Connecting dimension: ANSI/ASME B 16.5 class 150, ASTM D 4024, BS 1560, BS EN 1759

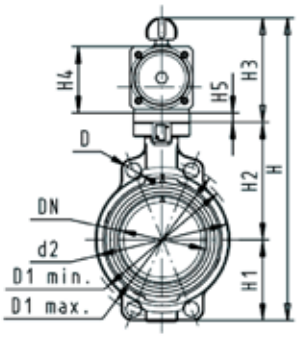
Option:

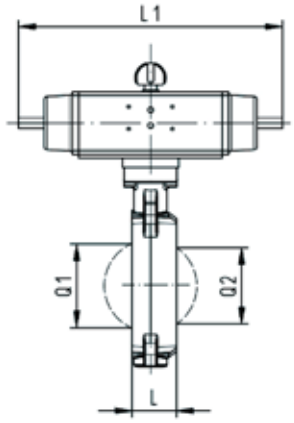
- Optional accessory: Integrated position feedback with limit switches (sold separately)

Size (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
2	50	10	**150 147 482**	12.785
2 ½	65	10	**150 147 483**	13.131
3	80	10	**150 147 484**	13.671
4	100	10	**150 147 485**	15.666
5	125	10	**150 147 486**	19.004
6	150	10	**150 147 487**	22.886
8	200	10	**150 147 488**	33.345

Size (inch)	Actuator unit type	d2 (mm)	D	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)
2	EA-120	160	UNC 5/8	121	459	77	134	188	60	45	122	180	165
2 ½	EA-120	180	UNC 5/8	140	471	83	140	188	60	46	122	180	182
3	EA-120	195	UNC 5/8	152	483	89	146	188	60	49	122	180	210
4	EA-120	226	UNC 5/8	191	521	106	167	188	60	56	122	180	240
5	EA-120	258	UNC 3/4	216	550	121	181	188	60	64	122	180	272
6	EA-120	284	UNC 3/4	241	570	133	189	188	60	72	122	180	300
8	EA-250	341	UNC 3/4	298	637	159	210	208	60	73	122	180	360

Size (inch)	L4 (mm)	Q1 (mm)	Q2 (mm)
2	200	40	
2 ½	200	54	35
3	200	67	50
4	250	88	74
5	250	113	97
6	250	139	123
8	250	178	169





Butterfly valve type 240 ABS
FC (Fail safe to close)
Without manual override

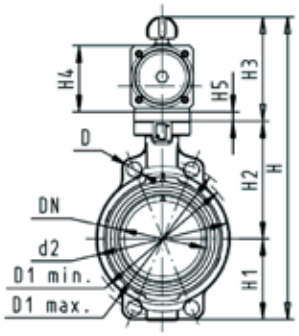
Model:

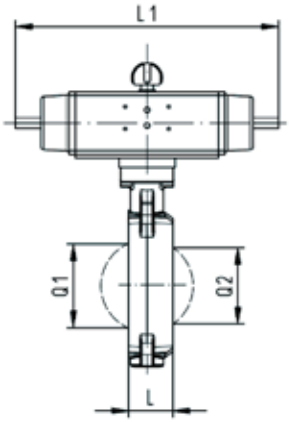
- Control range 90 °
- Connecting dimension: ISO 7005 PN 10, EN 1092 PN 10, DIN 2501 PN 10, ANSI/ASME B 16.5 Class 150, BS 1560: 1989, BS 4504, JIS B 2220

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
63	2	50	10	**199 240 402**	7.432
75	2 ½	65	10	**199 240 403**	6.834
90	3	80	10	**199 240 404**	7.494
110	4	100	10	**199 240 405**	11.316
140	5	125	10	**199 240 406**	15.049
160	6	150	10	**199 240 407**	21.559
225	8	200	10	**199 240 408**	29.826
280	10	250	10	**199 240 409**	62.170
315	12	300	10	**199 240 410**	79.807

d (mm)	closest inch (inch)	Actuator unit type	d2 (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	H5 (mm)
63	2	PA-30 FC	104	19	120	125	327	77	134	117	70	15
75	2 ½	PA-30 FC	115	19	140	145	340	83	140	117	70	15
90	3	PA-35 FC	131	19	150	160	361	89	146	126	78	15
110	4	PA-40 FC	161	19	175	191	400	104	167	129	86	0
140	5	PA-45 FC	187	23	210	216	436	117	181	139	96	0
160	6	PA-50 FC	215	24	241	241	468	130	189	149	106	0
225	8	PA-55 FC	267	23	290	295	529	158	210	161	118	0
280	10	PA-65 FC	329	25	353	362	808	205	264	191	148	0
315	12	PA-70 FC	379	25	400	432	866	228	285	196	157	0

d (mm)	closest inch (inch)	L (mm)	L1 (mm)	L2 (mm)	Q1 (mm)	Q2 (mm)
63	2	45	276	65	40	
75	2 ½	46	276	65	54	35
90	3	49	326	72	67	50
110	4	56	370	80	88	74
140	5	64	411	90	113	97
160	6	72	423	100	139	123
225	8	73	452	112	178	169
280	10	113	648	137	210	207
315	12	113	663	145	256	253





Butterfly valve type 240 ABS
FO (Fail safe to open)
Without manual override

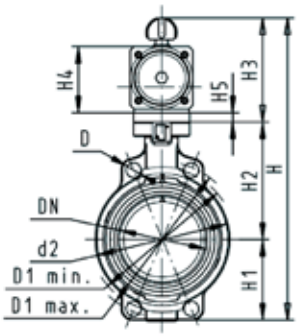
Model:

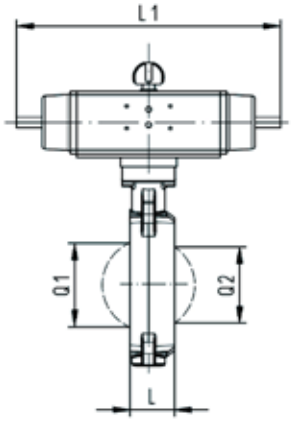
- Control range 90 °
- Connecting dimension: ISO 7005 PN 10, EN 1092 PN 10, DIN 2501 PN 10, ANSI/ASME B 16.5 Class 150, BS 1560: 1989, BS 4504, JIS B 2220

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
63	2	50	10	**199 240 422**	7.432
75	2 ½	65	10	**199 240 423**	6.834
90	3	80	10	**199 240 424**	7.494
110	4	100	10	**199 240 425**	11.316
140	5	125	10	**199 240 426**	15.049
160	6	150	10	**199 240 427**	21.559
225	8	200	10	**199 240 428**	29.826

d (mm)	closest inch (inch)	Actuator unit type	d2 (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	H5 (mm)
63	2	PA-30 FO	104	19	120	125	327	77	134	117	70	15
75	2 ½	PA-30 FO	115	19	140	145	340	83	140	117	70	15
90	3	PA-35 FO	131	19	150	160	361	89	146	126	78	15
110	4	PA-40 FO	161	19	175	191	400	104	167	129	86	
140	5	PA-45 FO	187	23	210	216	436	117	181	139	96	
160	6	PA-50 FO	215	24	241	241	468	130	189	149	106	
225	8	PA-55 FO	267	23	290	295	529	158	210	161	118	

d (mm)	closest inch (inch)	L (mm)	L1 (mm)	L2 (mm)	Q1 (mm)	Q2 (mm)
63	2	45	276	65	40	
75	2 ½	46	276	65	54	35
90	3	49	326	72	67	50
110	4	56	370	80	88	74
140	5	64	411	90	113	97
160	6	72	423	100	139	123
225	8	73	452	112	178	169





Butterfly valve type 240 ABS
DA (Double acting)
Without manual override

Model:

- Control range 90 °
- Connecting dimension: ISO 7005 PN 10, EN 1092 PN 10, DIN 2501 PN 10, ANSI/ASME B 16.5 Class 150, BS 1560: 1989, BS 4504, JIS B 2220

d (mm)	closest inch (inch)	DN (mm)	PN (bar)	EPDM Part No.	weight (lb)
63	2	50	10	**199 240 442**	4.896
75	2 ½	65	10	**199 240 443**	5.108
90	3	80	10	**199 240 444**	6.019
110	4	100	10	**199 240 445**	7.463
140	5	125	10	**199 240 446**	8.986
160	6	150	10	**199 240 447**	13.797
225	8	200	10	**199 240 448**	16.599

d (mm)	closest inch (inch)	Actuator unit type	d2 (mm)	D (mm)	D1 min. (mm)	D1 max. (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	H5 (mm)
63	2	PA-35 DA	104	19	120	125	317	77	134	107	60	15
75	2 ½	PA-35 DA	115	19	140	145	330	83	140	107	60	15
90	3	PA-40 DA	131	19	150	160	348	89	146	113	66	15
110	4	PA-45 DA	161	19	175	191	372	104	167	102	71	
140	5	PA-45 DA	187	23	210	216	408	117	181	111	78	
160	6	PA-55 DA	215	24	241	241	448	130	189	129	86	
225	8	PA-55 DA	267	23	290	295	507	158	210	139	96	

d (mm)	closest inch (inch)	L (mm)	L1 (mm)	L2 (mm)	Q1 (mm)	Q2 (mm)
63	2	45	177	55	40	
75	2 ½	46	177	55	54	35
90	3	49	190	60	67	50
110	4	56	235	65	88	74
140	5	64	235	72	113	97
160	6	72	279	80	139	123
225	8	73	279	90	178	169

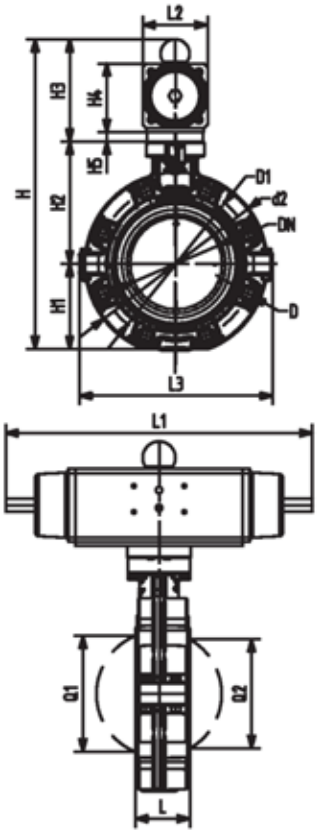
Lug Style butterfly valve Type 244 ABS
FC (Fail safe to close)
Without manual override

Model:

- Housing material: PP-GF30 with 316SS lug inserts
- Control range 90 °
- 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)



d (mm)	Size (inch)	PN (bar)	EPDM Part No.
63	2	10	**199 244 402**
75	2 ½	10	**199 244 403**
90	3	10	**199 244 404**
110	4	10	**199 244 405**
140	5	10	**199 244 406**
160	6	10	**199 244 407**
225	8	10	**199 244 408**

d (mm)	Size (inch)	Actuator unit type	d2 (mm)	D	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	H5 (mm)	L (mm)	L1 (mm)
63	2	PA-30 FC	160	UNC 5/8	120.6	328	77	134	117	70	15	45	276
75	2 ½	PA-30 FC	180	UNC 5/8	139.7	340	83	140	117	70	15	46	276
90	3	PA-35 FC	195	UNC 5/8	152.4	361	89	146	126	78	15	49	326
110	4	PA-40 FC	226	UNC 5/8	190.5	402	106	167	129	86		56	370
140	5	PA-45 FC	258	UNC 3/4	215.9	441	121	181	139	96		64	411
160	6	PA-50 FC	284	UNC 3/4	241.3	471	133	189	149	106		72	423
225	8	PA-55 FC	341	UNC 3/4	298.4	530	159	210	161	118		73	452

d (mm)	Size (inch)	L2 (mm)	L3 (mm)	Q1 (mm)	Q2 (mm)
63	2	65	165	40	
75	2 ½	65	182	54	35
90	3	72	210	67	50
110	4	80	240	88	74
140	5	90	272	113	97
160	6	100	300	139	123
225	8	112	360	178	169

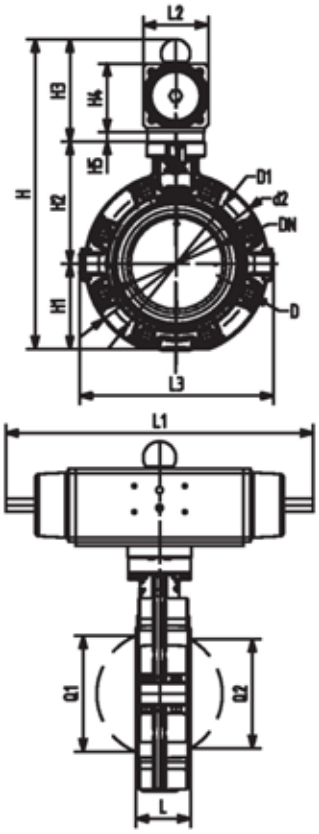
Lug Style butterfly valve type 244 ABS
FO (Fail safe to open)
Without manual override

Model:

- Housing material: PP-GF30 with 316SS lug inserts
- Control range 90 °
- 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)



d (mm)	Size (inch)	PN (bar)	EPDM Part No.
63	2	10	**199 244 422**
75	2 ½	10	**199 244 423**
90	3	10	**199 244 424**
110	4	10	**199 244 425**
140	5	10	**199 244 426**
160	6	10	**199 244 427**
225	8	10	**199 244 428**

d (mm)	Size (inch)	Actuator unit type	d2 (mm)	D	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	H5 (mm)	L (mm)	L1 (mm)
63	2	PA-30 FO	160	UNC 5/8	120.6	328	77	134	117	70	15	45	276
75	2 ½	PA-30 FO	180	UNC 5/8	139.7	340	83	140	117	70	15	46	276
90	3	PA-35 FO	195	UNC 5/8	152.4	361	89	146	126	78	15	49	326
110	4	PA-40 FO	226	UNC 5/8	190.5	402	106	167	129	86		56	370
140	5	PA-45 FO	258	UNC 3/4	215.9	441	121	181	139	96		64	411
160	6	PA-50 FO	284	UNC 3/4	241.3	471	133	189	149	106		72	423
225	8	PA-55 FO	341	UNC 3/4	298.4	530	159	210	161	118		73	452

d (mm)	Size (inch)	L2 (mm)	L3 (mm)	Q1 (mm)	Q2 (mm)
63	2	65	165	40	
75	2 ½	65	182	54	35
90	3	72	210	67	50
110	4	80	240	88	74
140	5	90	272	113	97
160	6	100	300	139	123
225	8	112	360	178	169

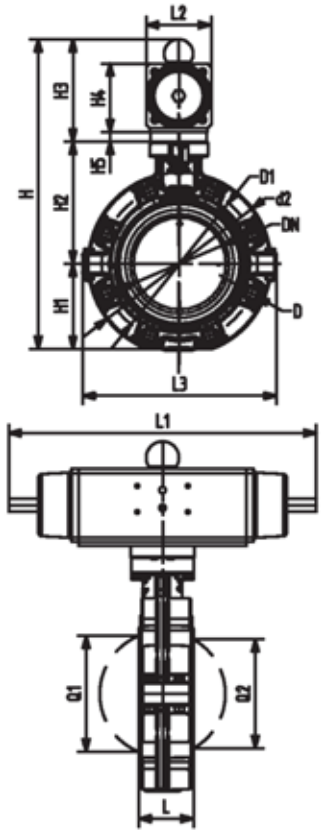
Lug Style butterfly valve type 244 ABS
DA (Double acting)
Without manual override

Model:

- Housing material: PP-GF30 with 316SS lug inserts
- Control range 90 °
- 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)



d (mm)	Size (inch)	PN (bar)	EPDM Part No.
63	2	10	**199 244 442**
75	2 ½	10	**199 244 443**
90	3	10	**199 244 444**
110	4	10	**199 244 445**
140	5	10	**199 244 446**
160	6	10	**199 244 447**
225	8	10	**199 244 448**

d (mm)	Size (inch)	Actuator unit type	d2 (mm)	D	D1 (mm)	H (mm)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	H5 (mm)	L (mm)	L1 (mm)
63	2	PA-35 DA	160	UNC 5/8	120.6	318	77	134	107	60	15	45	177
75	2 ½	PA-35 DA	180	UNC 5/8	139.7	330	83	140	107	60	15	46	177
90	3	PA-40 DA	195	UNC 5/8	152.4	348	89	146	113	66	15	49	190
110	4	PA-45 DA	226	UNC 5/8	190.5	384	106	167	111	78		56	235
140	5	PA-45 DA	258	UNC 3/4	215.9	413	121	181	111	78		64	235
160	6	PA-55 DA	284	UNC 3/4	241.3	461	133	189	129	96		72	279
225	8	PA-55 DA	341	UNC 3/4	298.4	508	159	210	139	96		73	279

d (mm)	Size (inch)	L2 (mm)	L3 (mm)	Q1 (mm)	Q2 (mm)
63	2	55	165	40	
75	2 ½	55	182	54	35
90	3	60	210	67	50
110	4	65	72	88	74
140	5	72	272	113	97
160	6	90	300	139	123
225	8	90	360	178	169

General Terms and Conditions of Sale

These GF Piping Systems USA Terms and Conditions (Rev.11/2018) 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.

Always check for the most current General Terms and Conditions and Warranty Statement at www.gfpiping.com under "Price Lists," which supersede and replace these General Terms and Conditions and Warranty Statement. If unable to access this website please request a copy at (714) 731-8800.

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.

Quotes

All prices provided by the Seller are in US currency and cover only the goods expressly specified. Quotations are valid for a period of 30 days unless otherwise specified. HDPE Pipe pricing is valid for seven (7) days after quote issuance unless otherwise stated or unless there has been fundamental change to our cost exposure within the seven (7) day period.

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.

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.

Always check for the most current General Terms and Conditions and Warranty Statement at www.gfpiping.com under "Catalogs and Pricing"

Freight

Continental US – Full freight will be paid on the following orders:

1. Pipe $8,000 net or greater in one of the following categories:

Combination of products to meet freight allowance is at the sole discretion of the Seller.

2. Fittings, Valves, & Actuation $2,200 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 airfreight 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:

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.

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, PVC/CPVC/HDPE Fittings and Accessories for a standard restock charge of 25%. Pipe and Custom Products are 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 six (6) 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 location designated by Seller. 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 Inside Sales 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 and arrive to Seller's location in saleable condition. 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.

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.

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 and/or services shall conform to the description of such products or services 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 the sale of Products 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 or Services 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 INDIRECT, DIRECT, INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND RESULTING FROM ANY USE OR FAILURE OF THE PRODUCTS, OR IN CONNECTION WITH ANY SERVICES, 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, ANY LIABILITY OF CUSTOMER TO A THIRD PARTY ON ACCOUNT OF SUCH LOSS, OR FOR ANY OTHER EXPENSE, DAMAGE OR LOSS OCCASIONED BY SUCH PRODUCT OR SERVICE, 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.

Services

In the event Seller provides any technical or other information, advice, suggestions, assistance, work, training, or services of any kind to Buyer ("Services"), whether or not for a fee, **SELLER MAKES NO WARRANTIES, EXPRESS OR IMPLIED, ORAL OR WRITTEN, WITH RESPECT TO SUCH SERVICES, EXCEPT AS STATED IN THESE TERMS AND CONDITIONS.** The willingness of Seller to provide the Services is based upon Buyer's acceptance of and agreement to the terms, conditions, and obligations set forth herein and in any related Service Agreement signed by Buyer.

Welder Certifications

Training and certifications, for example, LeveL I, II, III (Welder Certifications) are provided based on the agreement of Buyer to follow and conform to all instructions, recommendations, and requirements of such certifications and related training. Buyer shall indemnify, defend and forever hold Seller and its directors, officers, employees, agents, suppliers, parents, affiliates, subsidiaries, successors and assigns harmless from any and all fines, penalties, suits, actions, claims, liabilities, judgments, costs, and expenses (including reasonable attorneys' fees) resulting or arising from the acts or omissions of Buyer, its directors, officers, employees, agents, suppliers, customers, parents, affiliates, subsidiaries, successors and assigns (all collectively referred to herein as "Buyer") related to or arising from Welder Certifications, or the performance of any related work by Buyer. The foregoing shall apply, but shall not be limited to, injury to person (including death) or damage or harm to property or the environment. Buyer shall not be obligated to indemnify Seller for any fine, penalty, suit, action, claim, liability, judgment, cost, or expense to the extent attributable to Seller's negligence or willful misconduct.

Export Law Compliance

Buyer represents that Products will not be diverted, transshipped, exported or re exported to any country whatsoever, except in accordance with all applicable United States laws and regulations, including, but not limited to the Export Administration Act of 1979, and the regulations issued thereunder.

EU GDPR Compliance

Seller affiliates are subject to the European Union's General Data Privacy Regulation [Regulation (EU) 2016/679] (the "GDPR") when acting as a controller or processor of personal data of an individual data subject located in the European Union, as those terms are defined in the GDPR. Buyer acknowledges and agrees that it may be acting as a processor of personal data for Seller or its affiliates under these Terms and Conditions and that all applicable requirements of the GDPR are incorporated by reference herein. Buyer represents and warrants that (1) it is aware of and understands its compliance obligations under GDPR; (2) it will process personal data received from Seller or its affiliates only in accordance with Seller instructions and only in compliance with GDPR; and (3) with regard to its obligations under these Terms and Conditions it shall comply with all applicable requirements of the GDPR to the same extent as required for Seller.

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.

Applicable Law

The sale and purchase of Products and/or Services shall be governed by, and these terms and conditions shall be interpreted in accordance with the laws of the State where the Products purchased hereunder are manufactured or Services purchased hereunder are performed. All disputes hereunder shall be resolved in courts of competent jurisdiction located within the State where the Products sold or Services performed hereunder are manufactured or performed. The parties hereby waive the right to trial by jury.

Relationship of the Parties

The relationship between the parties shall be that of Seller and independent contractor. Neither Party shall be the agent of the other or have authority to act on behalf of the other party, except in a manner and to the extent provided herein or otherwise agreed to in writing. There is no special relationship between the parties or between Seller and any customer of Buyer. This Agreement creates a contractual relationship among the parties hereto, and creates no other relationship, including but not limited to a franchise, partnership, joint venture, agency, or any form of fiduciary or special relationship. Buyer agrees that it will never represent itself to third parties as having any relationship with Seller other than that of independent contractor.

Entire Agreement

These terms and conditions constitute the entire and complete agreement between Seller and Buyer concerning the sale and purchase of Products or Services. Neither party shall claim any modification, amendment or release from any of these terms and conditions unless the parties have entered into a mutual agreement to that effect, signed by Buyer and Seller.