



WATER PIPE SYSTEMS

PROFUSE



Peelable pipe system
The solution for protection
and non scrape jointing

Radius Systems - The smart choice

Strategic pipelines tend to be some of the most challenging in terms of the engineering, the most demanding in terms of reliability and usually represent significant investment for the new owner. To get the most from your new investment we understand that it is vitally important the design is optimised, that a full system easily installed is available and, should the need arise, that the means to adapt or repair it in the future are available. Here at Radius Systems, we have the experience, the skills and the resources to work alongside you at each stage of the process to ensure that you get the best value from your investment and that the journey from design to commissioning is straightforward and above all, predictable.

Our heritage and our experience in the manufacture of plastic pipe systems goes back over 40 years from our time as pioneers, introducing the first polyethylene pipes for natural gas distribution. This pioneering spirit has stayed with us ever since, as we have evolved the technology, expanding the use of plastic pipe systems to the water and wastewater industry, bringing state of the art products for trouble free and reliable performance.

If you are looking for an experienced partner who can help you deliver, then look no further.



ProFuse peelable pipe systems

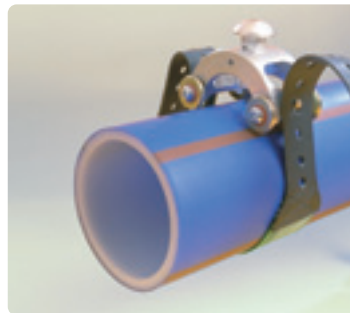
Protection with non-scrape electrofusion jointing

The ProFuse pipe system is a major advance in pipeline technology which reduces lifetime system costs by improving installation quality and system reliability. The ProFuse system is ideal for all clean and dirty water applications.

At the heart of the ProFuse system is a high performance PE 100 polyethylene pipe which has a

unique peelable skin. The ProFuse skin protects the pipe from the moment it is manufactured on the Radius Systems production line to beyond the point of installation and reinstatement.

During manufacture, the protective skin is added to the pipe through melt on melt technology. Applying the protective skin



The ProFuse Pipe Exposure Tool (PET) is used to score the outer skin of the ProFuse pipe.

before the core pipe emerges from the die head, prevents pipe surface contamination, either through oxidation or from physical contamination with dirt.

The skin is easily scored using Radius Systems's bespoke ProFuse PET (Pipe Exposure Tool) without damaging the core pipe. Once scored, the peelable skin is removed by hand revealing a pristine pipe surface which is ready to be jointed without further preparation using electrofusion or butt fusion jointing techniques.

Identifying ProFuse pipes

The ProFuse pipe has a PE 100 natural (white) core and is easily identifiable by the brown stripes on the dark blue skin once installed in the ground. These stripes define the pipe as a multi-layer pipe, in accordance with WIS 4-32-17. ProFuse can also be easily identified thanks to the line printed on the outer layer of the pipe. This print line is repeated every metre on the whole length of the pipe.



Using ProFuse pipes

ProFuse pipe is unique in its approach to non-scrape jointing and is suitable for use with all main jointing techniques such as electrofusion and butt fusion.

The provision of a sacrificial layer also allows ProFuse to be specified for use with some of the most demanding installation methods, such as No Dig technologies.

The jointing methodology of using a skinned pipe does vary from the installation practices of solid walled materials. It is recommended that all installers should receive training in the correct methods for the preparation and installation of



The natural core of the ProFuse pipe is protected by the sacrificial skin. The pipe is ready to joint without further preparation

ProFuse pipe systems. Radius Systems have incorporated these method changes into a range of well tailored training courses which deliver and meet the training requirements of the utility

customers, with courses accredited to relevant national bodies. For details of relevant training courses, please contact your local Radius Systems sales representative.

Benefits of using ProFuse Approvals

- **Damage protection**

The ProFuse skin is manufactured from polypropylene, an extremely robust material which absorbs typical installation damage even during activities such as pipe bursting, directional drilling and slip-lining

- **Optimum joint integrity**

The peelable skin technology reveals a pipe surface suited to making welded joints with no further preparation. The outside diameter of the pipe is maintained improving the joint quality

- **Reduced installation time**

The non scrape technology reduces pipe preparation for electrofusion socket fittings especially for large diameters

Radius Systems's Profuse material is made from a natural PE100 resin, which is fully stabilised and conforms to the dimensional and performance requirements of EN 12201.

The skin on the profuse material is additional and is removed prior to

jointing to reveal a true, dimensionally accurate PE 100 pipe material.

Profuse pipes are manufactured in accordance with UK Water Industry Specification 4-32-17 and are third party approved by the BSI kitemarking system.



ProFuse pipe being floated into position for a sliplining project in the Dee Valley (UK). The pipe was laid into an existing plate riveted water main beneath the river bed

ProFuse product range

Pipe

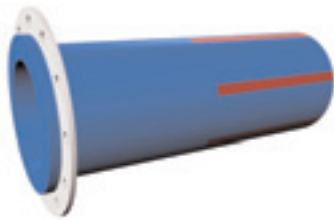
Nominal size OD mm	SDR rating	MOP Bar	Wall thickness		Approx. weight kg/m	Max. towing load	Product code (based on 6m lengths)
			Min	Max			
90	17	10	5.4	6.1	1.60	1.36	90PR76
	11	16	8.2	9.2	2.28	2.04	90PR6
110	17	10	6.6	7.4	2.32	2.04	110PR76
	11	16	10.0	11.1	3.36	3.04	110PR6
125	17	10	7.4	8.3	2.96	2.63	125PR76
	11	16	11.4	12.7	4.31	3.93	125PR6
160	17	10	9.5	10.6	4.76	4.31	160PR76
	11	16	14.6	16.2	6.98	6.44	160PR6
180	17	10	10.7	11.9	6.04	5.46	180PR76
	11	16	16.4	18.2	8.79	8.15	180PR6
250	17	10	14.8	16.4	11.39	10.53	250PR76
	11	16	22.7	25.1	16.53	15.72	250PR6
315	17	10	18.7	20.7	17.86	16.72	315PR76
	11	16	31.6	28.6	26.12	24.96	315PR6
355	17	10	21.1	23.4	22.67	21.23	355PR76
	11	16	32.2	35.6	33.08	31.70	355PR6
400	17	10	23.7	26.2	28.58	26.96	400PR76
	11	16	36.3	40.1	41.28	40.24	400PR6
450	17	10	26.7	29.5	36.12	34.12	450PR76
	11	16	40.9	45.1	53.03	50.93	450PR6
500	17	10	29.7	32.8	44.55	42.12	500PR76
	11	16	45.4	50.1	65.35	62.88	500PR6
560	17	10	33.2	36.7	54.88	52.84	560PR76
	11	16	50.8	56.0	81.76	78.87	560PR6
630	17	10	37.4	41.3	70.44	66.87	630PR76
	11	16	57.2	63.1	103.47	99.82	630PR6

- All pipes available in 6m, 12m or 18m lengths as standard. Other lengths are available on request
- ProFuse is also available in coils for sizes up to 180mm
- ProFuse pipe is compatible with the use of all standard pipe electrofusion socket and saddle fittings

For further details on the range of electrofusion fittings available, please contact Radius Systems

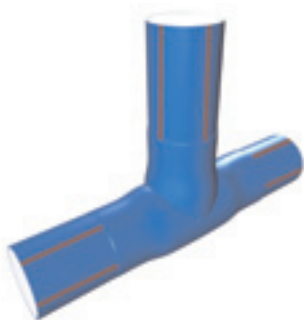
Fittings

Pupped flange assembly



Size mm	Product code SDR 11	Product code SDR 17
90 x 80	90PR77	90PR77
110 x 100	110PR78	110PR78
125 x 100	125PR79	125PR79
160 x 150	160PR80	160PR80
180 x 150	180PR80	180PR80
200 x 200	200PR81	200PR81
225 x 200	225PR81	225PR81
250 x 200	250PR81	250PR81
250 x 250	250PR82	250PR82
315 x 250	315PR82	315PR82
315 x 300	315PR83	315PR83
355 x 300	355PR83	355PR83
355 x 350	355PR84	355PR84
400 x 350	400PR84	400PR84
400 x 400	400PR85	400PR85
450 x 400	450PR85	450PR85
450 x 450	450PR86	450PR86
500 x 500	500PR87	500PR87
560 x 600	560PR89	560PR89
630 x 600	630PR89	630PR89

Pupped equal tees



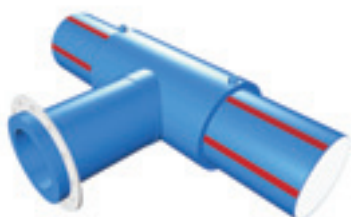
Size mm	Product code SDR 11	Product code SDR 17
90	90PR24P	90PR724P
110	110PR24P	110PR724P
125	125PR24P	125PR724P
160	160PR24P	160PR724P
180	180PR24P	180PR724P
200	200PR24P	200PR724P
225	225PR24P	225PR724P
250	250PR24P	250PR724P
315	315PR24P	315PR724P

Combinations of larger diameter tees up to 630mm with or without reducing branch outlets are available on request. Any leg of the tee can be factory fitted with a flange if required. Please contact your Radius Systems sales representative to discuss specific requirements

ProFuse product range

Fittings

Pupped equal tees - flanged branch



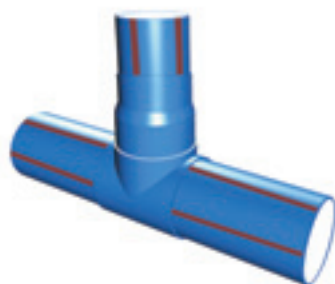
Size mm	Product code SDR 11	Product code SDR 17
90 x 80	90PR25P	90PR725P
110 x 100	110PR25P	110PR725P
125 x 100	125PR25P	125PR725P
160 x 150	160PR25P	160PR725P
180 x 150	180PR25P	180PR725P
200 x 200	200PR25P	200PR725P
225 x 200	225PR25P	225PR725P
250 x 250	250PR25P	250PR725P
315 x 300	315PR25P	315PR725P

Pupped reducers



Size mm	Product code SDR 11	Product code SDR 17
110 x 90	110PR07P	110PR707P
125 x 90	125PR07P	125PR707P
160 x 110	160PR07P	160PR707P
180 x 90	180PR077P	180PR7077P
180 x 125	180PR07P	180PR707P
250 x 180	360PR07P	360PR707P
315 x 250	315PR07P	315PR707P

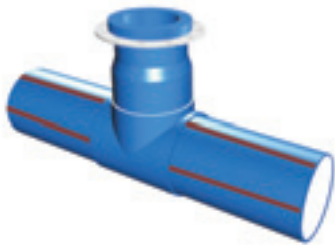
Pupped reduced tees



Size mm	Product code SDR 11	Product code SDR 17
110 x 90	11090PR26P	11090PR726P
125 x 90	12590PR26P	12590PR726P
160 x 110	160110PR26P	160110PR726P
180 x 90	18090PR26P	18090PR726P
180 x 125	180125PR26P	180125PR726P
250 x 90	25090PR26P	25090PR726P
250 x 125	250125PR26P	250125PR726P
250 x 180	250180PR26P	250180PR726P
315 x 90	31590PR26P	31590PR726P
315 x 125	315125PR26P	315125PR726P
315 x 180	315180PR26P	315180PR726P

All pupped fittings available up to 630mm. Please contact Radius Systems for details.

Pupped reduced tees - flanged branch



Size mm	Product code SDR 11	Product code SDR 17
110 x 80	11090PR26P	11090PR726P
125 x 80	12590PR26P	12590PR726P
160 x 100	160110PR26P	160110PR726P
180 x 80	18090PR26P	18090PR726P
180 x 100	180125PR26P	180125PR726P

Mitred elbows - 90°, 45°, 22½° and 11¼°



Angle	Size mm	Product code SDR 11	Product code SDR 17
90°	90	90PR12P	90PR712P
90°	110	110PR12P	110PR712P
90°	125	125PR12P	125PR712P
90°	160	160PR12P	160PR712P
90°	180	180PR12P	180PR712P
90°	200	200PR12P	200PR712P
90°	225	225PR12P	225PR712P
90°	250	250PR12P	250PR712P
90°	280	280PR12P	280PR712P
90°	315	315PR12P	315PR712P
90°	355	355PR12P	355PR712P
90°	400	400PR12P	400PR712P
90°	450	450PR12P	450PR712P
90°	500	500PR12P	500PR712P
90°	560	560PR12P	560PR712P
90°	630	630PR12P	630PR712P
45°	90	90PR21P	90PR721P
45°	110	110PR21P	110PR721P
45°	125	125PR21P	125PR721P
45°	160	160PR21P	160PR721P
45°	180	180PR21P	180PR721P
45°	200	200PR21P	200PR721P
45°	225	225PR21P	225PR721P
45°	250	250PR21P	250PR721P
45°	280	280PR21P	280PR721P
45°	315	315PR21P	315PR721P
45°	355	355PR21P	355PR721P
45°	400	400PR21P	400PR721P
45°	450	450PR21P	450PR721P
45°	500	500PR21P	500PR721P
45°	560	560PR21P	560PR721P
45°	630	630PR21P	630PR721P

All pupped fittings available up to 630mm. Please contact Radius Systems for details.

ProFuse product range

Fittings

Mitred elbows - 90°, 45°, 22½° and 11¼°



Angle	Size mm	Product code SDR 11	Product code SDR 17
22½°	225	225PR22P	225PR722P
22½°	250	250PR22P	250PR722P
22½°	280	280PR22P	280PR722P
22½°	315	315PR22P	315PR722P
22½°	355	355PR22P	355PR722P
22½°	400	400PR22P	400PR722P
22½°	450	450PR22P	450PR722P
22½°	500	500PR22P	500PR722P
22½°	560	560PR22P	560PR722P
22½°	630	630PR22P	630PR722P
11¼°	225	225PR11P	225PR711P
11¼°	250	250PR11P	250PR711P
11¼°	280	280PR11P	280PR711P
11¼°	315	315PR11P	315PR711P
11¼°	355	355PR11P	355PR711P
11¼°	400	400PR11P	400PR711P
11¼°	450	450PR11P	450PR711P
11¼°	500	500PR11P	500PR711P
11¼°	560	560PR11P	560PR711P
11¼°	630	630PR11P	630PR711P

Installation guidance

No Dig Installations

ProFuse is particularly suitable in No Dig Installations as the skin which is made out of a tough polypropylene material absorbs all the abrasion damage when the pipe is installed.

ProFuse can be supplied in coil form for sizes up to 180mm and in sticks for sizes up to 630mm for butt fusion jointing into long pipe strings, to enable trenchless installations to be undertaken over long lengths.

When towing the pipe into the ground, using either winching equipment or hydraulic rod units, it is important to limit the load applied to the pipe to prevent long term deformation of the material. The maximum loads applied to ProFuse are the same as for standard solid walled polyethylene pipe materials and are recommended by industry guidelines to not exceed 50% of the material's maximum yield strength.

The correct maximum winching loads have been calculated and are shown in the product range data table on page 6. Devices such as winch load limiters and weak link shear pin systems are available to limit the loads applied to the pipe during installation.



The ProFuse skin absorbs the abrasion damage during pipe bursting installations without affecting the core of the pipe



Installation & jointing

Electrofusion jointing guidance

A key benefit using ProFuse pipe is the ability to make joints using electrofusion fittings without the need to scrape the surface of the polyethylene pipe. This allows for faster and easier jointing and many utilities have converted from conventional solid wall material to ProFuse as the long term integrity of the electrofusion fittings is much improved.

Electrofusion fittings can be used to join ProFuse pipe to ProFuse pipe or ProFuse pipe to traditional PE 80 and PE 100 pipes. In all cases the maximum operating pressure for the pipeline will be determined by the pipe of the fitting having the lowest pressure rating.

It is recommended that all installers should receive training in the correct methods for the preparation and installation of electrofusion fittings to polyethylene pipe systems. For details of relevant training courses, please contact your local Radius Systems sales representative.



The pipe ends are rounded, if appropriate



The coupler is placed on the end of the pipe



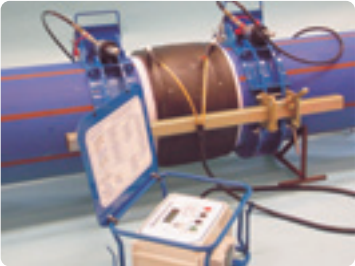
The skin is scored using the ProFuse PET



The second pipe is prepared and pushed onto the coupler



The skin is peeled when the joint is ready to be made



The coupler is ready to be fused

Butt fusion jointing guidance

As with other polyethylene pipes, ProFuse can be successfully butt fusion welded and can also be butt fused to pipes of a similar material, diameter and wall thickness.

In order to achieve consistent satisfactory welds, it is a mandatory requirement that approximately 25mm of the ProFuse protective skin is removed from the ends of each pipe to be welded. Radius Systems have developed a guide which fits on

the ProFuse PET to help remove the correct amount of skin. After removing the strip of skin, the procedure for jointing ProFuse using the butt fusion technique is as stated in WIS 4-32-08. The conditions and parameters stated in WIS 4-32-08 should be used to join ProFuse to ProFuse and ProFuse to other PE 100 materials.

The external bead formed during fusion can and should be removed

using a standard bead removal tool, allowing joint quality to be checked at the work site using established methods.



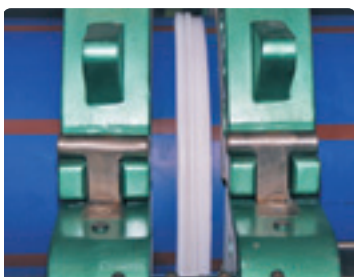
The guide wheel fitted on the ProFuse PET allows the correct amount of skin to be removed



The correct amount of skin is removed from both ends of the pipe exposing the natural core of the pipe



ProFuse is butt fused using standard equipment



An external bead is formed during fusion



Installation & jointing

Mechanical fittings

ProFuse pipe can also be used in connections made using mechanical compression fittings and ferrule straps. When making connections using mechanical fittings, the ProFuse skin should be removed from any area of pipe

in contact with the fitting. This will provide a pipe which is correctly dimensioned and free from any scores or defects that might otherwise form a potential leak path.

Standard stop settings must be used which detail the diameter and SDR of the pipe. The manufacturer's guidelines should be followed regarding the correct operation procedure of the tooling.

Flow stopping

Squeeze off tools are commonly used with polyethylene pipe systems as a method of temporarily interrupting the flow in a pipe system to enable joints to be made to extend the system or for damage repair. The squeeze off technique can be used on ProFuse pipe with standard squeeze off tooling. The skin does not need to be peeled off.



A versatile pipe system

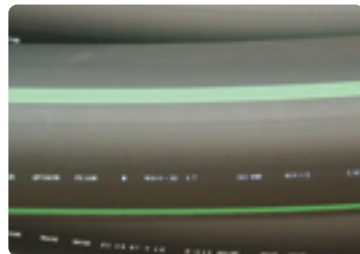
The ProFuse pipe range is manufactured in blue to conform to the UK water industry standards. However, Radius Systems have also manufactured ProFuse in a range of other

colours, to either meet the requirements of other national and international standards or to meet the needs of other system applications and specific project requirements.



Green ProFuse for Lyonnaise des Eaux - Gibraltar

Sea water mains replacement using slip lining and pipe bursting techniques



Black ProFuse for Thames Water - UK

Sewerage pumping main replacement using directional drilling technique



Purple ProFuse for Ne Water - Singapore

For above ground waste water use. First large diameter polyethylene installation as traditional metallic material proved unsuitable for this application

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