

GP-PT003/2

TECHNICAL

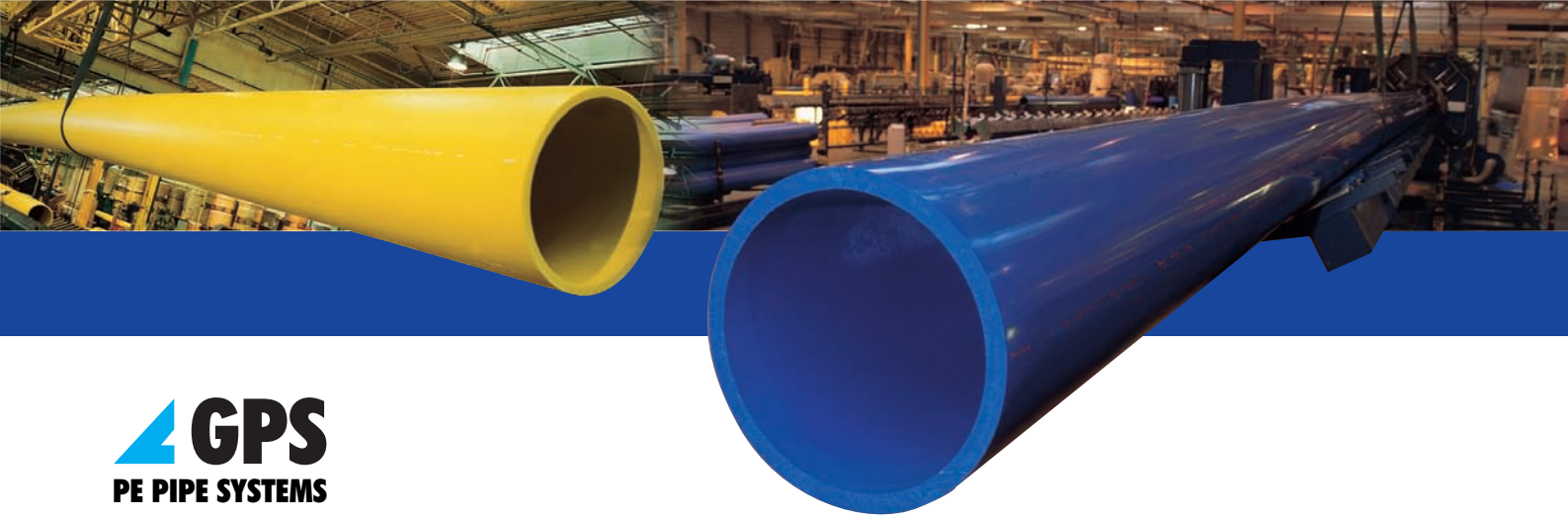
PROTECTA-LINE

BARRIER PIPE AND FITTINGS SYSTEMS

For complete peace of mind



Installation and Technical Guidelines



GPS
PE PIPE SYSTEMS

Our Company

GPS PE Pipe Systems is a member of the international Aliaxis Group of Companies who manufacture and sell pipe systems and related products for residential and commercial construction, industrial and public utilities.

We specialise in the research, development and manufacture of polyethylene and multi-layer pipe systems including fittings for gas and water transportation in the utilities, offshore and industrial markets.

Resulting from the amalgamation of two market leading companies, GPS PE Pipe Systems brings together over one hundred years of experience and knowledge in plastic pipe systemss.

The Environment

We actively and consistently strive to reduce our impact on the environment. We have measured our performance against various environmental indicators since 1997 and operated an environmental management system accredited to ISO 14001 since 1999. We are currently working towards an independent verification of our carbon footprint under the Certified Emissions Measurement And Reduction Scheme (CEMARS).

Market Oriented

GPS PE Pipe Systems products have a broad range of applications in the industrial and utilities markets on a worldwide basis. The utilities of water and gas distribution are important sectors for high integrity products where the maintenance of water quality and the safe transport of gaseous fuels are of paramount importance. Industrial applications include: alternative energy installations in landfill gas systems; effluent transportation and mineral slurries.

Many of the brands in the GPS portfolio have a long record of innovation in meeting the needs of the water and gas utilities. One of the foremost pioneers in polyethylene pipe systems, GPS is continually improving and updating its offering to meet the ever growing needs of the distribution engineer, ensuring they stay at the forefront of world gas and water distribution/treatment systems.

Manufactured in the UK, our products are sold to more than 60 countries worldwide.

Customer Focus

The key to our success lies in the commitment we pledge to provide the highest quality service and support to our customers and industry end-users. We are a team of highly motivated and experienced individuals who are dedicated to helping our customers achieve their goals.

We place the utmost importance in meeting the needs of our customers, constantly evolving our extensive product portfolio to meet the ever changing demands of the water and gas utilities, industrial and offshore markets.

Quality

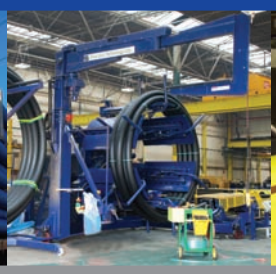
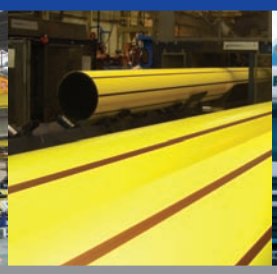
Designed, manufactured and supplied under a BS EN ISO 9001:2008 accredited Quality Management System, GPS products comply with relevant national, European and international product standards to ensure peace of mind for our customers.

Certificate No. FM 34819

Certificate No. E 51385

Business in the Community AWARDS 2010





World leaders in the design, manufacture, marketing and sales of high performance, high integrity plastic and composite piping systems.

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Introduction

Previously used contaminated land is increasingly being reused for new developments where drinking water is needed. Such land, in particular former industrial land, must either be remediated to reduce contamination to acceptable levels, or a pipe system must be installed which can guarantee the long term safety and quality of the water supply. Without remediation, conventional metal and polyethylene (PE) piping systems are not recommended in such land as certain residual chemicals can permeate or corrode the pipe wall causing unpleasant tastes and shortening the life of the pipe. For further details refer to the WRc Polyethylene Pipe Systems Manual - version 01/02 - Ref: ED11 and UKWIR 10/MW/03/21.

The fully integrated barrier pipe and fittings system for safely transporting water through contaminated land

Protecta-Line is an award winning fully integrated barrier pipe and fittings system in sizes from 25mm to 355mm. The five-layer pipe comprises: an internal standard PE host pipe for carrying the water; an aluminium barrier layer to stop the ingress of contaminants; an outer polyethylene protection layer; and two adhesive tie-layers.

Protecta-Line prevents the tainting that can be caused by through-wall permeation by hydrocarbons and related chemicals that might be present in contaminated land. Introduced in 1996 to the UK market, Protecta-Line won the IWEX Innovation Award in 1997. Due to its structure any chemicals left in the land cannot damage the pipe wall, ensuring preservation of long-term strength, many years of usage and whole-life cost savings. The double bonded construction incorporates an impermeable metallic barrier wrapped onto a standard central core of PE80 or PE100 (Excel) pipe conforming to BS 6572 or WIS 4-32-17/BS EN 12201.

The Protecta-Line Advantages

- WRAS and Regulation 31/27 approval for total peace of mind to the highest standards of safety demanded by water companies and other installers.
- The whole Protecta-Line system is Kitemarked to WIS 4-32-19, the only industry standard for pipe systems for potable water in contaminated land.
- Protecta-Line has all the installation benefits of conventional PE pipe - a lightweight, flexible material that is fast and easy to install.
- Protecta-Line system encompasses the most complete and fully integrated range of compatible pipe and fittings, approved for safe transportation of drinking water through contaminated land.
- Protecta-Line allows for a lower cost of installation than metallic pipe and is significantly less disruptive.
- Protecta-Line pipes may be subjected to cold bending as for standard polyethylene pipes (see GPS Installation & Technical Guidelines Brochure - GP-IT005).

Approvals

- Approved by the Secretary of State
- WRAS **(complete system approved)**
- BS 6572 (25mm - 63mm pipes)
- WIS 4-32-17 (25mm - 355mm pipes)
- BS EN 12201 (90mm - 355mm pipes)
- WIS 4-32-19 **(complete system is Kitemarked)**. System permeation tests independently verified

Protecta-Line is an approved system. Only Protecta-Line fittings shall be used with Protecta-Line pipe. The use of alternative fittings will have the following effects on your Protecta-Line system:



- Invalidation of WRAS approval and manufacturers system performance warranty.
- Compromised permeation resistance (causing non-compliance with WIS 4-32-19 and possible risks to health).
- Danger of pipe-layer delamination, compromising system performance integrity and risking pipe bursts. It would be illegal to install non-WRAS approved fittings.

WRAS
0609132
0702502
0902519
0902515
0703510

07472
56151
508224

WIS 4-32-19
KM 514626

The most complete system

The Protecta-Line range consists of:

- Protecta-Line Pipe from 25mm to 110mm in SDR11 and 125mm to 355mm in SDR17. Available in 6m and 12m sticks; 25m, 50m and 100m coils, depending on diameter.
- Protecta-Line Mechanical Compression Fittings from 25mm to 63mm including Couplers, Reducing Couplers, Transition Fittings, Equal Tees, 90º Elbows, End Connectors and Reducing Sets.
- Protecta-Line Stop Cocks at 25mm & 32mm.
- Protecta-Line Self-Tapping Ferrule Off-Takes in mains sizes 63mm to 355mm with 25mm or 32mm outlets.
- Protecta-Line Ferrule Off-Takes in mains sizes 90mm to 355m with 63mm outlets.
- Protecta-Line Ductile Iron Ferrule in 3/4" x 25mm.
- Protecta-Line Fluid Compression Fittings from 63mm to 180mm including Couplers, Reducers, 90º Elbows, 45º Elbows, Equal Tees, Flanged Branch Tees, Repair Couplers, Stub Flange Adaptors and Duck Foot Bends.
- Protecta-Line Electrofusion Fittings from 90mm to 355mm including Couplers, Reducers, 90º Elbows, 45º Elbows, Equal Tees, Flanged Branch Tees and Flange Adaptors.
- A range of fabricated fittings for butt-fusion in sizes from 90mm to 355m, without need to wrap in the field.

Sizes 90mm to 355mm of Protecta-Line can be joined using Electrofusion or Butt-fusion. When made in accordance with GPS PE Pipe Systems' recommended procedures, butt-fusion and electrofusion joints of the Protecta-Line system have been independently shown to meet the requirements of WIS 4-32-19 without any need for subsequent wrapping. This does not exempt installers from local regulations and the local Water Company preferences must be adhered to.

Protecta-Line systems should be pressure tested after installation using the standard industry procedures employed for PE pipelines, taking extra care when working in a contaminated environment as set out by the Local Water Undertaking.

View Protecta-Line installation videos online.
Use your mobile to scan this code.

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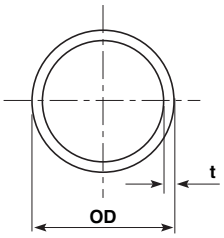
Protecta-Line Pipe

- Kitemarked to WIS 4-32-19.
- Standard blue PE100 (Excel) or PE80 (MDPE) core pipe with aluminium barrier layer and protective outer PE skin.
- In 6m and 12m sticks and 25m, 50m or 100m coils.
- For use with Protecta-Line mechanical compression fittings up to 63mm and fluid compression fittings from 63mm up to 180mm.
- Suitable for butt-fusion or electrofusion jointing where specified, in sizes 90mm and above.
- Brown stripes provide easy identification and comply with NJUG regulations.





Straight Lengths

Size* (mm)	Std Length (m)	Material	Pressure Rating (bar)	SDR	Min OD (mm)	Max OD (mm)	Mean Bore (mm)	Min Wall Thickness (mm)	Max Wall Thickness (mm)	Mean Weight (kg/m)	6M Code	12M Code
63	6	PE80 (MDPE)	12.5	11	64.3	65.6	51	6.5	7.6	1.3	44 512 311	-
90	6/12	PE100 (Excel)	16	11	92.2	93.5	73	9.3	10.7	2.6	44 512 313	44 527 313
110	6/12	PE100 (Excel)	16	11	112.2	113.5	89	11.1	12.7	3.7	44 512 314	44 527 314
125	6/12	PE100 (Excel)	16	11	127.2	128.5	101.2	12.5	14.2	4.7	44 512 315	44 652 315
	6/12	PE100 (Excel)	10	17	127.2	128.5	110	8.5	9.8	3.4	44 653 315	44 654 315
160	6/12	PE100 (Excel)	10	17	163.2	165.1	140	10.7	12.4	5.4	44 653 317	44 654 317
180	6/12	PE100 (Excel)	16	11	183.3	185.4	146.8	17.6	20	9.5	44 512 318	44 652 318
	6/12	PE100 (Excel)	10	17	183.3	185.4	158	11.9	13.7	6.8	44 653 318	44 654 318
225	6/12	PE100 (Excel)	10	17	227.3	229.8	197	14.6	16.6	10.2	44 653 320	44 654 320
250	6/12	PE100 (Excel)	10	17	252.3	254.9	220	16	18.3	12.4	44 653 321	44 654 321
280	6/12	PE100 (Excel)	10	17	282.3	285.1	246	17.8	20.1	15.3	44 653 322	44 654 322
315	6/12	PE100 (Excel)	10	17	317.3	320.2	277	19.9	22.4	19.2	44 653 323	44 654 323
355	6/12	PE100 (Excel)	10	17	357.3	360.6	312	22.3	25.1	24.2	44 653 324	44 654 324

Coils

Size* (mm)	Coil Lengths Available (m)	Material	Pressure Rating (bar)	SDR	Min OD (mm)	Max OD (mm)	Mean Bore (mm)	Min Wall Thickness (mm)	Max Wall Thickness (mm)	Approx Weight (kg/m)	Code
25	25/50	PE80 (MDPE)	12.5	11	26.3	27.5	20	3.0	3.7	0.26	44 658 308/44 659 308
32	25/50	PE80 (MDPE)	12.5	11	33.3	34.5	26	3.7	4.4	0.39	44 658 308/44 659 308
63	25/50/100	PE80 (MDPE)	12.5	11	64.3	65.6	51	6.5	7.6	1.3	44 658 311/44 659 311/44 660 311
90	50/100	PE100 (Excel)	16	11	92.2	93.5	73	9.3	10.7	2.6	44 659 313/44 660 313
110	50/100	PE100 (Excel)	16	11	112.2	113.5	89	11.1	12.7	3.7	44 659 314/44 660 314
125	50/100	PE100 (Excel)	16	11	127.2	128.5	101.2	12.5	14.2	4.7	44 659 315/44 660 315
	50/100	PE100 (Excel)	10	17	127.2	128.5	110	8.5	9.8	3.4	44 655 315/44 656 315
160	50/100	PE100 (Excel)	10	17	163.2	165.1	141	10.7	12.4	5.4	44 655 317/44 656 317
180	50/100	PE100 (Excel)	16	11	183.3	185.4	146.8	17.6	20	9.5	44 659 318/44 660 318
	50/100	PE100 (Excel)	10	17	183.3	185.4	158	11.9	13.7	6.8	44 655 318/44 656 318

* The nominal size is the nominal core pipe outside diameter.

Other lengths and SDRs may be available to order subject to a minimum order value. Please contact our Sales Office for further information.

To connect Protecta-Line to alternative barrier pipe systems, a mechanical connection should be used: either a threaded connection in the case of the service pipe sizes or a flange connection in the case of larger sizes. Contact our Technical Support for further details.

Testing and Commissioning

The sequence of events for Protecta-Line includes the same basic testing procedures as for conventional PE pipes, but taking extra care appropriate for a contaminated environment as set out by the Local Water Undertaking.

As for normal PE pipes these procedures will normally require, as a minimum, the adequate flushing of the services and the testing of all pipes and joints to the maximum head to which the system is to be subjected.

Only Protecta-Line fittings shall be used with Protecta-Line pipe. The use of alternative fittings will have the following effects on your Protecta-Line system:
- Invalidation of WRAS approval and manufacturers system performance warranty.
- Compromised permeation resistance (causing non-compliance with WIS 4-32-19 and possible risks to health).
- Danger of pipe-layer delamination, compromising system performance integrity and risking pipe bursts.
- It would be illegal to install non-WRAS approved fittings.

Protecta-Line Mechanical Compression Fittings

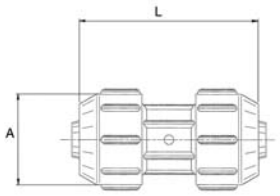
Protecta-Line Mechanical Compression Fittings are supplied for use with pipe sizes between 25mm and 63mm.

These acetal fittings are WRAS approved fittings for use with 25mm to 63mm Protecta-Line pipe as they are proven to WIS 4-32-19 to offer barrier protection against contaminants. They also carry a unique pipe insert to totally seal against the pipe bore ensuring there can be no contact between the drinking water and the pipe's aluminium layer.

- Proven barrier protection against contamination.
- No pipe end preparation required.
- No wrapping required.
- No risk of joint corrosion.
- No contact between the pipe's protective aluminium layer and drinking water.
- Easy and rapid installation.
- No specialist equipment required.
- All weather installation.
- Employs O-ring seal, in body of fitting only.
- Suitable for connecting Protecta-Line to a standard PE pipe.

PE to PE Couplers

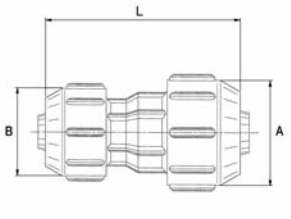




Size (mm)	A (mm)	L (mm)	Weight (kg)	Code
25 x 25	51	93	0.12	44 100 307
32 x 32	60	99	0.19	44 100 308
63 x 63	105	155	0.70	44 100 311

PE to PE Reducing Couplers

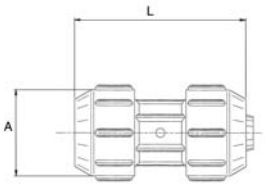




Size (mm)	A (mm)	B (mm)	L (mm)	Weight (kg)	Code
32 x 25	60	51	100	0.15	44 114 409
63 x 25	105	81	155	0.58	44 114 412
63 x 32	105	105	155	0.78	44 114 415

PE to Copper Coupler





Size (mm)	A (mm)	L (mm)	Weight (kg)	Code
25 x 15	51	93	0.12	44 996 005
25 x 22	51	93	0.13	44 996 006
32 x 28	60	93	0.21	44 996 007

Fittings for Protecta-Line in Brownfield and Contaminated Land

Protecta-Line Pipe Sizes (mm)													
25	32	63	90	110	125	160	180	225	250	280	315	355
Mechanical Compression Fittings													
			Fluid Compression Fittings										
			25mm and 32mm Self-Tapping Ferrule Off-Takes										
			63mm Ferrule Off-Takes										
			Electrofusion or Butt-Fusion										

A range of fabricated fittings for butt-fusion in sizes 90mm to 355mm is available to order – please contact Sales Office for further information.

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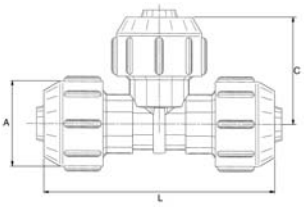
Equal Tees

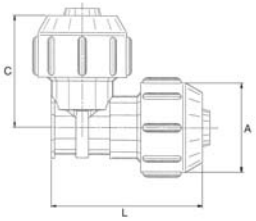




Size (mm)	A (mm)	C (mm)	L (mm)	Weight (kg)	Code
25 x 25	51	64	134	0.18	44 122 307
32 x 32	60	68	146	0.30	44 122 308
63 x 63	105	100	216	1.25	44 122 311

90º Elbows

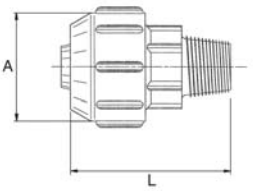




Size (mm)	A (mm)	C (mm)	L (mm)	Weight (kg)	Code
25	51	68	93	0.13	44 115 307
32	60	71	97	0.22	44 115 308
63	105	105	158	0.90	44 115 311

End Connectors - PE x Male Iron BSP Tapered

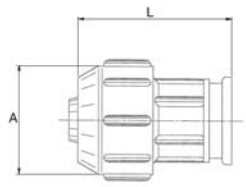




Size (mm x inch)	A (mm)	L (mm)	Weight (kg)	Code
25 x ¾	51	64	0.07	44 151 608
32 x ¾	60	74	0.08	44 151 611
32 x 1	60	77	0.11	44 151 612
63 x 1½	105	100	0.39	44 151 628
63 x 2	105	105	0.39	44 151 629

End Connectors - PE x Female Iron BSP Tapered

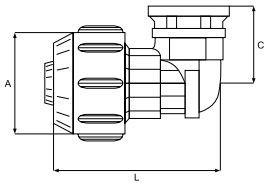




Size (mm x inch)	A (mm)	L (mm)	Weight (kg)	Code
25 x ¾	51	67	0.08	44 101 608
32 x 1	60	75	0.12	44 101 612
63 x 2	105	100	0.43	44 101 629

90º Elbows - PE x Female Iron BSP Tapered

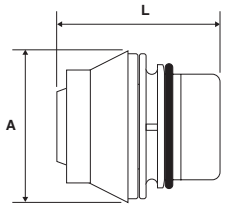




Size (mm x inch)	A (mm)	C (mm)	L (mm)	Weight (kg)	Code
25 x ¾	51	35	73	0.08	44 396 608
32 x ¾	60	39	80	0.18	44 396 612
63 x 2	105	62	145	0.57	44 396 629

Reducing Sets - to allow easy Protecta-Line diameter changes

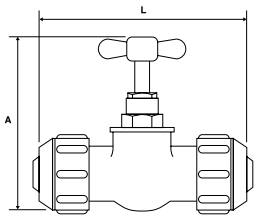




Size (mm)	A (mm)	L (mm)	Weight (kg)	Code
32 x 25	44	42	0.03	44 105 409
63 x 32	80	51	0.15	44 105 415

Stop Cocks - BS 5433 Type



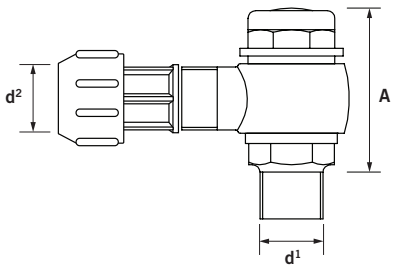


Size (mm)	A (mm)	L (mm)	Weight (kg)	Code
25*	140	135	0.9	44 142 307
32**	165	170	1.7	44 142 308

* Now includes 22mm copper Type A insert
** Now includes 28mm copper Type A insert

Ductile Iron Ferrule - PE x Male Iron BSP Tapered





Size (inch x mm) d¹ x d²	A (mm)	Weight (kg)	Code
¾ x 25	60	0.45	44 762 407

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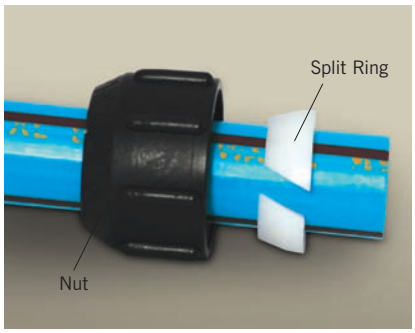
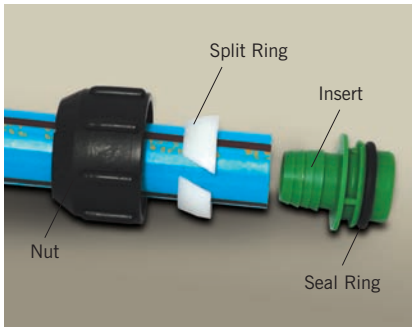
Jointing Instructions for 25mm-63mm Protecta-Line Mechanical Compression Fittings (Service Pipes)

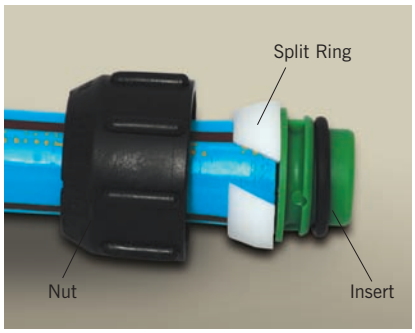
For use on GPS Protecta-Line pipe only.



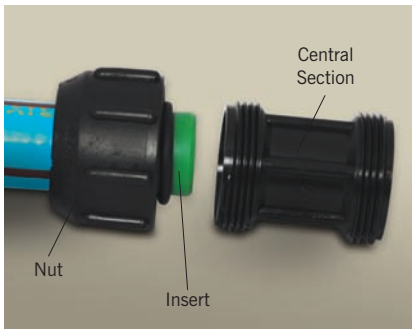
1. Cut the pipe square. Unscrew the Protecta-Line fitting and remove the nut and white split ring. Slide these on to the Protecta-Line pipe, nut first ensuring that the taper of the split ring faces towards the nut.



2. Tap the insert into the end of the Protecta-Line pipe with a flat wooden object. Ensure that the seal ring is correctly positioned on the pipe insert.

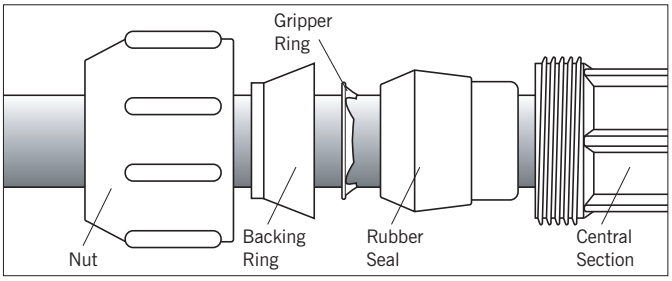


3. Slide the split ring along the Protecta-Line pipe until it is up against the insert. Snap the nut over the split ring.



4. Offer the body of the fitting to the Protecta-Line pipe end and screw the nut on to the fitting body. Continue to tighten the nut until the thread on the body is no longer visible.

Protecta-Line to copper joint (incorporates insert set for Copper Type A for above ground use on Table X tube).



1. Cut copper pipe square, preferably with cutters, and deburr.
2. Degrease pipe and roughen with wire wool or similar.
3. Unscrew nut from copper side of Protecta-Line fitting and slide this nut and plastic backing ring along copper pipe – with taper of backing ring towards nut.
4. Then slide metal gripper ring on to pipe and position it 10–15mm from end, ensuring flat face of gripper ring is facing towards backing ring/nut (i.e. slots in the gripper ring must face towards fitting body).
5. Next slide rubber seal on to copper pipe all the way up to internal stop - taper facing towards other parts already on pipe.
6. This will make certain that the metal gripper ring is pushed to correct location along pipe.
7. Slide backing ring forward to meet gripper ring/rubber seal.
8. Push assembly into body of Protecta-Line fitting and engage nut.
9. Tighten nut firmly with a wrench.
10. Ensure all pipework is securely anchored to counteract end loading.

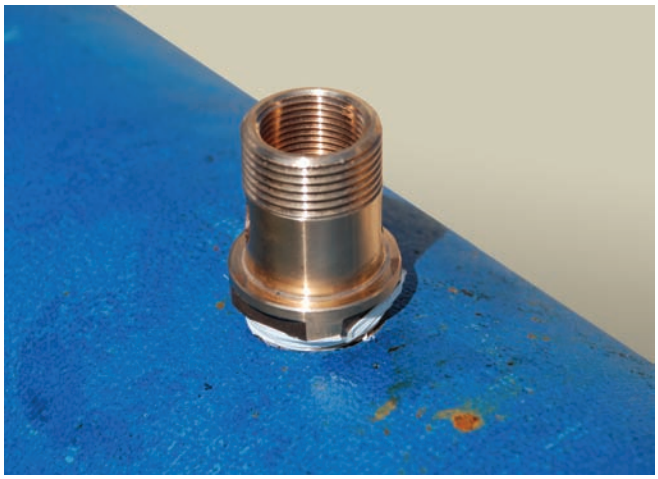
Caution: Do not use heat near plastics and do not re-use gripper ring.

Connecting Protecta-Line mechanical compression fittings to iron fittings
When screwing Protecta-Line Mechanical Compression Fittings onto iron fittings it is important not to use excessive amounts of **thread** sealing tape or other material **because** this can result in unreasonable force needed to complete the joint. Thread sealing tape should be WRc approved.

Installation Instructions for Protecta-Line Ductile Iron Ferrule

1. Drill and tap the ductile iron main and insert the ferrule nipple in the usual way.





2. Fit the Protecta-Line end connector compression fitting to the outlet of the ferrule banjo, employing sufficient PTFE tape to ensure a good seal. Fit the Protecta-Line service pipe into the compression fitting on the outlet as described on page 7.



3. Fit the banjo onto the ferrule nipple and replace the securing collar. After aligning the outlet to the desired position, tighten the securing collar.



4. Remove the plug from the top of the securing collar and withdraw the nipple plug all the way up to the top of the stem to achieve a good seal and then replace the plug.





5. Reinstate any protective wrappings to the ductile iron pipe.

Note: The ductile iron ferrule may have a gunmetal rather than an acetal top cap on some fittings.

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Protecta-Line Ferrule Off-Takes

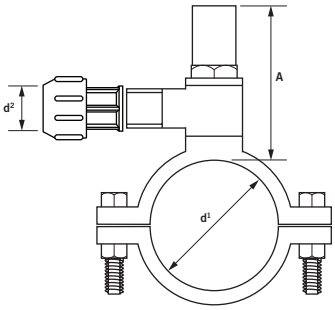
- 25mm and 32mm Protecta-Line self-tapping ferrule off-take for 63mm to 355mm Protecta-Line mains.
- 63mm Protecta-Line ferrule off-take for 90mm to 355mm Protecta-Line mains.
- Each ferrule off-take incroporates a self-locking insert sleeve that grips into drilled/tapped hole in the mains pipe and securely seals the pipe crown to the underside of the fittings base.
- The insert sleeve features a captive seal that positively isolates the barrier pipe aluminium layer from the drinking water.
- Ground contaminants and pipe aluminium barrier layer are isolated from water supply.
- Simple all weather installation and use.

Note: Protecta-Line gunmetal ferrule off-takes should always be used in preference to PE electrofusion saddles.

25mm and 32mm Self Tapping Ferrule Off-Takes



Fitting includes 1 x PE x Female Iron BSP Tapered End Connector.

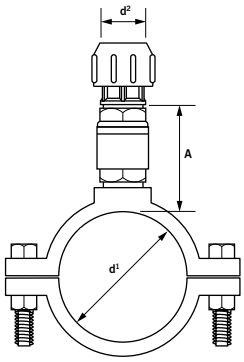


Size (mm) d^1 x d^2	A (mm)	Weight (kg)	Code
63 x 25	95	0.92	44 762 412
90 x 25	95	1.07	44 762 393
110 x 25	95	1.10	44 762 394
125 x 25	95	1.19	44 762 395
160 x 25	95	1.28	44 762 397
180 x 25	95	1.35	44 762 398
225 x 25	95	1.90	44 762 400
250 x 25	95	2.30	44 762 401
280 x 25	95	2.50	44 762 402
315 x 25	95	3.20	44 762 403
355 x 25	95	3.30	44 762 404
63 x 32	100	1.24	44 762 415
90 x 32	100	1.31	44 762 417
110 x 32	100	1.37	44 762 418
125 x 32	100	1.42	44 762 419
160 x 32	100	1.52	44 762 421
180 x 32	100	1.60	44 762 422
225 x 32	100	2.10	44 762 424
250 x 32	100	2.50	44 762 425
280 x 32	100	2.70	44 762 426
315 x 32	100	3.40	44 762 427
355 x 32	100	3.50	44 762 428

63mm Ferrule Off-Takes



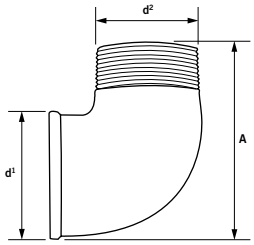
Fitting includes 1 x 63mm PE x Male Iron BSP Tapered End Connector.



Size (mm) d^1 x d^2	A (mm)	Weight (kg)	Code
90 x 63	155	3.38	44 762 459
110 x 63	155	3.77	44 762 460
125 x 63	155	3.79	44 762 461
160 x 63	155	3.73	44 762 463
180 x 63	155	3.88	44 762 464
225 x 63	155	5.01	44 762 466
250 x 63	155	5.12	44 762 467
280 x 63	155	5.29	44 762 468
315 x 63	155	4.97	44 762 469
355 x 63	155	6.12	44 762 470

90º Gunmetal Elbow, FI/MI (for use with 63mm Ferrule Off-Takes)





Size (mm x inch) d^1 x d^2	A (mm)	Weight (kg)	Code
63 x 2	72	0.89	44 996 050

Installation Instructions for 25mm and 32mm Protecta-Line Gunmetal Self-Tapping Ferrule Straps

For use on GPS Protecta-Line pipe only.

Gloves and safety glasses must be worn during the whole assembly process.

The ferrule strap cutter includes a sealing sleeve that prevents water contact with the aluminium barrier layer.

1. Fit the Protecta-Line end connector compression fitting to the ferrule strap male outlet, employing sufficient PTFE tape to ensure a good seal. (It is advisable to rotate the ferrule outlet having first slackened the securing collar).



2. Clean the surface of the Protecta-Line main where the self-tapping ferrule strap is to be installed, avoiding areas which appear damaged.



3. Ensuring that the sealing "O" ring is in place under the upper ferrule strap (and taking care not to damage this on the protruding sleeve), fit the self-tapping ferrule squarely around the main and tighten the two strap bolts evenly and symmetrically.



4. Fit the Protecta-Line service pipe into the compression fitting on the outlet, as described in the separate instructions. After aligning the outlet to the desired position, tighten the securing collar.



5. Remove the plug from the top of the ferrule cap, and, using an 8 or 11mm (depending on service pipe size) square section key, wind down the cutter assembly all the way until hard and solid resistance is felt. Note that before the solid resistance is felt there may be a temporary drop in resistance, followed by an increase as the sleeve around the cutter enters the main.



6. Withdraw the cutter all the way up to the top of the stem, employing a final counter-clockwise torque of approximately 15Nm to ensure a good seal and replace the plug. Some leakage through the plughole is normal before the cutter has been fully unscrewed.



Caution: Do not remove cutter or sleeve from this product before use.

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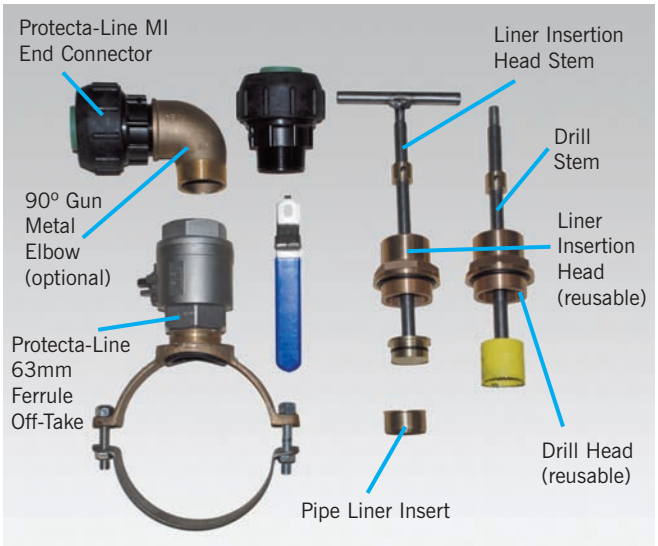
Installation Instructions for 63mm Protecta-Line Gunmetal Ferrule Off-Takes



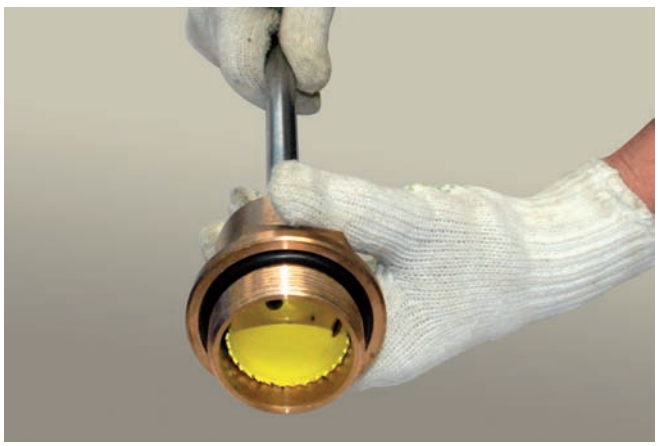
Accessory	Code
* Protecta-Line 2" Drill Head	44 794 003
**Protecta-Line 2" Liner Head	44 794 004
***Protecta-Line Drill/Liner Head O-Ring Kit	44 996 062

*Drill Head setting: fix stop at 230mm from base to drill tip
**Drill Liner setting: fix stop at 180mm from stop base to bottom of tip on liner head
*** Includes four O-rings for replacement in either Drill Head or Liner Head

1. Ensuring that the sealing O-ring is in place under the upper ferrule strap, fit the ferrule squarely around the main in the required position and tighten the two strap bolts evenly and symmetrically. Ensure that ball valve operates correctly before fitting.



2. After assembling the drill stem with a 48mm hole cutter, withdraw the drill stem fully into the drill head.



3. Ensure that the ball valve is in the fully open position (anti-clockwise rotation). Fit the drill head to the outlet of the ferrule.



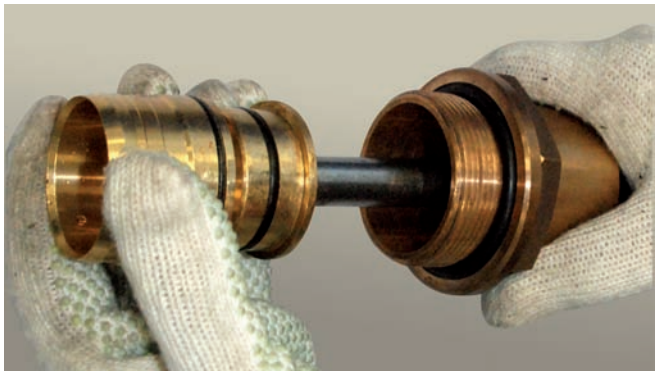
4. Attach the chuck of an electric drill to the top of the drill stem (ensuring that the power supply is disconnected).
Re-connect the power supply to the electric drill and operate the drill with downward pressure until the stop on the drill stem contacts the top of the drill head.



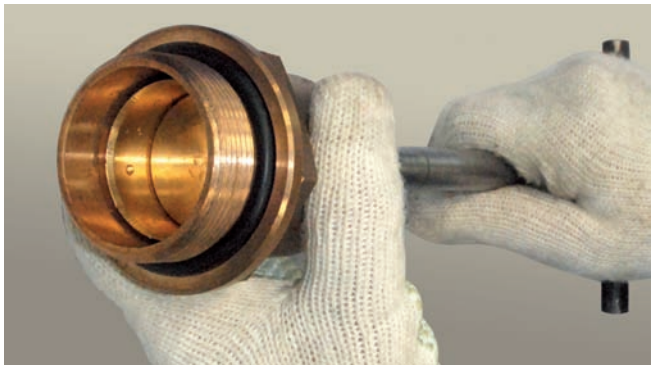
5. Disconnect the power supply to the electric drill and remove the drill from the drill stem. Withdraw the drill stem, until the cutter is fully returned into the drill head and fully close the ball valve (clockwise rotation) before removing the drill head from the outlet of the ferrule.



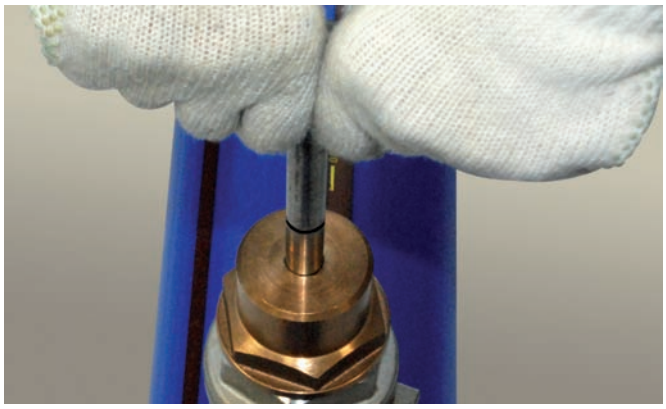
6. Position the liner insert onto the carrier of the liner insertion head.



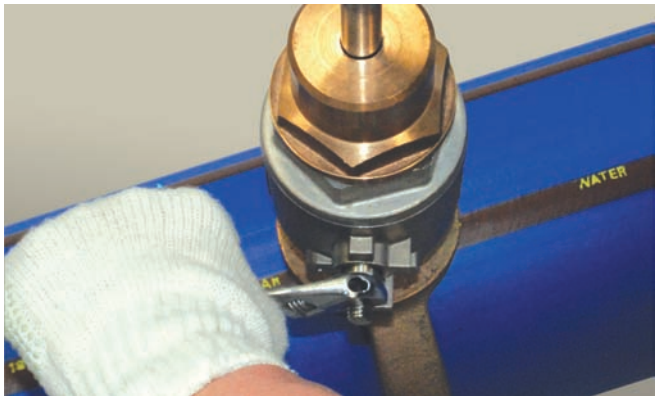
7. Fully withdraw the carrier and pipe liner insert into the liner insert head (indicated by the lower depth mark on the stem).



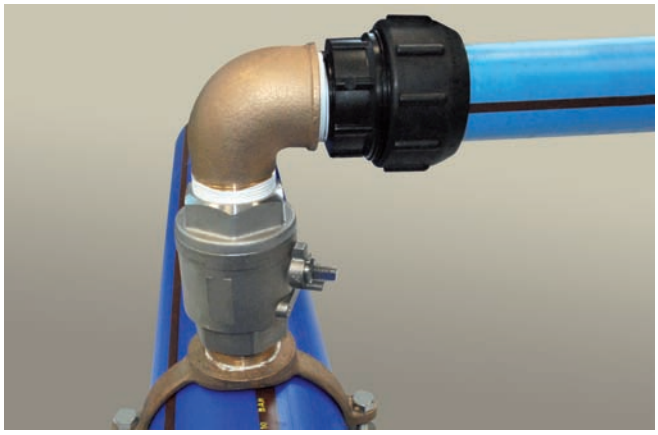
8. Fit the liner insertion head to the outlet of the ferrule. Open the ball valve (anti-clockwise rotation) and fully insert the liner insert, by applying downward pressure on the tee-bar handle on the shaft of the liner insertion head until the stop on the liner insertion head stem contacts the top of the liner insertion head.



9. Withdraw the liner insertion head stem until the carrier is fully withdrawn into the liner insert head (indicated by the lower depth mark on the stem). Close the ball valve (clockwise rotation) and remove the liner insertion head.



10. The communication pipe can now be fitted to the outlet of the ferrule utilising a Protecta-Line 63mm x 2" MI mechanical end connector, either directly to the ferrule outlet (side connection) or in conjunction with 2" MI/FI 90° elbow (top connection).



11. Open the ball valve (anti-clockwise rotation).

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Protecta-Line Fluid Compression Fittings

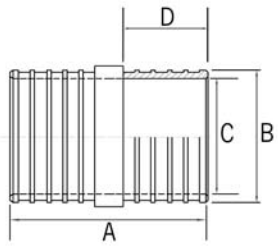
Protecta-Line fluid compression fittings are available for pipe sizes from 63mm to 180mm, to suit the SDR and PE class employed. The fittings comprise of a shell, or one or more half-shells, made from epoxy coated steel featuring an integral inner copper membrane. A simple pipe support liner is provided, again made from Rilsan coated steel. Fluid Compression Fittings are available as Couplers, Repair Couplers, Reducers, 90° Elbows, 45° Elbows, Equal Tees, Stub Flanges, Flanged Branch Tees and Duck Foot Bends. No pipe preparation or subsequent joint wrapping is required.

- Easy all weather installation.
- 100% barrier protection without wrapping.
- WIS 4-24-01 Type 1 approved fitting (fully end load bearing).
- PE core pipe swages closely into the insert liner grooves to give a perfect seal without the need for any elastomeric seals.
- Compatible with pipe rating.
- Uses environmentally friendly Protecta-Line hydraulic fluid.
- Outer shell and sleeve are Rilsan and epoxy coated for maximum corrosion resistance.

Couplers

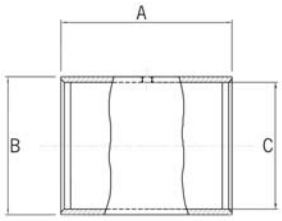


Consists of 1 x liner and 1 x standard full sized shell. Weight shown is for complete product.



Full Shell Dimensions

Size (mm)	A (mm)	B (mm)	C (mm)
63	102	84	66
90	136	111	94
110	161	133	114
125	180	196	130
160	200	184	166
180	230	207	188

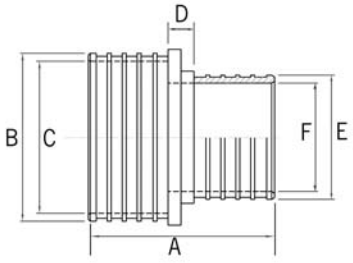


Size (mm)	SDR 11 Liner Dimensions						SDR 17 Liner Dimensions					
	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)	SDR 11 Code	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)	SDR 17 Code
63	82	50	43	36	1.3	44 110 311	-	-	-	-	-	-
90	116	71	62	53	2.7	44 100 313	-	-	-	-	-	-
110	141	87	74	60	4.8	44 100 314	-	-	-	-	-	-
125	-	-	-	-	-	-	160	107	95	70	6.2	44 109 315
160	-	-	-	-	-	-	180	138	122	80	11.2	44 109 317
180	-	-	-	-	-	-	210	155	137	95	15.5	44 109 318

Reducers

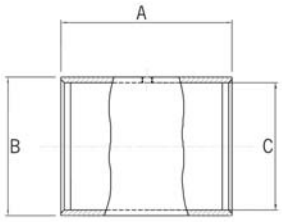


Consists of 1 x reducing liner and 2 x half sized shells. Weight shown is for complete product.



Half Shell Dimensions

Size (mm)	A (mm)	B (mm)	C (mm)
63	102	79	66
90	111	110	94
110	125	133	114
125	125	196	130
160	150	184	166
180	172	207	188

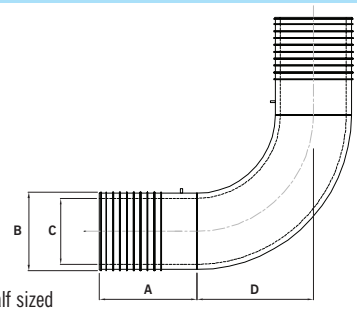


Size (mm)	SDR 11 Liner Dimensions								SDR 17 Liner Dimensions							
	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	Weight (kg)	SDR 11 Code	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	Weight (kg)	SDR 17 Code
90 x 63	260	71	62	81	50	43	4.3	44 441 459	-	-	-	-	-	-	-	-
110 x 90	290	87	75	100	71	62	7.3	44 441 483	-	-	-	-	-	-	-	-
125 x 110*	-	-	-	-	-	-	-	-	428	107	95	152	86	74	8.4	44 440 493
160 x 125	-	-	-	-	-	-	-	-	335	138	125	87	95	83	15.9	44 440 504
180 x 125	-	-	-	-	-	-	-	-	340	156	142	114	108	96	18.7	44 440 505

Please note that both ends of all reducers are for the stated SDR.
* 125mm SDR17 reducing down to 110mm SDR11.

90º Elbows

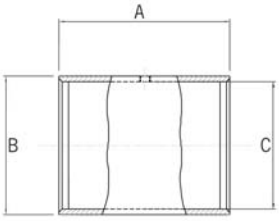




Consists of 1 x elbow liner and 2 x half sized shells. Weight shown is for complete product.

Half Shell Dimensions

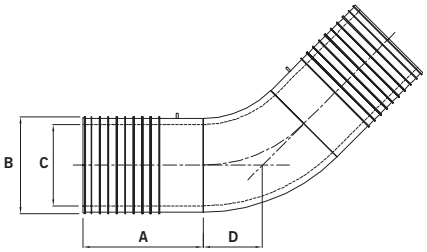
Size (mm)	A (mm)	B (mm)	C (mm)
63	102	79	66
90	111	110	94
110	125	133	114
125	125	196	130
160	150	184	166
180	172	207	188



Size (mm)	SDR 11 Liner Dimensions						SDR 17 Liner Dimensions					
	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)	SDR 11 Code	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)	SDR 17 Code
63	115	50	43	81	3.0	44 209 311	-	-	-	-	-	-
90	124	71	61	100	5.4	44 210 313	-	-	-	-	-	-
110	138	87	74	119	9.5	44 210 314	-	-	-	-	-	-
125	-	-	-	-	-	-	138	107	95	87	11.3	44 208 315
160	-	-	-	-	-	-	167	137	122	114	22.2	44 208 317
180	-	-	-	-	-	-	192	155	137	130	27.7	44 208 318

45º Elbows

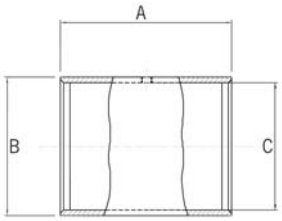




Consists of 1 x elbow liner and 2 x half sized shells. Weight shown is for complete product.

Half Shell Dimensions

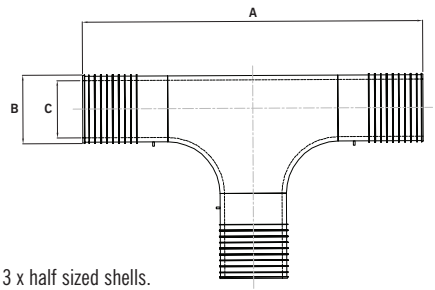
Size (mm)	A (mm)	B (mm)	C (mm)
63	102	79	66
90	111	110	94
110	125	133	114
125	125	196	130
160	150	184	166
180	172	207	188



Size (mm)	SDR 11 Liner Dimensions						SDR 17 Liner Dimensions					
	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)	SDR 11 Code	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)	SDR 17 Code
63	115	50	43	40	2.9	44 215 311	-	-	-	-	-	-
90	124	71	61	49	5.2	44 216 313	-	-	-	-	-	-
110	138	87	74	56	9.2	44 216 314	-	-	-	-	-	-
125	-	-	-	-	-	-	138	107	95	74	10.7	44 214 315
160	-	-	-	-	-	-	167	137	122	89	21.1	44 214 317
180	-	-	-	-	-	-	192	155	137	105	25.9	44 214 318

Equal Tees

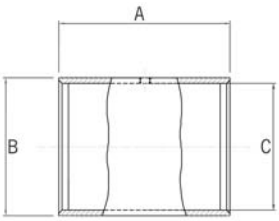




Consists of 1 x equal tee liner and 3 x half sized shells. Weight shown is for complete product.

Half Shell Dimensions

Size (mm)	A (mm)	B (mm)	C (mm)
63	102	79	66
90	111	110	94
110	125	133	114
125	125	196	130
160	150	184	166
180	172	207	188



Size (mm)	SDR 11 Liner Dimensions					SDR 17 Liner Dimensions				
	A (mm)	B (mm)	C (mm)	Weight (kg)	SDR 11 Code	A (mm)	B (mm)	C (mm)	Weight (kg)	SDR 17 Code
63	362	50	43	5.3	44 221 311	-	-	-	-	-
90	404	71	61	9.5	44 222 313	-	-	-	-	-
110	452	87	74	15.9	44 222 314	-	-	-	-	-
125	-	-	-	-	-	500	107	95	19.6	44 220 315
160	-	-	-	-	-	596	137	122	36.7	44 220 317
180	-	-	-	-	-	634	155	137	47.2	44 220 318

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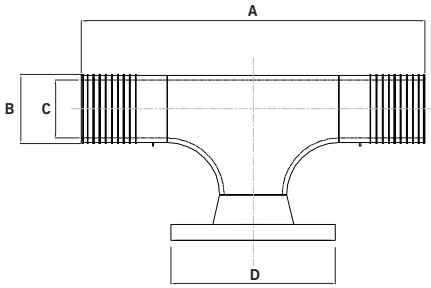
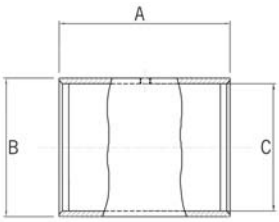
Flanged Branch Tees





Half Shell Dimensions

Size (mm)	A (mm)	B (mm)	C (mm)
90	111	110	94
110	125	133	114
125	125	196	130
160	150	184	166
180	172	207	188



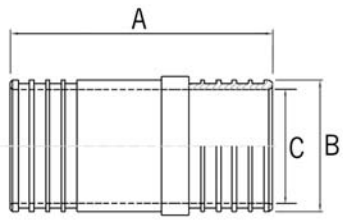
Consists of 1 x flanged branch tee liner and 2 x half sized shells. Weight shown is for complete product. (Bolt set not supplied).

Size (mm x PN)	Bolting	Torque (Nm+/- 10%)	PCD	SDR 11 Liner Dimensions						SDR 17 Liner Dimensions					
				A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)	SDR 11 Code	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)	SDR 17 Code
90 x DN80 PN16	M16 X 8	70	160	404	71	62	200	11.0	44 351 313	-	-	-	-	-	-
110 x DN80 PN16	M16 X 8	70	160	448	86	74	200	NA	44 351 314	-	-	-	-	-	-
125 x DN80 PN16	M16 X 8	70	160	-	-	-	-	-	-	436	108	96	200	19.0	44 363 315
160 x DN80 PN16	M16 X 8	70	160	-	-	-	-	-	-	590	138	121	200	NA	44 363 317
180 x DN80 PN16	M16 X 8	70	160	-	-	-	-	-	-	634	156	142	200	42.5	44 363 318
90 x DN100 PN16	M16 X 8	80	180	404	71	62	220	11.9	44 352 313	-	-	-	-	-	-
110 x DN100 PN16	M16 X 8	80	180	448	86	74	220	NA	44 352 314	-	-	-	-	-	-
125 x DN100 PN16	M16 X 8	80	180	-	-	-	-	-	-	500	108	96	220	19.9	44 364 315
160 x DN100 PN16	M16 X 8	80	180	-	-	-	-	-	-	590	138	121	220	NA	44 364 317
180 x DN100 PN16	M16 X 8	80	180	-	-	-	-	-	-	634	156	142	220	41.5	44 364 318
160 x DN150 PN16	M20 X 8	120	240	-	-	-	-	-	-	590	138	121	285	NA	44 365 317
180 x DN150 PN16	M20 X 8	120	240	-	-	-	-	-	-	634	156	142	285	43.9	44 365 318

The information given for bolting torque values are for metal to metal connections. Drilled to BS EN 1092-1:2007 Table 13.

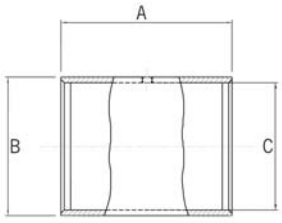
Repair Couplers





Repair Shell Dimensions

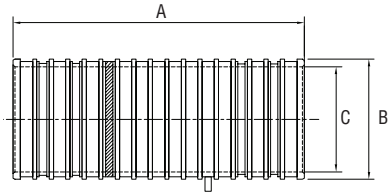
Size (mm)	A (mm)	B (mm)	C (mm)
63	145	79	66



Consists of 1 x repair coupler liner and 1 x repair coupler sized shell. Weight shown is for complete product.

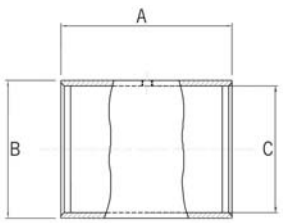
Size (mm)	SDR 11 Liner Dimensions					SDR 17 Liner Dimensions				
	A (mm)	B (mm)	C (mm)	Weight (kg)	SDR 11 Code	A (mm)	B (mm)	C (mm)	Weight (kg)	SDR 17 Code
63	126	50	43	1.7	44 246 311	-	-	-	-	-





Repair Half Shell Dimensions

Size (mm)	A (mm)	B (mm)	C (mm)
90	111	110	66
110	125	133	114
125	125	196	130
160	150	184	166
180	172	207	188

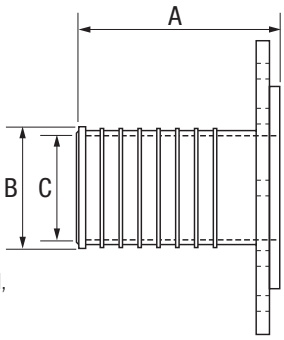


Consists of 1 x repair coupler liner and 2 x half sized shells.

Size (mm)	SDR 11 Liner Dimensions					SDR 17 Liner Dimensions				
	A (mm)	B (mm)	C (mm)	Weight (kg)	SDR 11 Code	A (mm)	B (mm)	C (mm)	Weight (kg)	SDR 17 Code
90	177	71	61	3.5	44 246 313	-	-	-	-	-
110	203	86	74	6.0	44 246 314	-	-	-	-	-
125	-	-	-	-	-	236	107	95	7.7	44 245 315
160	-	-	-	-	-	269	122	122	12.5	44 245 317
180	-	-	-	-	-	319	155	137	20.4	44 245 318

Stub Flange Adaptors

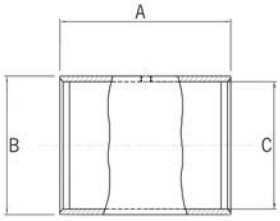




Consists of 1 x stub flange liner, 1 x half sized shell, backing ring and gasket. (Bolt set not supplied)

Half Shell Dimensions

Size (mm)	A (mm)	B (mm)	C (mm)
63	102	79	66
90	111	110	94
110	125	133	114
125	125	196	130
160	150	184	166
180	172	207	188

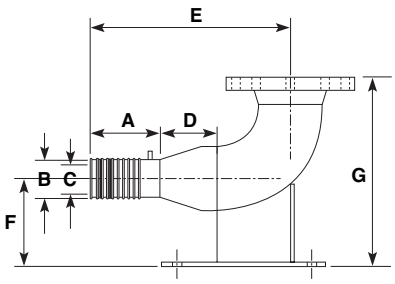


Size (mm x PN)	Bolting	Torque (Nm+/- 10%)	PCD	SDR 11 Liner Dimensions					SDR 17 Liner Dimensions				
				A (mm)	B (mm)	C (mm)	Weight (kg)	SDR 11 Code	A (mm)	B (mm)	C (mm)	Weight (kg)	SDR 17 Code
63 x DN50 PN16	M16 X 4	60	125	115	50	43	3.1	44 227 311	-	-	-	-	-
63 x DN80 PN16	M16 X 8	70	160	115	50	43	3.4	44 228 311	-	-	-	-	-
90 x DN80 PN16	M16 X 8	70	160	124	71	62	6.0	44 228 313	-	-	-	-	-
110 x DN100 PN16	M16 X 8	80	180	138	87	75	8.9	44 228 314	-	-	-	-	-
125 x DN100 PN16	M16 X 8	80	180	-	-	-	-	-	138	108	96	10.9	44 226 315
160 x DN150 PN16	M20 X 8	120	240	-	-	-	-	-	167	138	125	17.9	44 226 317
180 x DN150 PN16	M20 X 8	120	240	-	-	-	-	-	192	156	142	21.9	44 226 318

The information given for bolting torque values are for metal to metal connections.
Drilled to BS EN 1092-1:2007 Table 13.

Duck Foot Bends

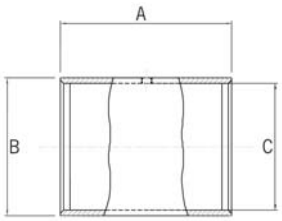




Consists of 1 x flanged bend, 1 x half sized shell and gasket. (Bolt set not supplied)

Half Shell Dimensions

Size (mm)	A (mm)	B (mm)	C (mm)
63	102	79	66
90	111	110	94
110	125	133	114
125	125	196	130
160	150	184	166
180	172	207	188



Size (mm x PN)	Bolting	Torque (Nm+/- 10%)	PCD	Weight (kg)	SDR 11 Liner Dimensions								SDR 17 Liner Dimensions							
					A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	SDR 11 Code	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	SDR 17 Code
63 x DN80 PN16	M16 x 8	70	160	9.0	115	50	43	89	320	135	300	44 384 459	-	-	-	-	-	-	-	-
90 x DN80 PN16	M16 x 8	70	160	9.0	124	71	62	89	320	135	300	44 384 313	-	-	-	-	-	-	-	-
110 x DN80 PN16	M16 x 8	70	160	9.5	138	87	75	N/A	240	135	300	44 384 483	-	-	-	-	-	-	-	-
125 x DN80 PN16	M16 x 8	70	160	13.5	-	-		-	-	-	-	-	138	108	96	N/A	245	135	300	44 385 484
160 x DN80 PN16	M16 x 8	70	160	-	-	-		-	-	-	-	-	167	138	125	102	370	135	300	44 385 486
180 x DN80 PN16	M16 x 8	70	160	16.5	-	-		-	-	-	-	-	192	156	142	127	420	135	300	44 385 487

The information given for Bolting Torque Values are for metal to metal connections.
Drilled to BS EN 1092-1:2007 Table 13.

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Accessories



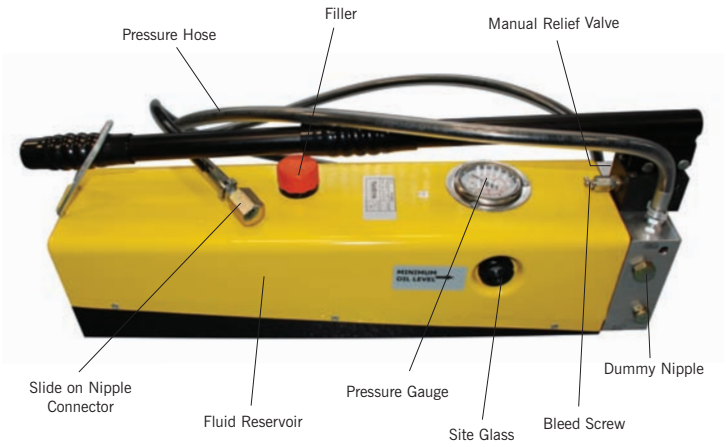
Hydraulic pump available for hire through the following outlets:
MCA Hire Services
www.mcahire.com
Plant & Site Services Ltd.
www.psshire.com

Accessory	Weight (kg)	Code
Aluminium wrapping tape (45m long x 50mm wide).	0.5	44 996 008
Hydraulic Pump	12.0	44 996 009
Protecta-Line hydraulic fluid (5 litres)	5.0	44 996 010

Only Protecta-Line hydraulic fluid should be used with the pump as any other type of fluid can damage it.

Installation Instructions for Protecta-Line Fluid Compression Fittings - Pressurising the Joint

Gloves and safety glasses must be worn during the whole assembly process. Residual pressure within the fitting may be released while removing the connector, causing a momentary spurt of fluid.



1. A calibrated hydraulic pump must be used for all pressurisation of the Protecta-Line fluid compression fitting range. The pump must be filled with Protecta-Line hydraulic fluid.

2. Slide the nipple connector over the nipple on the Protecta-Line fluid compression fitting. Please note that the nipple connector is a slide fit over the nipple, not a push fit. An alternative nipple connector, secured in position by a knurled nut may be fitted. Care should be taken not to overtighten the connector and damage the seal.

3. Gently raise and lower the pump handle, watching the pressure gauge. As the pressure gauge approaches 260 bar, the pressure breaker valve will activate. This indicates that the required pressure has been achieved. Wait 10 seconds and repeat the pumping action until the pressure breaker valve activates. Wait 10 seconds and repeat again. The pressure gauge should now show a steady reading of approximately 260 bar. The joint is now made.

4. **The pressure must be released before removing the slide-on fitting connector from the Protecta-Line Fluid Compression shell.** Depress the manual relief valve on the pump for 2 seconds then slide off the nipple connector from the Protecta-Line fluid compression fitting.

5. If for any reason the nipple needs to be removed, the pressure in the fitting **must** be released first by using the pressure release tool, i.e. depressing the centre part of the fitting nipple. (N.B. Care should be taken as a momentary spurt of fluid may occur).

6. Check that the marks on the pipe still line up with the end of the fitting.

7. The joint is now complete.

Fluid Quantities

Approximate fluid quantities to pressure the fitting shell (full shell):

Shell Size	Fluid Quantity (cc)	Number of Shells/Litre
63	40	25 Approx
90	90	11 Approx
110	150	6 Approx
125	190	5 Approx
160	320	3 Approx
180	375	2 Approx

Only Protecta-Line hydraulic fluid should be used with the pump as any other type of fluid can damage it.

Alternative Nipple Connector

1. An alternative style nipple connector is fitted to some hydraulic pumps.

2. The nipple connector slides over the nipple of the Protecta-Line Fluid Compression fitting and is secured in position by screwing the knurled nut at the top. Care should be taken not to overtighten the connector and damage the seal.

3. After the pressure is released (Stage 4) the nipple connector is removed by first unscrewing the knurled nut at the top of the connector sufficiently to slide the connector off of the nipple.



How to Bleed the Pump

Gloves and safety glasses must be worn during the whole assembly process.



Pumps fitted with a bleed screw



1. The bleed screw is positioned below the pump handle at the rear of the block.
2. Park the nipple connector onto the dummy nipple positioned on the pump block.
3. Raise handle to fullest extent.
4. Turn bleed screw anti-clockwise approximately one quarter of a turn.
5. Lower handle applying gentle pressure, oil will dribble out of the bleed valve.
6. Once the handle has reached the end of its stroke turn the bleed valve clockwise until solid.
7. Wipe any excess oil from around the bleed valve.
8. Check for pressurisation and repeat the bleed operation sequence if necessary.

   Note: Residual pressure within the system may be released while removing the nipple connector, causing a momentary spurt of fluid.

9. If unit still fails to pressurise after bleeding, return to supplier.

Pumps not fitted with a bleed screw

1. Park the nipple connector onto the dummy nipple positioned on the pump block.
2. Activate the manual relief valve and hold down.
3. Raise and lower the pump handle ten times, in each case achieving maximum stroke.
4. Release the manual relief valve.
5. Check for pressurisation and repeat bleed operation sequence if necessary.
6. Operate the manual relief valve and remove the nipple connector from the dummy nipple.

   Note: Residual pressure within the system may be released while removing the nipple connector, causing a momentary spurt of fluid.

7. If unit still fails to pressurise after bleeding, then return to supplier.

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Jointing Instructions for 63mm-180mm Protecta-Line Fluid Compression Fittings (Mains Pipes)

For use on GPS Protecta-Line pipe only.

Gloves and safety glasses must be worn during the whole assembly process.

1. Inspect the end of the pipes to be joined for any obstruction, removing any large burrs or ridges. Check the pipe ends are reasonably square.



2. Using a tape measure and a suitable marker pen mark the appropriate dimension "X" from the ends of the pipes to be joined.

63 - 47mm	110 - 71mm	160 - 91mm
90 - 64mm	125 - 81mm	180 - 106mm



3. Slide the outer shell over the pipe end (where there is evidence that the pipe has some degree of ovality then the pipe end should be re-rounded).
   Push the insert into the pipe end making sure that the pipe end is firmly against the shoulder of the insert.



For all fittings other than the coupler and repair coupler, the marking dimensions are as follows:

63 – 102mm	110 – 125mm	160 – 150mm
90 – 111mm	125 – 125mm	180 – 172mm

Note: The insert should be pushed into the pipe spigot until the stop is reached. The outer shell should be positioned so that one edge is aligned with the mark on the pipe and the other aligned with the end of the pipe. The spigots of stub flanges should be fully inserted into the pipe end upto the flange.

4. Connect the pipe and insert on to the free pipe end and push home fully, ensuring that both pipe spigot ends are in contact with the central stop of the insert.



5. Slide the outer shell over the assembly until the two marks on each end of the pipe are visible at each end of the outer shell.



6. The joint is now ready to be pressurised. Follow the pressurisation procedure.

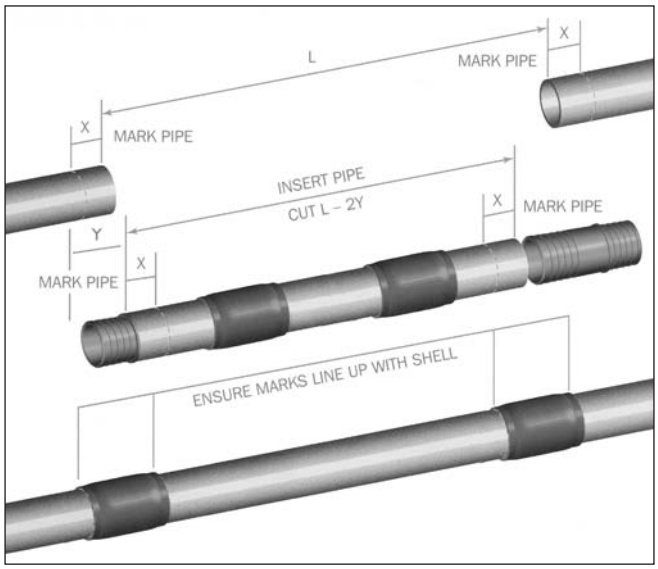




Jointing Instructions for Protecta-Line Fluid Compression Repair Fittings

63mm Repair Couplers

Gloves and safety glasses must be worn during the whole assembly process



Pipe Diameter	X	2Y	Min 'L'
63	47	108	400

- Remove damaged Protecta-Line pipe section. The length removed, L, must be at least as long as stated in the table.
- Mark pipe ends left in the ground 'X' mm from ends using the repair gauge and marker pen.
- Cut length of new Protecta-Line pipe L - 2Y long and also mark 'X' mm in from each end. Note Y = insert liner spigot shorter length + shoulder.
- Slide 2 repair shells over the new pipe section and push the longer spigots of the associated insert liners into both ends of this section.
- Position the new pipe section in line with the existing pipe in the ground and move both the insert liners outwards until their shoulders are hard against the cut ends of the existing pipe.
- Slide the two repair shells outwards so that the four marks previously made line up with the ends of the shells.
- Both repair fittings are now ready to be pressurised as per above.

90–180mm Repair Couplers

Gloves and Safety Glasses must be worn during the whole assembly process



1. Cut out the damaged pipe section. The minimum length of the cut is shown in the table below.



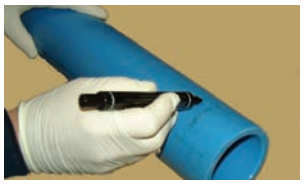
2. The pipe should be internally deburred with a polyethylene deburring tool.



3. Where there is evidence that the pipe spigot has some degree of ovality, then the pipe spigot should be re-rounded.



4. From an undamaged pipe length cut out a repair piece. The length of the repair piece should be equal to the length of the cut out less the dimension 'Y' (see table below).



5. Clearly mark the penetration depth (dimension 'Z') on spigot ends (see table below).



6. Clearly mark dimensions on the new pipe.



7. Push the repair coupler inserts into the pipe with the short end of the repair couplers protruding. Ensure that the pipe ends are firmly against the stops on the inserts. Slide the repair coupler half shells on to the new pipe.



8. Slide the remaining half shells onto the pipe where the repair coupler inserts are to be fitted and insert the repair section with inserts into the pipeline. Slide the repair couplers and shells into position.



9. Ensure that the shells line up with the marks on the pipe. The joint is now ready to be pressurised. Please follow pressurisation procedure.

Pipe Diameter	Cut out Length (Min)	Dimension Y	Dimension Z
90	390	128	66
110	440	145	75
125	525	168	85
160	570	182	92
180	690	235	117

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Protecta-Line Electrofusion Fittings

Protecta-Line Electrofusion Fittings are supplied for use with pipe sizes in sizes 90mm to 355m.

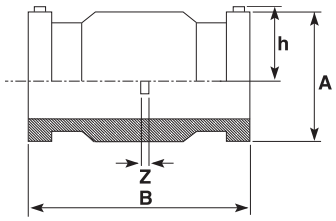
Each fitting has a barcode to allow Electrofusion Control Units (ECU's) to read information such as Product Type and Size, Fusion Time and Cooling Time to ensure quick and easy installation. Fittings can be jointed either in manual mode or by scanning their integral barcode label.

- Easy and rapid installation.
- Can be carried out in a trench, especially useful for repairs or tie-ins.
- Proven barrier protection against contamination.
- No risk of joint corrosion.
- No contact between the pipe's protective aluminium layer and drinking water.

Couplers - 39.5 Volt


90mm-180mm

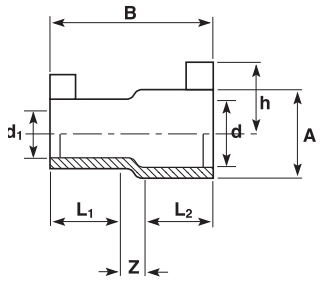

225mm-355mm



Size (mm)	A (mm)	B (mm)	h (mm)	Z (mm)	Weight (kg)	Fusion Time (Sec)	Cooling Time (mins)	Code
90	119	127	74	3	0.60	120	8	PL100313
110	141.5	135	82	3	0.80	160	10	PL100314
125	158.5	147	92	3	1.10	180	12	PL100315
160	198	164	113	3	1.60	300	14	PL100317
180	221	167	123	3	2.10	400	16	PL100318
225	278	220	145	8	3.90	500	18	PL100320
250	310	224	155	8	5.10	600	20	PL100321
280	341	256	175	8	7.10	700	28	PL100322
315	389	291	192	8	9.50	980	30	PL100323
355	405	295	218	4	9.00	980	28	PL100324

Reducer - 39.5 Volt

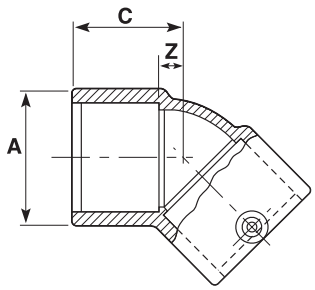




Size (mm) d x d_1	A (mm)	B (mm)	L_1 (mm)	L_2 (mm)	h (mm)	Z (mm)	Weight (kg)	Fusion Time (Sec)	Cooling Time (mins)	Code
110 x 90	136	189	72	85	83	32	0.9	200	12	PL402483
125 x 90	155	210	67	90	91	53	1.2	180	14	PL402484
125 x 110	156	201	73.5	95	93	32.5	1.3	240	14	PL402493
160 x 110	195	254	72	101	114	81	2.2	300	14	PL402495
180 x 125	214	276	83	110	124	83	2.6	300	16	PL402505

45º Elbows - 39.5 Volt

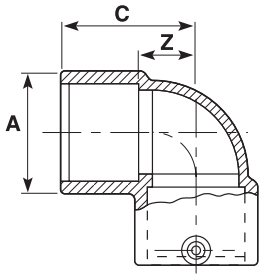




Size (mm)	A (mm)	C (mm)	Z (mm)	Weight (kg)	Fusion Time (Sec)	Cooling Time (mins)	Code
90	115	89	20	0.8	120	10	PL105313
110	136	97	27	1.0	160	10	PL105314
125	156	105	30	1.4	180	12	PL105315
160	198	120	36	2.6	300	16	PL105317
180	223	128	40	3.4	400	18	PL105318

90º Elbows - 39.5 Volt

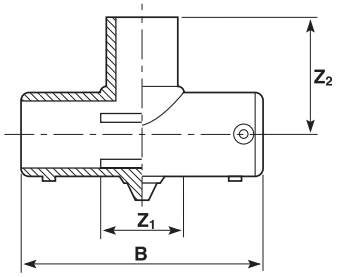




Size (mm)	A (mm)	C (mm)	Z (mm)	Weight (kg)	Fusion Time (Sec)	Cooling Time (mins)	Code
90	114.5	118	49	0.9	120	10	PL104313
110	137	130	60	1.3	160	10	PL104314
125	155.5	143	67	1.8	180	12	PL104315
160	199	171	87	2.6	300	16	PL104317
180	222	185	98	4.4	400	18	PL104317

Equal Tees - 39.5 Volt



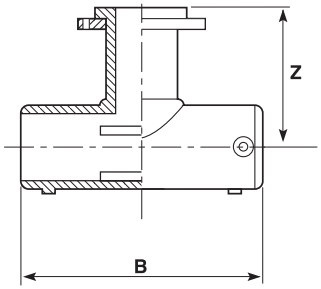


Size (mm)	B (mm)	Z_1 (mm)	Z_2 (mm)	Weight (kg)	Fusion Time (Sec)	Cooling Time (mins)	Code
90	211	83.5	150	1.1	120	10	PL408313
110	240	108	171	1.7	160	10	PL408314
125	280	119	177	2.3	240	12	PL408315
160	314	150	227	4.4	260	14	PL408317
180	365	161	225	5.8	440	20	PL408318

Supplied factory-wrapped to ensure complete barrier performance.

Flanged Branch Tees - 39.5 Volt





Size (mm)	B (mm)	Z (mm)	Weight (kg)	Fusion Time (Sec)	Cooling Time (mins)	Code
90 x 80 PN16	211	296	2.6	12	10	PL301313
110 x 80 PN16	240	515	3.9	160	10	PL301314
125 x 80 PN16	280	532	4.7	240	12	PL301315
160 x 80 PN16	314	615	6.7	260	14	PL301317
180 x 80 PN16	365	834	7.9	440	20	PL301318
90 x 100 PN16	211	534	3.2	100	10	PL302313
110 x 100 PN16	240	310	3.9	160	10	PL302314
125 x 100 PN16	280	301	4.3	240	12	PL302315
160 x 100 PN16	314	650	7.6	260	14	PL302317
180 x 100 PN16	365	671	9.2	440	20	PL302318
160 x 150 PN16	314	410	8.5	260	14	PL303317
180 x 150 PN16	365	415	5.2	440	20	PL303318

Supplied factory-wrapped to ensure complete barrier performance.

Flange Adaptor Kits



Adaptor Kit comprises of:-

- 1 x Stub Flange
- 1 x Coupler
- 1 x Gasket (representation)
- 1 x Backing Ring
- 1 x Bolt set

Size (mm)	SDR 11 Code	SDR 17 Code
90 x 80 PN16	PL251313	
110 x 100 PN16	PL251314	
125 x 100 PN16		PL250315
160 x 150 PN16		PL250317
180 x 150 PN16		PL250318
225 x 200 PN16		PL250320
250 x 200 PN16		PL250534
250 x 250 PN16		PL250321
280 x 250 PN16		PL250542
315 x 250 PN16		PL250543
315 x 300 PN16		PL250323
355 x 300 PN16		PL250547
355 x 350 PN16		PL250324

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Procedures for Butt-Fusion and Electrofusion of Protecta-Line Pipelines of 90mm and above in Diameter

When made in accordance with GPS PE Pipe Systems' recommended procedures, butt-fusion and electrofusion joints of the Protecta-Line system have been independently shown to meet the requirements of WIS 4-32-19 without any need for subsequent wrapping. This does not exempt installers from local regulations and the local Water Company preferences must be adhered to.

Standard butt-fusion and electrofusion procedures must be adhered to, but please note the following additional points:.

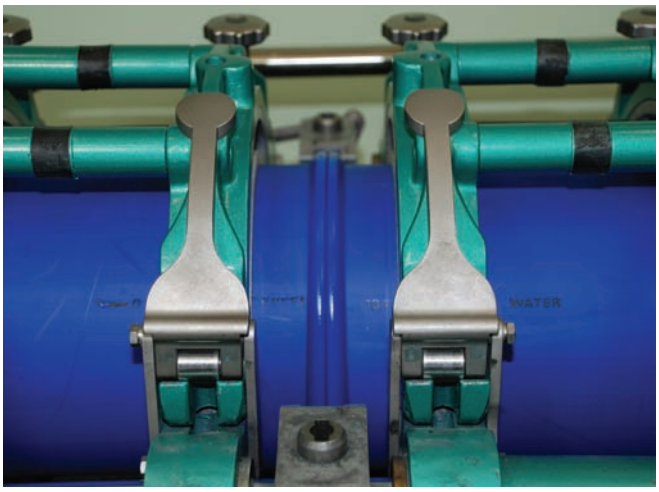
Butt-Fusion

Where this is permitted by the local water company, it is important that the outer PE and aluminium layers are removed far enough back, using the Protecta-Line Surprep tool (see next pages), to prevent the aluminium from coming into contact with the butt-fusion machine trimmer or heater plates.

In addition, the outer PE and aluminium layers should be removed far enough back to permit normal debeading of the completed joint for normal quality control purposes.

It is recommended that the layers should be removed to a length equal to the width of the debeading tool on the end of each pipe. This should be increased by 50% when carrying out dummy weld procedures prior to final jointing.

Butt-fusion clamps should be checked for suitability before commencing work, particularly in larger sizes. Care should be taken not to damage the outer layers of Protecta-Line pipe when clamping it in the butt-fusion machine. In the case of some machines this may necessitate gently radiusing the edges of the jaw shutlines.



Electrofusion

It is essential that the Protecta-Line pipe is properly prepared prior to electrofusion jointing. It is necessary first to remove the outer PE layer, aluminium layer and any residual adhesive layer material.

Note: It is potentially dangerous to carry out electrofusion jointing where the aluminium layer is still in place.

The Protecta-Line Surprep Scraper must be used for pipe end preparation, as it not only removes the outer layers, but it also prepares the core pipe for electrofusion jointing.

Electrofusion clamps should be checked for suitability before commencing work, particularly in larger sizes. All electrofusion joint assemblies must be held in clamps throughout the fusion and cooling periods.

Protecta-Line Jointing End Preparation for Electrofusion Procedures

Pipe Size (mm)	Length (B) (mm)	Register (Z) (mm)	Min preparation insertion depth (mm)	Max preparation depth (mm)
90	127	3	62	67
110	135	3	66	71
125	147	3	72	77
160	164	3	81	86
180	167	3	82	87
225	220	8	106	111
250	224	8	108	113
280	256	8	124	129
315	291	8	142	147
355	295	8	144	149

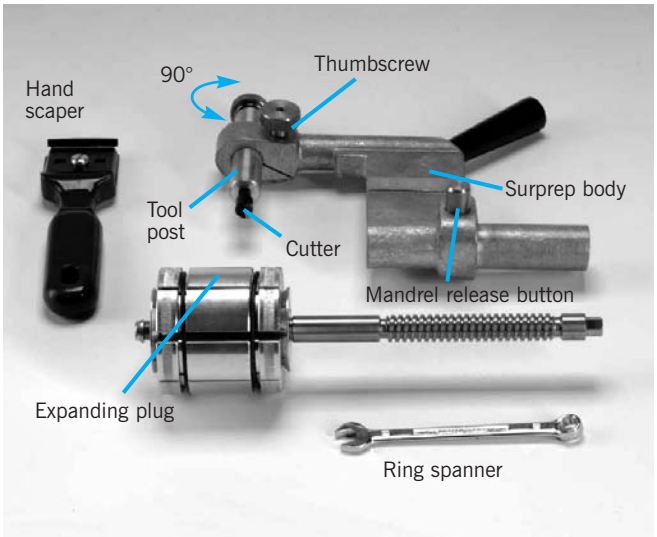
Aluminium Foil Wrapping Lengths - Foil width 50mm

Size (mm)	E/F fitting length (mm)	Amount of foil required (metres)	Joints per roll
25	76	0.38	132
32	83	0.69	72
63	111	2.04	25
90	130	3.37	15
110	135	4.46	11
125	150	5.06	10
160	165	7.41	7
180	165	8.22	6
225	220	14.05	4
250	225	15.71	3
280	260	19.58	3
315	290	25.42	2
355	300	27.12	2

Only Protecta-Line fittings shall be used with Protecta-Line pipe. The use of alternative fittings will have the following effects on your Protecta-Line system:

- Invalidation of WRAS approval and manufacturers system performance warranty.
- Compromised permeation resistance (causing non-compliance with WIS 4-32-19 and possible risks to health).
- Danger of pipe-layer delamination, compromising system performance integrity and risking pipe bursts.
- It would be illegal to install non-WRAS approved fittings.

Procedure for Using the Protecta-Line Surprep Scraper (90mm-180mm)



The Protecta-Line Surprep Kit has been designed to allow the correct scraping of Protecta-Line barrier pipe prior to electrofusion jointing.

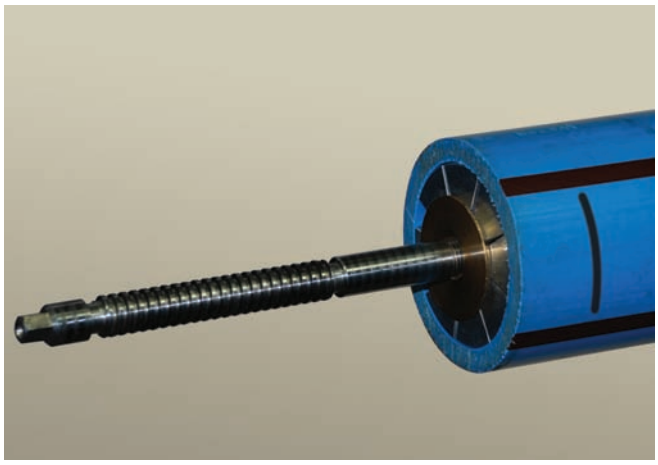
Code	90mm	110mm	125mm	160mm	180mm
01-07-081	●	●			
01-07-083			●	●	●

To order, please contact Caldervale directly on 01924 469571 or sales@caldertech.co.uk

The Surprep Kit is available for hire through MCA Hire Services www.mcahire.com and Plant & Site Services Ltd www.psshire.com

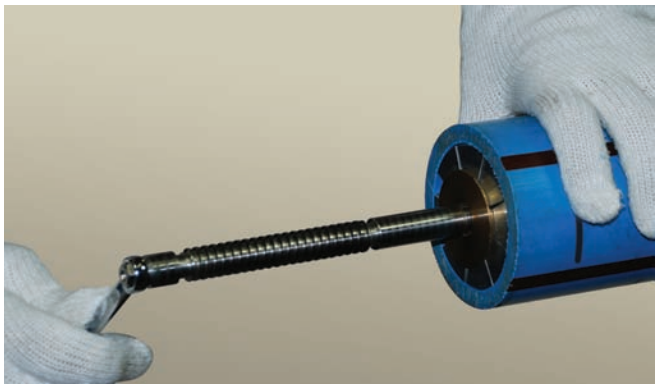


1. Measure the insertion depth of the electrofusion fitting to be used. Place a mark on both pipes to show the position where the edge of the fitting will be.
2. Clamp the pipe to be prepared taking care to avoid damage to the pipe's outer covering.
3. Separate the mandrel from the body of the Protecta-Line Surprep Scraper.

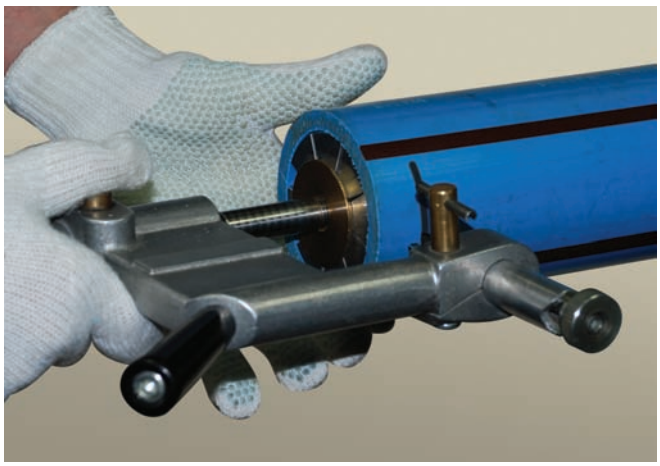


4. Hold the expanding plug and rotate the mandrel anti-clockwise until the plug is a light interference fit in the pipe bore.
5. Push into pipe until edge of plug is level with edge of pipe. Expand plug further using the 10mm ring spanner.

   Do not over-tighten in order to avoid pipe distortion.



6. Slide the body of the Protecta-Line Surprep Scraper onto the mandrel, depress the release button and position the cutter close to the edge of the pipe.



Note: Protecta-Line Surprep Scraper cuts in an anti-clockwise direction, beginning at the end of the pipe.

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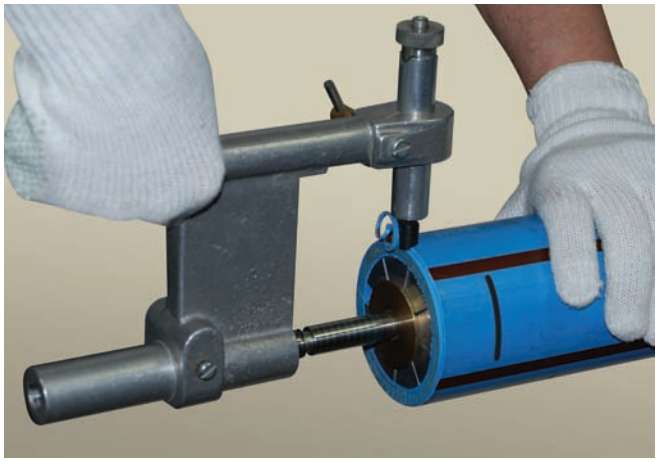
7. Rotate the knob on the top of the tool post through 90°, against the spring tension, such that the cutter is in its raised position.



8. Loosen the body thumbscrew and position the cutter shoe on the edge of the pipe. Tighten the thumbscrew.



9. Rotate the knob on top of the post through 90° so that spring pressure is applied to the cutter.
10. Rotate the tool anti-clockwise in a smooth continuous motion to remove the outer layers in a continuous strip.
11. Stop cutting when the socket depth mark is reached.



12. Rotate the knob on top of the tool post so that the spring pressure is released.
13. Use the hand scraper to remove the peeled strip from the pipe.

    Caution: Do not attempt to break the peeled strip by pulling with bare hands, it has a sharp edge!

    Remove the tool in the reverse order of assembly (steps 3-6).

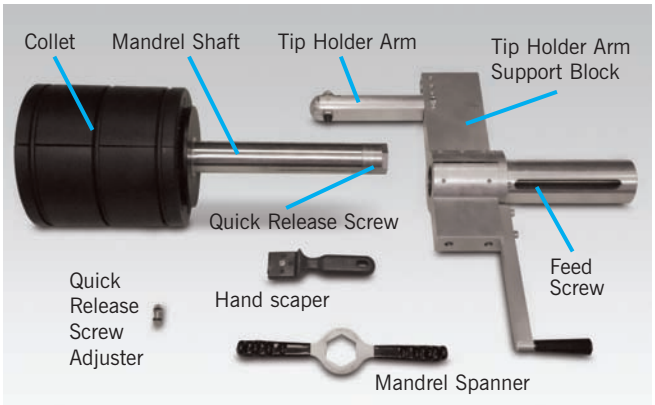


14. Inspect the prepared surface to ensure:
    i) All of the metallic layer has been removed.
    ii) All of the adhesive which bonds the metallic layer to the blue core has been removed.
15. If, for any reason, the prepared surface is not a uniform blue colour all over, use the hand scraper to complete the preparation process.

    Never attempt a second pass with the Protecta-Line Surprep Scraper.

When made in accordance with GPS PE Pipe Systems' recommended procedures, butt-fusion and electrofusion joints of the Protecta-Line system have been independently shown to meet the requirements of WIS 4-32-19 without any need for subsequent wrapping. This does not exempt installers from local regulations and the local Water Company preferences must be adhered to.

Procedure for Using the Large Diameter Protecta-Line Scraper (above 180mm)



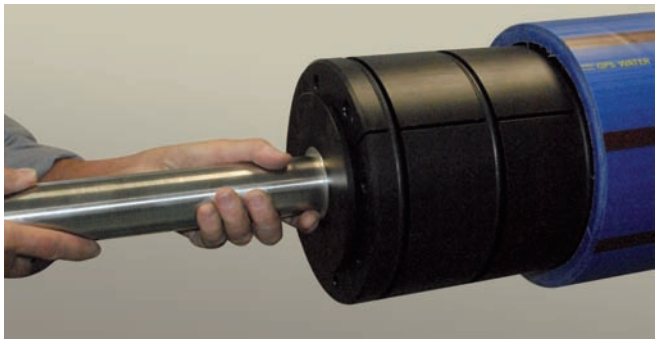
	225mm	250mm	280mm	315mm	355mm
Pipe insert collet					
01-07-255	●				
01-07-256		●			
01-07-257			●		
01-07-258				●	
01-07-259					●
Rotary tool c/w mandrill shaft*					
01-07-251	●	●	●	●	●

* Includes 2 collet expanding cones

To order, please contact Caldervale directly on 01924 469571 or sales@caldertech.co.uk

The Large Diameter Scraper is available for hire through MCA Hire Services www.mcahire.com and Plant & Site Services Ltd www.psshire.com

For Protecta-Line sizes above 180mm, the Surprep Scraper is a dedicated tool for each pipe size, with the cutter set to produce the required outside diameter. Adjustments must be done by a competent person and should not be carried out on site.

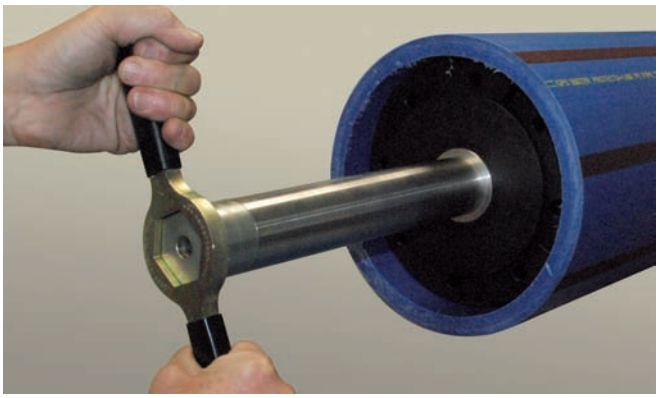


1. First mark the required length of pipe to be scraped (see table on page 23).

   Ensure that the correct size collet for the pipe to be scraped is fitted to the mandrel.

   Adjust the collet by twisting the mandrel shaft anti-clockwise until it achieves its smallest outside diameter.

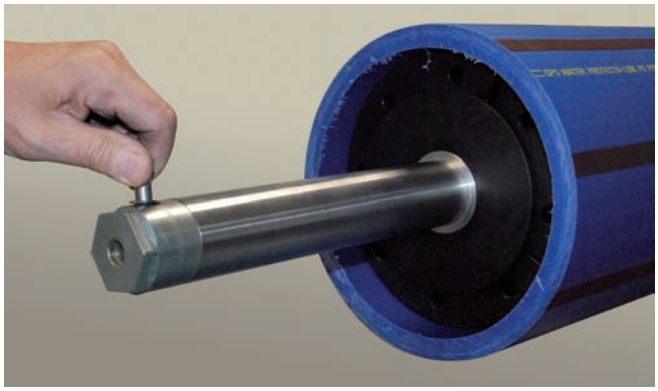
   Slide the collet into the bore of the pipe, allowing 20mm of pipe to show after the collet, to allow for the barrelling effect found at the end of the pipe.



2. Adjust the collet by twisting the mandrel shaft clockwise until the mandrel becomes secure in the bore of the pipe and tighten with the mandrel spanner.

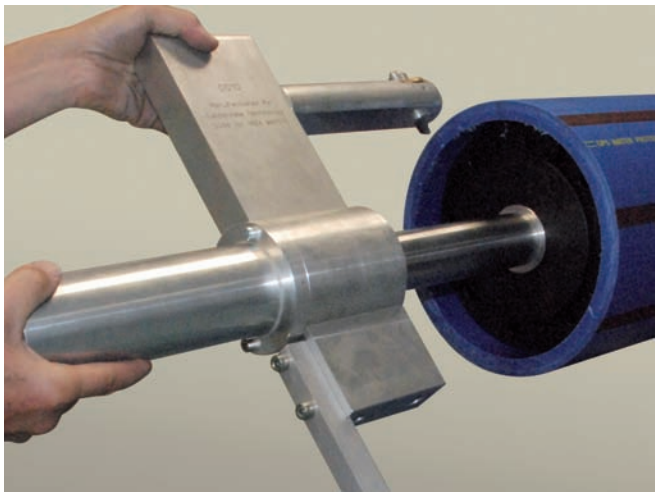
   To achieve the correct alignment parallel to the pipe bore, a joggling action in all directions is required.

   The collet also acts to re-round the pipe so check for gaps between the collet and the bore of the pipe.



3. Once the mandrel is secure and is parallel with the pipe bore, screw down the quick release screw to its full extent (about one and a half turns) using the adjuster, which is stored at the base of the tip arm support block.

   Note: Remember the position of the quick release screw.



4. Ensure that the tip holder arm has been located in the hole corresponding to the pipe size in the tip holder support block.

   Locate the tool onto the mandrel shaft taking care not to damage the bore of the tool.

   Slowly slide the tool along the mandrel shaft using a twisting action, until the feed screw touches the quick release feed screw nut.

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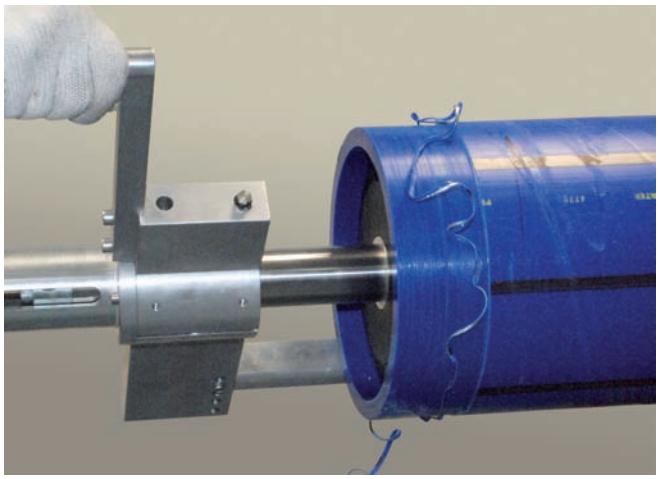
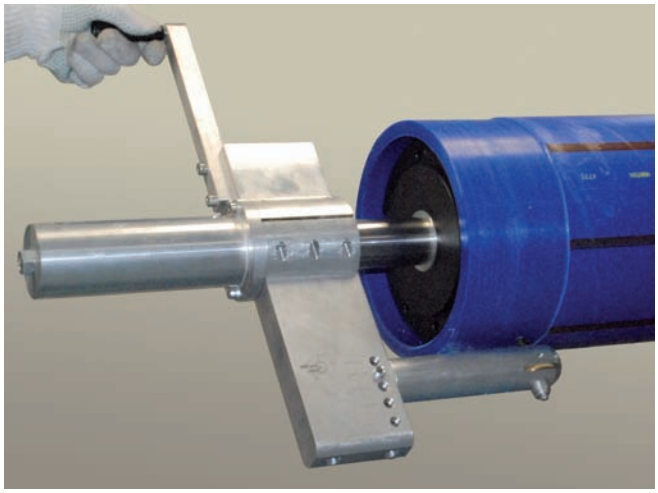


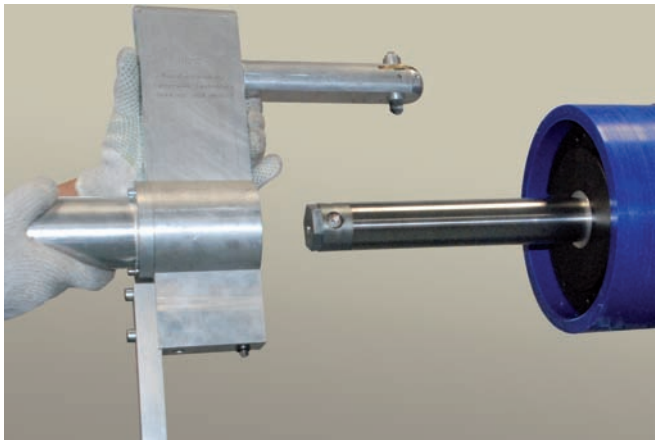
5. Taking care to avoid damaging the quick release nut and feed screw, rotate the tool in a clockwise direction with a slight force pushing forward.

   Once the feed screw has engaged with the quick release nut, it will now proceed to travel along the length of the mandrel shaft, removing the outer barrier layers and preparing the pipe for electrofusion jointing.



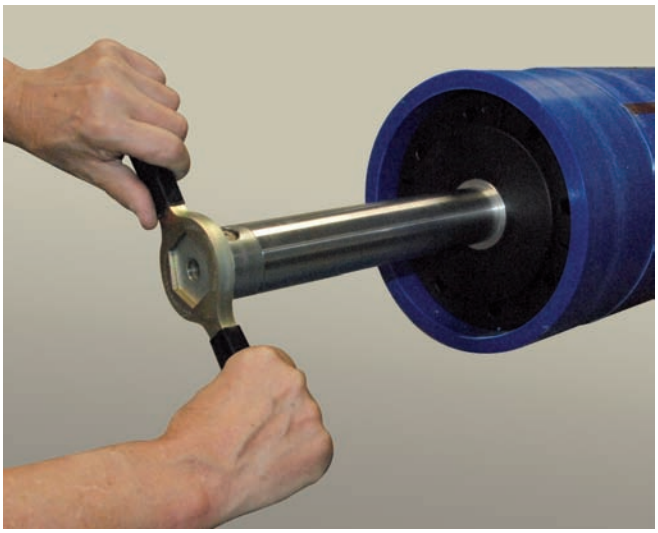
6. When the required length of pipe has been prepared, raise the quick release screw to its top position (about one and a half turns).

   The quick release screw can be accessed through the slot in the feed screw housing tube.

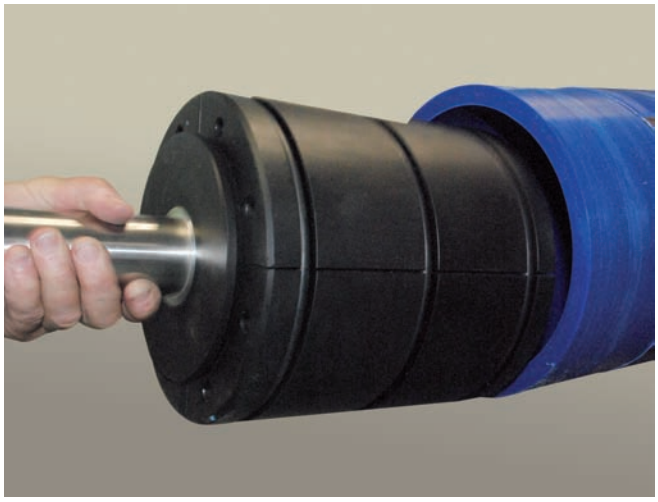


7. The tool can now be removed from the mandrel shaft.

   Note: The tool should be removed to a clean dry and safe area.



8. Loosen the collet using the mandrel spanner on the mandrel shaft in an anti-clockwise direction until free.



9. Remove the collet and mandrel from the pipe.

   The collet should be removed to a clean dry and safe area.

   If there are any areas of pipe that have not been prepared properly, then the hand scraper should be used to complete the preparation process.

   Note: The barrelling effect found at the end of the pipe may result in the barrier layers remaining on the pipe surface for a short distance in from the end of the pipe.

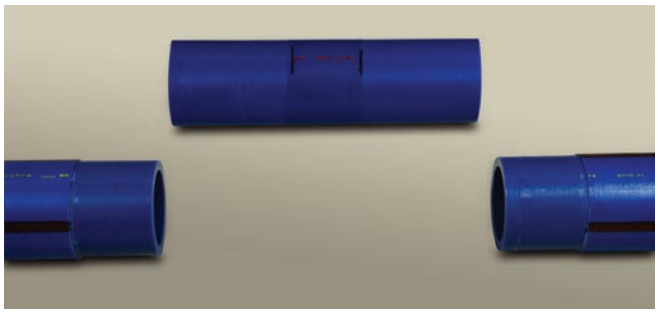
Repair Using Electrofusion (for Protecta-Line 225mm-355mm)

The pipe stops incorporated in the Protecta-Line or Durafuse couplers are shearable and have been provided for the specific purpose of using the fittings for making repairs or breaking into existing pipelines.

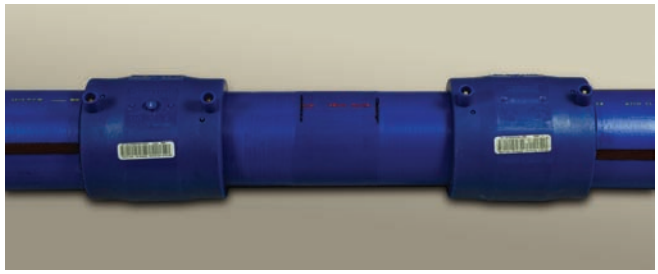
1. Cut out the damaged section of the Protecta-Line pipe at least four times the length of the electrofusion repair couplers and ensure the pipe ends are cut square.
2. Measure the distance between the exposed pipe ends and cut a length of plain PE100 pipe of the same diameter and wall thickness as the existing Protecta-Line pipe, equal to the measured distance less 10mm ensuring that the pipe ends are cut square
3. Clean the ends of the cut section of plain pipe, for a distance slightly greater than the overall length of the repair couplers.
4. Using the pipe end preparation tool, remove the entire surface of the pipe over the marked area, preferably as a continuous ribbon or strip. **Note: The use of mechanical end preparation tools is preferred as hand scraping requires great care and can be time-consuming especially on larger diameter pipes. It is essential that material is removed by scraping or peeling; scratching or abrading is not sufficient.**
5. Remove the pipe stops in the coupler. This can be most satisfactorily achieved by placing one end of a **thoroughly cleaned** short length of pipe into the coupler and striking the other end onto a hard surface. The pipe stops can also be removed using a sharp knife, but care must be taken not to damage the bore of the fitting.
6. Clean the ends of the Protecta-Line pipe for repair and prepare for electrofusion jointing using the Protecta-Line Suprep Scraper as described on pages 26 and 27.
7. Using a suitable marker pen, draw circumferential lines half the length of the repair coupler on the prepared Protecta-line pipe ends which will be used to indicate the location of each repair coupler prior to fusion.
8. Care should be taken to ensure any residual water in the mains is not allowed to come into contact with the electrofusion area.

9 Insert the new plain section of pipe with repair couplers and then slide the repair couplers onto the Protecta-Line pipe ends, ensuring that they are positioned up to the marks on the prepared Protecta-Line pipe ends. Ensure that the surfaces are clean and dry.

10. Carry out the electrofusion jointing procedure as described in the GPS Installation & Technical Guidelines brochure - GP-IT005.







Alternative Method

Alternatively, stub flange assemblies may be fitted to the ends of the Protecta-Line pipe (after preparation with the Protecta-Line Surprep Scraper) and then connected with a double flanged ductile iron spacer.



This method may be used where there is a risk of water in the pipe contaminating electrofusion joints during installation. Foam pigs can be used to temporarily seal the pipe bore. When electrofusion jointing of the stub flange assemblies has been completed, they can be removed before installation of the double flanged ductile iron spacer.

Squeeze-off of Protecta-Line pipe
Protecta-Line pipe can be squeezed off in the industry-approved way, as summarised in the GPS Installation and Technical Guidelines. However, as a precaution after re-rounding previously squeezed off areas should be wrapped with Protecta-Line aluminium tape followed by a proprietary waterproof petrolatum tape (equivalent to Denso™), in addition to any reinforcement bands that may be required to be fitted. For information on acceptable usage conditions refer to Table 9.2 in the WRc PE Pipe Systems Manual version 01/02.

When made in accordance with GPS PE Pipe Systems' recommended procedures, butt-fusion and electrofusion joints of the Protecta-Line system have been independently shown to meet the requirements of WIS 4-32-19 without any need for subsequent wrapping. This does not exempt installers from local regulations and the local Water Company preferences must be adhered to.

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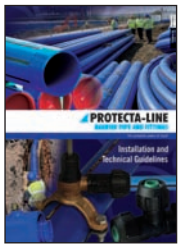

GP-PT003/2
Protecta-Line Installation and Technical Guidlines ☐



GP-IT005/2
Installation and Technical Guidlines ☐



G0003/1
SlimFlange ☐



G0021/2
Protecta-Line Self-tapping Ferrule Off-takes ☐



GP-XF006
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G0010/1
DuraFuse Duck Foot Bends ☐



GP-SF004/1
SlimFlanges for Gas ☐



G0022
Protecta-Line Ferrule Off-takes ☐



G0025
Protecta-Line Traceability ☐



G0020
Large Diameter Pipe Systems ☐



LS001
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