

➤ **POLYETHYLENE  
WATER  
PIPES & FITTINGS**

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# OD-DN Conversion Tables

## WSD POLYETHYLENE OUTSIDE DIAMETER (OD) CONVERSION TO NOMINAL DIAMETER (DN)

The Hong Kong Water Supplies Department (WSD) publishes a conversion table (Table 22.09-2) in their Particular Specification, Appendix 22.09, to ensure internal diameter alignment when connecting Polyethylene pipes to other pipe materials like steel and Ductile Iron.

PE is defined by its outside diameter (DN/OD for pipes and dn for fittings), whereas Ductile Iron is defined by its nominal internal diameter (DN). A PE pipes thickness (SDR Rating) determines the pipes actual internal dimension. The table below provides the official WSD conversions given in Table 22.09 for pipes and fittings, regardless of the PN / SDR rating being used.

All dimensions are given in mm.

PE Nominal Size (DN/OD) / Nominal Outside Diameter (d <sub>n</sub> ) <i>(outside diameter of PE pipes and fittings)</i>	Equivalent Size in DN <i>(WSD nominated matching size)</i>
20	15
25	20
32	25
50	40
63	50
90	80
125	100
180	150
250	200
315	250
355	300
450	350
500	400
560	450
630	500
710	600
800	700

**Note:** Larger sizes are not stipulated in Appendix 22.09 but are available up to DN/OD 1000 in PN16 SDR11 and DN/OD 2000 in PN10 SDR17

*Product specifications and dimensions are subject to change without notice.  
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# Pipes

## PIPE TYPES

**M10E Pipe** has a 10% external colour indication layer. This is used to identify the media inside the pipe, ie: Signal Blue (RAL 5005) for potable water or Purple (RAL 4004) for non-potable water. These pipes are co-extruded, using identical base compounds complying to BS EN 12201-1. This produces a single homogeneous pipe wall, meaning the colour cannot be separated from the rest of the pipe. M10E pipe is supplied in sizes from 90mm OD to 1600mm OD. For sizes below 90mm OD, we supply M100 solid colour pipe.

The colour thickness on M10E pipe is exactly 10% of the total wall thickness (+/-1.5%). This provides a damage depth indicator meaning if the black inner colour is visible on the surface of the pipe, this indicates surface damage is deeper than 10% of the pipes wall thickness (10% is the accepted maximum depth for external damage), therefore the section of pipe where black is visible, must be replaced.

**M100 / M100 Pipe** is a 100% solid colour wall, the pipe is extruded from a single pre pigmented compound in either black, blue or Purple.

## PIPE MANUFACTURING STANDARDS

All Mill-Pro pipes and fittings are manufactured in accordance with:

BS EN 12201-1 for Compounds,

BS EN 12201-2 for Pressure pipes

BS EN 12201-3 for Pressure fittings

Water Supplies Department Particular Specification Appendix 22.09

Mill-Pro Pipes and fittings also comply with ISO 4427-1/2 and AS/NZS 4130 for pipe, AS/NZS 4131 for PE Compounds and AS/NZS 4129 for fittings, although not marked as such.

*Product specifications and dimensions are subject to change without notice.*

*For the latest information refer to our website: [www.millpro.com.hk](http://www.millpro.com.hk) or contact our [sales team](#).*



*This mark is used to identify Mill-Pro products that meet the requirements of the Water Supplies Department PS Appendix 22.09. The use of this mark is not endorsed by the WSD and is not intended to infer approval by the WSD.*

## PIPE COMPOUNDS

**M10E / M100E - Extreme Pipes** are manufactured ONLY using PE100 RC compounds for the pipe body and the colour layer. PE100 RC compounds provide approximately 8000 hours slow crack growth resistance when compared to traditional PE100+ Compounds, for a negligible extra cost. All pipes supplied ex stock by Mill-Pro in Hong Kong are PE100 RC (M10E / M100E).

**M10 / M100 Pipes** are manufactured from a PE100+ association approved compound providing 1000 hrs slow crack growth resistance. Since 2011 in Hong Kong, PE100 RC (Resistant to Crack) compounds have been required. These provide far superior performance and pipe life. Mill-Pro only supplies M10 / M100 pipes made from PE100+ compounds by special order.

**Purple compounds** are manufactured and type tested in accordance with WSD PS Appendix 22.09, Annex 1. Using a certified PE100 RC unpigmented compound, pigmenting is conducted by a third party to RAL 4004. Samples are sent for UV weathering and the weathered samples are then type tested by an ISO/IEC 71025 certified lab for conformance to Annex 1. This batch of certified purple PE100 RC compound is then used to manufacture M10 & M100 purple pipes.

**PE100 RC** (Resistant to Crack) sometimes known as Extreme Stress Crack Resistant (ESCR) or High Stress Crack Resistant (HSCR) compounds, are defined in the German publicly available standard: PAS 1075:2009-04. PE100 RC compounds are designed to provide lifelong resistance (>100 years) to traditional Slow Crack Growth (SCG) failures caused by rock impingement and point loading stress.

Designed for applications all commonly found in Hong Kong: Where sand bedding around the pipe is not used, where backfill material is ungraded and typically contains broken concrete or where secondary excavation (repeated excavation alongside the PE pipe, to access other services in close proximity) leaves the PE pipes without the required bedding around the pipe to prevent rocks or concrete point loading on the pipe surface.

### Global PE100 RC compound manufacturers – updated September 2020

Below is a complete list of the PE100 RC compounds produced by PE100 Plus manufacturers, to comply with the WSD PS Appendix 22.09 Clause 3 the compound supplier must be on this list.

Manufacturer	Compound Model / Datasheet	Colour	RAL Colour Code	Density (Compound)	MFI (190°/5.0kg)	OIT
Borealis	Boresafe HE3490LS-H	Black	RAL 9011	959 kg/m <sup>3</sup>	0.25g/10min	>20 min@200°C
Borealis	Boresafe HE3494LS-H	Blue	RAL 5005	959 kg/m <sup>3</sup>	0.25g/10min	>20 min@210°C
Borouge	Boresafe HE3490LS-H	Black	RAL 9011	960 kg/m <sup>3</sup>	0.25g/10min	≥20 min@210°C
Sabic	P6006RC Black	Black	-	959 kg/m <sup>3</sup>	0.23g/10min	≥30 min@210°C
Sabic	P6006RC Blue	Blue	-	-	-	-
Total	XSC20 B	Black	-	958 kg/m <sup>3</sup>	0.3g/10min	≥30 min@210°C
Total	XSC50 Blue	Blue	-	950 kg/m <sup>3</sup>	0.3g/10min	-
LyondellBasell	Hostalen CRP100 RESIST CR Black	Black	RAL 9004	958 kg/m <sup>3</sup>	0.23g/10min	≥30 min@210°C
LyondellBasell	Hostalen CRP100 RESIST CR Blue	Blue	RAL 5005	950 kg/m <sup>3</sup>	0.27g/10min	≥30 min@210°C
Ineos	Eltex TUB 121N6000	Black	-	959 kg/m <sup>3</sup>	0.3g/10min	≥20 min@210°C
Ineos	Eltex TUB 124N6000	Blue	-	953 kg/m <sup>3</sup>	0.3g/10min	≥20 min@210°C
Qenos	Alkadyne HCR193B	Black	-	959 kg/m <sup>3</sup>	0.2g/10min	≥30 min@210°C
<i>Mill-Pro uses 100% virgin, Pre-Pigmented/Compounded complying with BS EN 12201-1 for its pipe and fitting products.</i>						
<i>Mill-Pro does not use any recycled materials in the manufacture of any of our products. Our products are 100% end of life recyclable.</i>						
<i>All indication stripe colours, CCTV inner colour are pre pigmented, certified PE100 RC compounds.</i>						
<i>Purple compound is pigmented using a PE100 RC unpigmented compound and type tested in accordance with PS Appendix 22.09, Annex A.</i>						

## M10E / EXTREME - PE100 RC Pipe

PE100+ pipe with a 10% external colour layer identifying the pipes service use: Signal Blue (RAL 5005) for potable water, and Purple (RAL 4004) for non-potable/Flushing water. The outer colour layer also provides damage depth indication. Pipes are extruded using identical PE100 RC base compounds to produce a single homogeneous pipe wall section in accordance with BS EN 12201-2 with 8000 hours Slow Crack Growth (SCG) compound performance providing an exceptional in-ground service life.

NOTE: All M10 pipes supplied by Mill-Pro in Hong Kong are PE100 RC, unless ordered otherwise.

### HONG KONG WATER SUPPLIES DEPARTMENT PIPES

The following tables are for Drinking and Flushing water pipe. These pipes fully comply with the Hong Kong Water Supplies Department (WSD) Particular Specification.

## M10E Blue PE100 RC Pipe / PN16 / SDR11

### Blue Co-Extruded Drinking Water Pipe (RAL 5005)

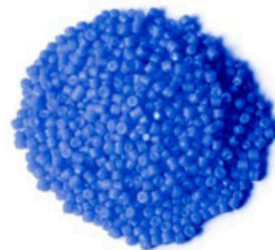
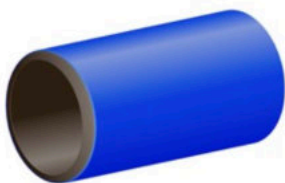
Product code	WSD Equivalent Size	Nominal Outside Diameter (dn)	Mean Outside Diameter (dem)		Max Out-of-roundness (Ovality)	SDR 11			WSD Fresh Water Pipe
			Min	Max		Wall thickness	ID	kg/m	
						Mean	Mean	Mean	Availability in Hong Kong
P1K26.102.090	DN 80	90	90	90.6	1.8	8.7	72.9	2.1	Ex-Stock
P1K26.102.125	DN 100	125	125	125.8	2.5	12.1	101.3	4.1	Ex-Stock
P1K26.102.180	DN 150	180	180	181.1	3.6	17.3	146.0	8.5	Ex-Stock
P1K26.102.250	DN 200	250	250	251.5	5.0	23.9	203.0	16.3	Ex-Stock
P1K26.102.315	DN 250	315	315	316.9	11.1	30.1	255.8	25.9	Ex-Stock
P1K26.102.355	DN 300	355	355	357.2	12.5	33.9	288.3	32.9	Ex-Stock
P1K26.102.450	DN 350	450	450	452.7	15.6	43.0	365.4	52.9	8-12 Weeks
P1K26.102.500	DN 400	500	500	503.0	17.5	47.8	406.0	65.3	8-12 Weeks
P1K26.102.560	DN 450	560	560	563.4	19.6	53.4	454.9	81.8	8-12 Weeks
P1K26.102.630	DN 500	630	630	633.8	22.1	60.2	511.6	103.7	8-12 Weeks
P1K26.102.710	DN 600	710	710	716.4	24.9	67.8	577.6	131.9	8-12 Weeks
P1K26.102.800	DN 700	800	800	807.2	28.0	76.3	651.0	167.3	8-12 Weeks

For sizes below 90mm OD click [here](#) for M100 Extreme PE100 RC Blue pipe

These tables only show WSD standard pipe sizes and ratings, for other pipe sizes and pressure ratings use the tables below

For sizes, ≥ DN350 / 450 OD orders may be subject to Minimum Order Quantities of approximately 400m, [Contact us](#) for more information

All pipes listed with product codes are supplied in straight 5.80m lengths. Contact us for custom lengths up to 11.8m long



## M10E Purple PE100 RC Pipe / PN16 / SDR11

### Purple Co-Extruded Non-Potable / Flushing Water Pipe (RAL 4004)

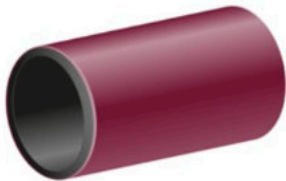
Product code	WSD Equivalent Size	Nominal Outside Diameter (dn)	Mean Outside Diameter (dem)		Max Out-of-roundness (Ovality)	SDR 11			WSD Flushing Water Pipe
			Min	Max		Wall thickness	ID	kg/m	
	DN	DN / OD			Mean	Mean	Mean	Availability in Hong Kong	
P1K66.102.090	DN 80	90	90	90.6	1.8	8.7	72.9	2.1	8-12 Weeks
P1K66.102.125	DN 100	125	125	125.8	2.5	12.1	101.3	4.1	8-12 Weeks
P1K66.102.180	DN 150	180	180	181.1	3.6	17.3	146.0	8.5	Ex-Stock
P1K66.102.250	DN 200	250	250	251.5	5.0	23.9	203.0	16.3	Ex-Stock
P1K66.102.315	DN 250	315	315	316.9	11.1	30.1	255.8	25.9	Ex-Stock
P1K66.102.355	DN 300	355	355	357.2	12.5	33.9	288.3	32.9	8-12 Weeks
P1K66.102.450	DN 350	450	450	452.7	15.6	43.0	365.4	52.9	8-12 Weeks
P1K66.102.500	DN 400	500	500	503.0	17.5	47.8	406.0	65.3	8-12 Weeks
P1K66.102.560	DN 450	560	560	563.4	19.6	53.4	454.9	81.8	8-12 Weeks
P1K66.102.630	DN 500	630	630	633.8	22.1	60.2	511.6	103.7	8-12 Weeks
P1K66.102.710	DN 600	710	710	716.4	24.9	67.8	577.6	131.9	8-12 Weeks
P1K66.102.800	DN 700	800	800	807.2	28.0	76.3	651.0	167.3	8-12 Weeks

For sizes below 90mm OD click [here](#) for M100 Extreme PE100 RC Purple pipe

These tables only show WSD standard pipe sizes and ratings, for other pipe sizes or pressure ratings use the table below

For sizes ≥ DN300 / 355 OD orders may be subject to Minimum Order Quantities of approximately 400m, Contact us for more information

All pipes listed with product codes are supplied in straight 5.80m lengths. [Contact us](#) for custom lengths up to 11.8m long



## M100E / EXTREME - PE100 RC Pipe

Single colour solid wall PE pipe, manufactured from a PE100 RC (Resistant to Crack) compound, available in colours: Black, Blue and Purple (Purple is a pre pigmented compound that has been independently tested to meet WSD PS Appendix Annex 1).

### M100E Blue PE100 RC Pipe / PN16 / SDR11

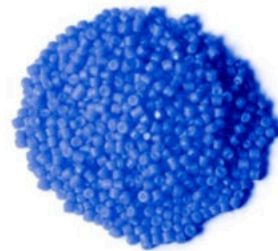
#### Blue Drinking Water Pipes

Product code	WSD Equivalent Size	Nominal Outside Diameter (dn)	Mean Outside Diameter (dem)		Maximum Out-of-roundness (ovality)	SDR 11			WSD Fresh Water Pipe Availability in Hong Kong
			Min	Max		Wall thickness	ID	Kg/m	
	DN	DN / OD			Mean	Mean	Mean		
P1826.102.025	DN 20	25	25	25.3	1.2	2.5	20.2	0.2	8-12 Weeks
P1826.102.032	DN 25	32	32	32.3	1.3	3.2	25.8	0.3	Ex-Stock
P1826.102.050	DN 40	50	50	50.4	1.4	4.9	40.4	0.7	Ex-Stock
P1826.102.063	DN 50	63	63	63.4	1.5	6.2	50.9	1.1	Ex-Stock

**For sizes above 63mm OD click [here](#) for M10 Extreme PE100 RC Blue pipe**

These tables only show WSD standard pipe sizes and ratings, for other pipe sizes and pressure ratings use the tables below.

All pipes listed with product codes are supplied in straight 5.80m lengths. *Contact us* for custom lengths up to 11.8m long



### M100E Purple PE100 RC Pipe / PN16 / SDR11

#### Purple Flushing / Non Potable Water Pipes

Product code	WSD Equivalent Size	Nominal Outside Diameter (dn)	Mean Outside Diameter (dem)		Maximum Out-of-roundness (ovality)	SDR 11			WSD Flushing Water Pipe Availability in Hong Kong
			Min	Max		Wall thickness	ID	Kg/m	
	DN	DN / OD			Mean	Mean	Mean		
P1866.102.025	DN 20	25	25	25.3	1.2	2.5	20.2	0.2	8-12 Weeks
P1866.102.032	DN 25	32	32	32.3	1.3	3.2	25.8	0.3	8-12 Weeks
P1866.102.050	DN 40	50	50	50.4	1.4	4.9	40.4	0.7	8-12 Weeks
P1866.102.063	DN 50	63	63	63.4	1.5	6.2	50.9	1.1	8-12 Weeks

**For sizes above 63mm OD click [here](#) for M10 Extreme PE100 RC Purple pipe**

These tables only show WSD standard pipe sizes and ratings, for other pipe sizes or pressure ratings use the table below.

All pipes listed with product codes are supplied in straight 5.80m lengths. *Contact us* for custom lengths up to 11.8m long





## Hong Kong Water Supplies Department Pipes

The following table is for black PN20 pipes for Drinking or Flushing water, where the pipe is exposed to sunlight. For non-buried pipe exposed to the sun, the pipes pressure rating is increased from PN16 to PN20 (SDR11 to SDR 9) to offset thermal de-ration where PE pipes hoop strength reduces as operating temperatures increase. These pipes fully comply with the Hong Kong Water Supplies Department (WSD) Particular Specification for both Drinking and Flushing water pipes, in buried and above ground installations.

### M100E Black PE100 RC Pipe / PN20 / SDR9

#### Black Drinking Water Pipes for above ground installation

Product code	WSD Equivalent Size	Nominal Outside Diameter (dn)	Mean Outside Diameter (dem)		Maximum Out-of-roundness (ovality)	SDR 9			WSD Exposed Pipe
			Min	Max		Wall thickness	ID	Kg/m	
						Mean	Mean	Mean	Availability in Hong Kong
P1817.102.032	DN 25	32	32	32.3	1.3	3.9	24.5	0.3	Ex-Stock
P1817.102.050	DN 40	50	50	50.4	1.4	6.0	38.3	0.8	Ex-Stock
P1817.102.063	DN 50	63	63	63.4	1.5	7.6	48.1	1.3	Ex-Stock
P1817.102.090	DN 80	90	90	90.6	1.8	10.7	68.9	2.6	Ex-Stock
P1817.102.125	DN 100	125	125	125.8	2.5	14.8	95.9	4.9	Ex-Stock
P1817.102.180	DN 150	180	180	181.1	3.6	21.2	138.2	10.2	Ex-Stock
P1817.102.250	DN 200	250	250	251.5	5.0	29.4	192.1	19.6	8-12 Weeks
P1817.102.315	DN 250	315	315	316.9	11.1	37.1	241.9	31.1	8-12 Weeks
P1817.102.355	DN 300	355	355	357.2	12.5	41.7	272.8	39.5	8-12 Weeks
P1817.102.450	DN 350	450	450	452.7	15.6	52.8	345.8	63.4	8-12 Weeks
P1817.102.500	DN 400	500	500	503.0	17.5	58.7	384.2	78.3	8-12 Weeks
P1817.102.560	DN 450	560	560	563.4	19.6	65.7	430.3	98.2	8-12 Weeks
P1817.102.630	DN 500	630	630	633.8	22.1	73.9	484.1	124.3	8-12 Weeks
P1817.102.710	DN 600	710	710	716.4	24.9	83.35	546.5	158.2	8-12 Weeks
P1817.102.800	DN 700	800	800	807.2	28.0	93.85	615.9	200.8	8-12 Weeks

These tables only show WSD standard pipe sizes and ratings, for other pipe sizes or pressure ratings use the tables below

PN20 black pipe is used for installations exposed to sunlight. PN20 pipe maintains a PN16 Pressure rating after applying the thermal de-ration factor.

Orders for sizes > DN150 / 180 OD may be subject to Minimum Order Quantities or approximately 400m, [Contact us](#) for more information.

All pipes listed with product codes are supplied in straight 5.80m lengths. *Contact us* for custom lengths up to 11.8m long





## Friatec Electrofusion Couplers

Mill-Pro partners with FRIATEC, part of the Aliaxis Group, to offer the world's leading electrofusion (EF) couplers and fittings.

Founded in 1863, Friatec developed the world's first electrofusion couplers in 1979 for joining PE gas pipes. Friatec remains the world leader in electro-fusion fittings for water, wastewater and gas.

The Frialen product range has an outstanding reputation in Hong Kong since 2006. Friatec couplers have the lowest failures rates, both short and long term when compared to any other coupler available in Hong Kong, by a significant margin. A recent project in Hong Kong installed ~2000pcs of 400 OD couplers, less than 0.2% of the couplers failed during testing (due to product or installation problems), this compares with our competitor's failure rates of up to 20%.

From their world-class automated manufacturing facilities in Mannheim Germany, Friatec offers the worlds largest range of electrofusion fittings, tools, accessories and welding machines to provide a complete electro-fusion solution for joining PE Pipes and fittings.

FRIATEC manufacture a limited range of EF fittings in blue colour up to DN/OD 315 for the Hong Kong market, for the complete Friatec Electrofusion product range visit Friatec Technical Plastics.



A visual pop up fusion indicator confirms weld pressure and traceability bar codes are included for recording batch GIS and BIM records for each coupler installed. All couplers are sealed in individual plastic bags for protection on site.

Note: The pipe or spigot ends and the coupler must be prepared in accordance with the *general installation instructions* using a spigot mechanical peeler, 90% isopropyl alcohol wipes and we recommend using the *Friamat fusion control unit* for logging the full range of weld data available.

Frialen UB11 Electrofusion couplers are made in Germany.

*Product specifications and dimensions are subject to change without notice.*

For the latest information refer to our website: [www.millpro.com.hk](http://www.millpro.com.hk) or contact our [sales team](#).

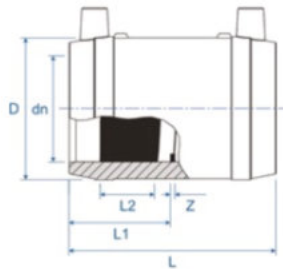


*This mark is used to identify Mill-Pro products that meet the requirements of the Water Supplies Department PS Appendix 22.09. The use of this mark is not endorsed by the WSD and is not intended to infer approval by the WSD.*

## Blue Couplers / MB / PN16 / SDR11

Friatec's Frialen PE100 RC MB Injection moulded couplers are suitable for fusing pipes from SDR11 to SDR17.6 MB couplers feature large insertion depth for pipe stability during fusion (no holding clamps required) and extra wide fusion and cold zones for maximum melt containment. Exposed heating coils for direct heat transmission to the pipe and a small annular gap to ensure optimum joining pressure in the fusion zone.

Product Code	dn	D	L	L1	L2	Z	Availability in Hong Kong
P3326.150.032	32	45	78	38	21	2	Ex-Stock
P3326.150.050	50	68	98	48	27	2	Ex-Stock
P3326.150.063	63	82	110	55	29	2	Ex-Stock
P3326.150.090	90	114	157	77	51	3	Ex-Stock
P3326.150.125	125	156	172	85	51	3	Ex-Stock



## Blue Couplers / UB / PN16 / SDR11

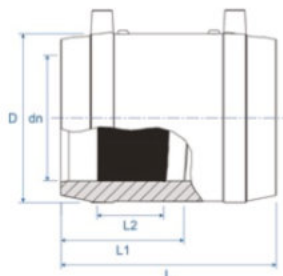
Friatec's Frialen PE100 RC UB11 Injection moulded blue couplers are suitable for fusing pipes from SDR11 to SDR17.6. UB couplers feature large insertion depth for pipe stability during fusion (no holding clamps required) and extra wide fusion and cold zones for maximum melt containment. Exposed heating coils for direct heat transmission to the pipe and a small annular gap to ensure optimum joining pressure in the fusion zone.

UB11 blue coupler sizes  $dn \geq 250$  include a barcode PREHEAT function to warm the pipe and coupler to help re-round oval pipes and close the fusion gap prior to welding to meet HK WSD requirements.

Product Code	dn	D	L	L1	L2	Availability in Hong Kong
P3326.100.180	180	220	210	105	63	Ex-Stock
P3326.100.250	250	315	246	123	68	Ex-Stock
P3326.100.315	315	390	300	150	78	Ex-Stock

For couplers in sizes DN/OD 355 and greater, use a [black UB coupler](#).

Blue couplers may be available in special sizes greater than DN/OD 315 for large order quantities, please [contact us](#).



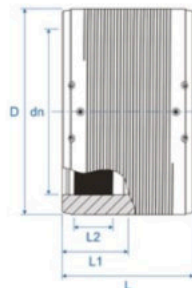
## Black Couplers / UB / PN16 / SDR11

Friatec's Frialen PE100 UB11 black couplers are suitable for fusing pipes from SDR11 to SDR17.6. UB couplers feature large insertion depth for pipe stability during fusion (no holding clamps required) and extra-wide fusion and cold zones for maximum melt containment. Exposed heating coils for direct heat transmission to the pipe and a small annular gap to ensure optimum joining pressure in the fusion zone.

UB11 coupler sizes  $dn \geq 400$  include a barcode PREHEAT function to warm the pipe and coupler to help re-round oval pipes and close the fusion gap prior to welding and permanent external reinforcement wound into the body of the coupler to ensure the coupler does not expand during the fusing process.

*Note: Couplers that are not injection moulded and do not have external reinforcement are likely to expand during fusion. Coupler expansion increases the gap between the pipe and coupler, which reduces weld pressure in the joint. This leads to slow crack growth failure through the weld plane. Slow Crack Growth, by its name, is slow and occurs over time (1-5 years), well beyond the joint successfully passing hydrostatic testing on site.*

Product Code	dn	D	L	L1	L2	Availability in Hong Kong
P3316.100.180	180	220	210	105	63	Ex-Stock
P3316.100.250	250	315	246	123	68	Ex-Stock
P3316.100.315	315	390	300	150	78	Ex-Stock
P3316.100.355	355	445	300	150	68	8-12 Weeks
P3316.098.400	400	500	320	160	90	8-12 Weeks
P3316.098.450	450	560	340	170	79	8-12 Weeks
P3316.098.500	500	630	360	180	80	8-12 Weeks
P3316.098.560	560	715	380	190	95	8-12 Weeks
P3316.098.630	630	810	420	210	101	8-12 Weeks
P3316.098.710	710	900	442	210	108	8-12 Weeks
P3316.098.800	800	1000	500	250	136	8-12 Weeks
P3316.098.900	900	1130	600	300	165	8-12 Weeks
P3316.098.1000	1000	1200	680	340	171	8-12 Weeks



## Black Couplers / MB-UB / PN20 / SDR 9

The Frialen PE100 SDR9 black coupler range is made up of a combination of MB & UB style couplers.

MB & UB couplers feature large insertion depths for pipe stability during fusion (no holding clamps required) and extra-wide fusion and cold zones for maximum melt containment. All couplers feature exposed heating coils for direct heat transmission to the pipe and a machined internal bore to ensure optimum joining pressure in the fusion zone.

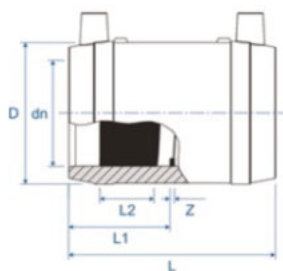
UB SDR9 couplers dn280 and above include a barcode PREHEAT function to warm the pipe and coupler before fusion. Preheat assists in closing the fusion gap between the pipe and coupler prior to welding. Couplers dn280 and above feature permanent external reinforcement wound into the body of the coupler to ensure the coupler does not expand during the fusing process.

Note: Couplers that are not injection moulded and do not have external reinforcement are likely to expand during fusion. Coupler expansion increases the gap between the pipe and coupler, which reduces weld pressure in the joint. This leads to slow crack growth failure through the weld plane. Slow Crack Growth, by its name, is slow and occurs over time (1-5 years), well beyond the joint successfully passing hydrostatic testing on site.

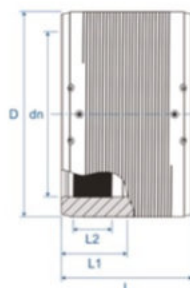
Product Code	dn	D	L	L1	L2	Z	Availability in Hong Kong
P3316.150.025	25	38	66	32	17	2	8-12 Weeks
P3316.150.032	32	45	78	38	21	2	8-12 Weeks
P3316.150.050	50	68	98	48	27	2	8-12 Weeks
P3316.150.063	63	82	110	55	29	2	Ex-Stock
P3318.100.090	90	117	138	69	41	-	Ex-Stock
P3318.100.125	125	160	172	86	46	-	Ex-Stock
P3318.100.180	180	225	210	105	63	-	Ex-Stock
P3318.100.250	250	315	246	123	68	-	8-12 Weeks
P3318.098.315	315	400	285	142	79	-	8-12 Weeks
P3318.098.355	355	450	300	150	88	-	8-12 Weeks
P3317.098.400	400	500	320	160	90	-	8-12 Weeks
P3317.098.450	450	560	340	170	79	-	8-12 Weeks
P3317.098.500	500	630	360	180	85	-	8-12 Weeks
P3317.098.560	560	715	380	190	95	-	8-12 Weeks
P3317.098.630	630	810	420	210	101	-	8-12 Weeks

MB couplers ≤ dn63 and SDR9 Couplers dn90 to dn355 are fully rated for PN25 / SDR7.4 and can be used for PN20 applications.

### MB Couplers dn25-dn63



### UB Couplers dn90-dn630



## Black Couplers / MB-UB / PN25 / SDR7.4

The Frialen PE100 SDR7.4 black coupler range is made up of a combination of MB and UB style couplers. MB & UB couplers both feature large insertion depths for pipe stability during fusion (no holding clamps required) and extra-wide fusion and cold zones for maximum melt containment. Exposed heating coils for direct heat transmission to the pipe and a small annular gap to ensure optimum joining pressure in the fusion zone.

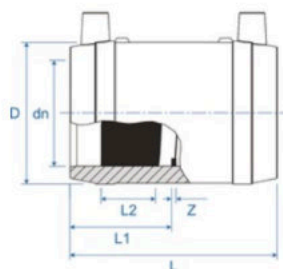
UB SDR7.4 coupler sizes  $dn \geq 280$  include a barcode PREHEAT function to warm the pipe and coupler to help re-round oval pipes and close the fusion gap prior to welding and size  $dn \geq 250$  feature permanent external reinforcement wound into the body of the coupler to ensure the coupler does not expand during the fusing process.

*Note: Couplers that are not injection moulded and do not have external reinforcement are likely to expand during fusion. Coupler expansion increases the gap between the pipe and coupler, which reduces weld pressure in the joint. This leads to slow crack growth failure through the weld plane. Slow Crack Growth, by its name, is slow and occurs over time (1-5 years), well beyond the joint successfully passing hydrostatic testing on site.*

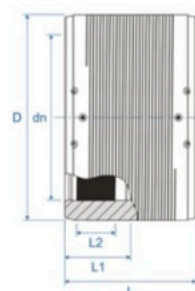
Product Code	dn	D	L	L1	L2	Z	Availability in Hong Kong
P3316.150.025	25	38	66	32	17	2	8-12 Weeks
P3316.150.032	32	45	78	38	21	2	8-12 Weeks
P3316.150.050	50	68	98	48	27	2	8-12 Weeks
P3316.150.063	63	82	110	55	29	2	Ex-Stock
P3318.100.090	90	117	138	69	41	-	Ex-Stock
P3318.100.125	125	160	172	86	46	-	Ex-Stock
P3318.100.180	180	225	210	105	63	-	Ex-Stock
P3318.100.250	250	315	246	123	68	-	8-12 Weeks
P3318.100.280	280	355	268	134	84	-	8-12 Weeks
P3318.098.315	315	400	285	142	79	-	8-12 Weeks
P3318.098.355	355	450	300	150	88	-	8-12 Weeks

MB couplers  $\leq dn63$  and SDR9 Couplers  $dn90$  to  $dn355$  are fully rated for PN25 / SDR7.4.

### MB Couplers dn20-63



### UB Couplers dn90-355



## Couplers / KM / XL / SDR17

The conical ring coupler KM XL features a unique flexible technology that is designed to accommodate changes in the size (OD) and shape (Ovality) of existing large diameter PE pipes when repairing or connecting to existing mains.

It is not uncommon for large-bore PE pipes that have been in service for some time, to grow 1-2% in diameter due to the constant hoop stress applied by the internal pressure. This increase in diameter is normal, however, it can make repair and connections using traditional slide over electrofusion couplers impossible.

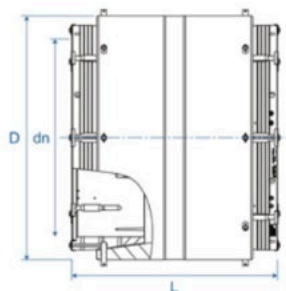
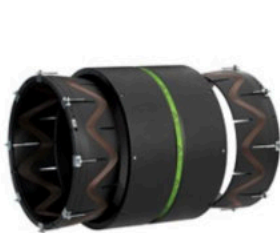
Another common problem is uneven backfilling, this can force a pipe into an oval shape during installation and the pipe has been held in this oval position by the backfill since its initial burial. This ovality can also prevent repair couplers from being slid over the existing pipe.

The diameter range tolerance found in the KM XL overcomes this problem, installation can proceed after a single *mechanical peeling*, without the need for any retaining devices or *re-rounding clamps*. The KM XL can accommodate in-ground pipe ovality of up to 6% of OD.

The preparations (removing the oxide layer/cleaning) and the assembly work (conical ring activation/fusion) are described in the *general assembly instructions* for the FRIALEN conical ring coupler KM XL. The conical ring coupler KM XL must be fused exclusively with the powerful fusion unit *FRIAMAT XL* fitted with a Y plug with an input voltage of 400 V and output voltage of max 80 V. The conical ring coupler KM XL d 1200 must be fused twice, on both sides of the coupler.

Note: There are separate fusions required for both the inside and outside conical ring.

Product Code	dn	D	L	Availability in Hong Kong
P3314.11.355	355	497	705	12 weeks
P3314.11.400	400	550	730	12 weeks
P3314.11.450	450	602	750	12 weeks
P3314.11.560	560	730	850	12 weeks
P3314.11.630	630	805	940	12 weeks
P3314.11.800	800	1005	1065	12 weeks
P3314.11.1000	1000	1245	1145	12 weeks
P3314.11.1200	1200	1450	1290	12 weeks





## Bends

Mill-Pro offers a wide range of standard elbows and custom made bends in angles from 1° to 90° in both Blue and Black including:

- Moulded electrofusion elbows
- Moulded spigot elbows
- Segmented bends
- Fabricated elbows

**Moulded electrofusion elbows:** in standard angles, used for smaller diameter pipelines ( $\leq 180$  OD) with a radius of  $r = \sim 0.5 \times OD$

**Moulded spigot elbows:** in standard angles  $\leq 315$  OD, with a radius of  $r = \sim 0.5 \times OD$ . Black injection moulded spigot elbows are available up to DN/OD 400, generally not listed for water supply as the Minimum Order Quantity (MOQ) makes their use uneconomic and WSD requires segmented bends to be used in sizes  $>dn 315$ . Black moulded elbows can be found in our wastewater section here.

**Segmented bends:** factory-fabricated from Blue, Black or Purple Pipe, these are available in any size and angle with the minimum radius determined by the number of mitres, generally  $r = 2.5 \times OD$ . Larger radii may be problematic in tight installations, so fabricated elbows can be used.

**Fabricated Elbows:** are a compact elbow machined from hollow bar with welded spigots and  $r = \sim 0.5 \times OD$ . They are custom made in any size  $\geq dn355$  in any angle from 1° to 90°.

### SEGMENTED BENDS

These are fabricated to BS EN 12201-3 Annex B.3, made by cutting pipes on an angle (cut angle), rotating one of the cut ends 180° and welding the angled segments back together. Because the cut angle is  $>90^\circ$  to the pipe axis, the cross-sectional area of the pipe bore increases as the angle increases. The greater the angle, the greater the internal cross-sectional area at the weld. So the internal pressure is now acting on a greater internal cross-sectional area at the welded joint, however, because the pipes wall thickness (SDR) remains unchanged, the thickness of the pipe is now insufficient to maintain the original pressure rating.

Therefore the segmented bend may now be subject to a pressure de-rating factor. The amount of de-rating depends on the cut angle, the greater the angle, the greater the internal cross-sectional area and the greater the de-ration required.

BS EN 12201-3 Table B.3		Single mitre	Two mitre	Three Mitre	Four Mitre	Five Mitre	Six Mitre
SDR11 90° Bend	Derating factor	Not permitted	Not permitted	0.8	0.8	0.8	1.0
	PN rating			PN12.8	PN12.8	PN12.8	PN16
SDR11 45° Bend	Derating factor	Not permitted	0.8	1.0	1.0	1.0	1.0
	PN rating		PN12.8	PN16	PN16	PN16	PN16
SDR11 22° Bend	Derating factor	0.8	1.0	1.0	1.0	1.0	1.0
	PN rating	PN12.8	PN16	PN16	PN16	PN16	PN16
SDR11 11° Bend	Derating factor	1.0	1.0	1.0	1.0	1.0	1.0
	PN rating	PN16	PN16	PN16	PN16	PN16	PN16



## Blue / Purple 11° Segmented Spigot Bends / PN16 / SDR11

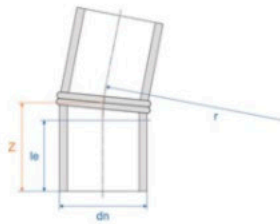
Mill-Pro's segmented single mitre spigot bends are fabricated from Mill-Pro M10E PE100 RC SDR11 blue or purple pipe in accordance with BS EN 12201-3, Clause B.3, using butt weld techniques to BS ISO 21307. They feature long spigots for electrofusion joining and 1D and 2D bar code stickers for complete product traceability on site. All bends are sealed in individual plastic bags for protection on site.

Segmented bends are manufactured from a pipe, with cut angles  $\leq 7.5^\circ$  and therefore are not subject to pressure de-ration factor required in BS EN 12201 Clause B.3. Generally, the internal weld beads are removed where possible and external weld beads are not removed unless ordered otherwise.

Any angle from  $1^\circ$  to  $15^\circ$  can be custom manufactured in the sizes and radii indicated below. The standard angle for a single mitre bend is  $11^\circ$  with a radius of  $2.5 \times OD$ .

PN16 Purple	PN16 Blue	dn	le	r = 2.5 dn	z - 11° Single mitre	Availability in Hong Kong
P5K66.290.250	P5K26.290.250	250	250	625	310	6-8 weeks
P5K66.290.315	P5K26.290.315	315	300	788	376	6-8 weeks
P5K66.290.355	P5K26.290.355	355	300	888	385	6-8 weeks
P5K66.290.450	P5K26.290.450	450	300	1125	408	6-8 weeks
P5K66.290.500	P5K26.290.500	500	350	1250	470	6-8 weeks
P5K66.290.560	P5K26.290.560	560	350	1400	485	6-8 weeks
P5K66.290.630	P5K26.290.630	630	350	1575	502	6-8 weeks
P5K66.290.710	P5K26.290.710	710	350	1775	521	6-8 weeks
P5K66.290.800	P5K26.290.800	800	350	2000	543	6-8 weeks
P5K66.290.900	P5K26.290.900	900	400	2250	617	6-8 weeks
P5K66.290.1000	P5K26.290.1000	1000	400	2500	641	6-8 weeks

Fabricated bends are made from pipe, so sizes up to dn1000 in PN16/SDR11 rating are available in blue or purple colour.



Product specifications and dimensions are subject to change without notice.  
For the latest information refer to our website: [www.millpro.com.hk](http://www.millpro.com.hk) or contact our [sales team](#).



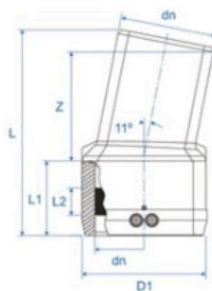
This mark is used to identify Mill-Pro products that meet the requirements of the Water Supplies Department PS Appendix 22.09. The use of this mark is not endorsed by the WSD and is not intended to infer approval by the WSD.

## Blue 11° Injection Moulded Electrofusion Spigot Elbows / PN16 / SDR11

Friatec's PE100 RC Injection moulded electrofusion elbows are suitable for fusing pipes from SDR11 to SDR17.6. Electrofusion sockets feature all the same performance benefits found in blue couplers. This 11° elbow has an electrofusion socket on one end and spigot on the other, allowing two elbows to be combined together to provide an adjustable angle from 0° to 22°. All elbows are sealed in individual plastic bags for protection on site.

Product Code	dn	D1	L	L1	L2	le	Z	Availability in Hong Kong
P3326.112.125	125	160	250	84	34	87	166	Ex-Stock
P3326.112.180	180	226	310	100	50	105	210	Ex-Stock

For other sizes, use a spigot elbow or bend from the tables below and *blue couplers* to join.

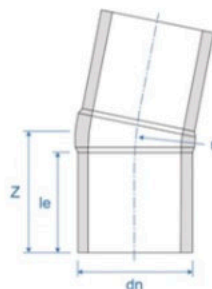


## Blue 11° Injection Moulded Spigot Elbows / PN16 / SDR11

Mill-Pro PE100 RC Injection moulded spigot elbows are manufactured using Mill-Pro's own tooling under our continuous inspection. They feature long spigots for electrofusion joining and built-in reinforcement that exceeds the type testing requirements of BS EN 12201-2 and ISO 4427-3. Mill-Pro fittings feature hard moulded brand, batch numbers for compliance checking and 1D and 2D bar code stickers for complete product traceability on site. All elbows are sealed in individual plastic bags for protection on site. Spigot fittings are joined by Electrofusion Couplers or Butt Fusion.

Product Code	dn	le	r	Z	Availability in Hong Kong
P5826.112.032	32	45	16	47	Ex-Stock
P5826.112.050	50	56	25	58	Ex-Stock
P5826.112.063	63	65	33	68	Ex-Stock
P5826.112.090	90	79	45	83	Ex-Stock
P5826.112.250	250	130	125	142	Ex-Stock
P5826.112.315	315	150	158	166	Ex-Stock

For sizes dn125, dn180 use Electrofusion elbows above.



## Black 11° Segmented Spigot Bends / PN20 / SDR9

PN20 / SDR9 fabricated bends can be used for above-ground installations exposed to direct sunlight in a PN16 pipeline, where the pipes surface temperature may exceed 40°C. The higher pressure rating allows for thermal de-rating due to prolonged elevated operating temperatures.

Manufactured from Mill-Pro M100 PE100 RC SDR9 Black pipe and fabricated according to BS EN 12201-3, clause B.3, using butt weld techniques according to BS ISO 21307. They feature long spigots for electrofusion or butt fusion joining and 1D and 2D bar code stickers for complete product traceability. All bends are sealed in individual plastic bags for protection on site.

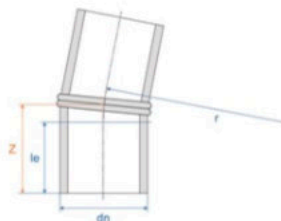
Segmented bends are manufactured from a pipe, with cut angles  $\leq 7.5^\circ$  and therefore are not subject to pressure de-rating factor required in BS EN 12201 Clause B.3. Generally, the internal weld beads are removed where possible and external weld beads are not removed unless ordered otherwise.

Any bend angle from 0° to 15° can be custom manufactured, standard angle for a single mitre bend is 11° with a radius of 2.5 x OD.

Product Code	dn	le	r = 2.5 dn	Z – 11° Single mitre	Availability in Hong Kong
P5817.290.090	90	150	225	172	4-6 Weeks
P5817.290.125	125	150	313	180	4-6 Weeks
P5817.290.180	180	150	450	193	4-6 Weeks
P5817.290.250	250	250	625	310	Contact us
P5817.290.315	315	300	788	376	Contact us
P5817.290.355	355	300	888	385	Contact us
P5817.290.450	450	300	1125	408	Contact us
P5817.290.500	500	350	1250	470	Contact us
P5817.290.560	560	350	1400	485	Contact us
P5817.290.630	630	350	1575	502	Contact us
P5817.290.710	710	350	1775	521	Contact us
P5817.290.800	800	350	2000	543	Contact us

dn800 is the largest size bends available in SDR9.

Supply of Bends in sizes  $\geq$  dn250 is subject to the availability of SDR9 pipe.

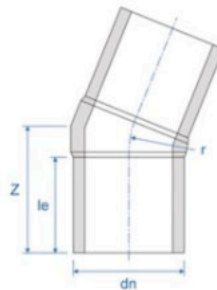


## Blue 22° Injection Moulded Spigot Elbows / PN16 / SDR11

Mill-Pro PE100 RC Injection moulded spigot elbows are manufactured using Mill-Pro's own tooling under our continuous inspection. They feature long spigots for electrofusion or butt fusion joining and built-in reinforcement that exceeds the type testing requirements of BS EN 12201-2 and ISO 4427-3.

Mill-Pro fittings feature hard moulded brand, batch numbers for compliance checking and 1D and 2D bar code stickers for complete product traceability. All elbows are sealed in individual plastic bags for protection on site. Spigot fittings are joined by Electrofusion Couplers or Butt Fusion.

Product Code	dn	le	r	Z	Availability in Hong Kong
P5826.110.032	32	45	16	48	Ex-Stock
P5826.110.050	50	56	25	61	Ex-Stock
P5826.110.063	63	65	33	71	Ex-Stock
P5826.110.090	90	79	45	88	Ex-Stock
P5826.110.125	125	87	63	99	Ex-Stock
P5826.110.180	180	105	90	123	Ex-Stock
P5826.110.250	250	130	125	155	Ex-Stock
P5826.110.315	315	150	158	181	Ex-Stock



## Blue / Purple 22° Segmented Spigot Bends / PN16 / SDR11

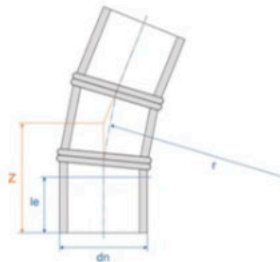
Fabricated two mitre spigot bends are manufactured from Mill-Pro M10 PE100 RC SDR11 blue or purple pipe and fabricated according to BS EN 12201-3, clause B.3, using butt weld techniques according to BS ISO 21307. They feature long spigots for electrofusion joining and 1D and 2D bar code stickers for complete product traceability. All elbows are sealed in individual plastic bags for protection on site.

Segmented bends are manufactured from a pipe, with cut angles  $\leq 7.5^\circ$  and therefore are not subject to pressure de-rating factor required in BS EN 12201 Clause B.3. Generally, the internal weld beads are removed where possible and external weld beads are not removed unless ordered otherwise.

Any bend angle from 16° to 30° can be custom manufactured. The standard angle for a two mitre bend is 22° with a radius of 2.5 x OD.

PN16 Purple	PN16 Blue	dn	le	r = 2.5 dn	z - 22° Double mitre	Availability in Hong Kong
P5K66.285.250	P5K26.285.250	250	250	625	371	6-8 weeks
P5K66.285.315	P5K26.285.315	315	300	788	453	6-8 weeks
P5K66.285.355	P5K26.285.355	355	300	888	473	6-8 weeks
P5K66.285.450	P5K26.285.450	450	300	1125	519	6-8 weeks
P5K66.285.500	P5K26.285.500	500	350	1250	593	6-8 weeks
P5K66.285.560	P5K26.285.560	560	350	1400	622	6-8 weeks
P5K66.285.630	P5K26.285.630	630	350	1575	656	6-8 weeks
P5K66.285.710	P5K26.285.710	710	350	1775	695	6-8 weeks
P5K66.285.800	P5K26.285.800	800	350	2000	739	6-8 weeks
P5K66.285.900	P5K26.285.900	900	400	2250	837	6-8 weeks
P5K66.285.1000	P5K26.285.1000	1000	400	2500	886	6-8 weeks

Fabricated bends are made from pipe, so sizes up to dn1000 in PN16/SDR11 rating are available in blue or purple colour.



## Black 22° Segmented Spigot Bends / PN20 / SDR9

PN20 / SDR9 fabricated bends can be used for above-ground installations exposed to direct sunlight in a PN16 pipeline, where the pipes surface temperature may exceed 40°C. The higher pressure rating allows for thermal de-rating due to prolonged elevated operating temperatures.

Manufactured from Mill-Pro M100 PE100 RC SDR9 Black pipe and fabricated according to BS EN 12201-3, clause B.3, using butt weld techniques according to BS ISO 21307. They feature long spigots for electrofusion or butt fusion joining and 1D and 2D bar code stickers for complete product traceability. All bends are sealed in individual plastic bags for protection on site.

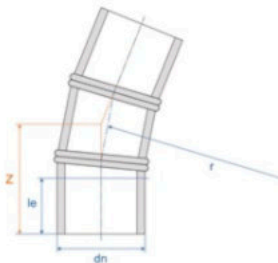
Segmented bends are manufactured from a pipe, with cut angles  $\leq 7.5^\circ$  and therefore are not subject to pressure de-rating factor required in BS EN 12201 Clause B.3. Generally, the internal weld beads are removed where possible and external weld beads are not removed unless ordered otherwise.

Any bend angle from 16° to 30° can be custom manufactured, standard angle for a two mitre bend is 22° with a radius of 2.5 x OD.

Product Code	dn	le	r = 2.5 dn	Z – 22° Two mitre	Availability in Hong Kong
P5817.285.090	90	150	225	194	4-6 Weeks
P5817.285.125	125	150	313	211	4-6 Weeks
P5817.285.180	180	150	450	237	4-6 Weeks
P5817.285.250	250	250	625	371	Contact Us
P5817.285.315	315	300	788	453	Contact Us
P5817.285.355	355	300	888	473	Contact Us
P5817.285.450	450	300	1125	519	Contact Us
P5817.285.500	500	350	1250	593	Contact Us
P5817.285.560	560	350	1400	622	Contact Us
P5817.285.630	630	350	1575	656	Contact Us
P5817.285.710	710	350	1775	695	Contact Us
P5817.285.800	800	350	2000	739	Contact Us

dn800 is the largest size bends available in SDR9.

Supply of Bends in sizes  $\geq$  dn250 is subject to the availability of SDR9 pipe.



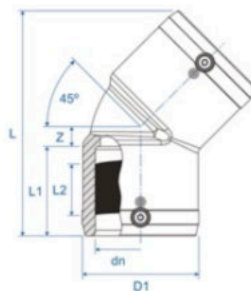
## Blue 45° Injection Moulded Electrofusion Elbows / PN16 / SDR11

Friatec's PE100 RC Injection moulded electrofusion elbows are suitable for fusing pipes from SDR11 to SDR17.6 Electrofusion sockets feature all the same performance benefits found in blue couplers along with built-in reinforcement, so no de-ration is required.

NOTE: The pipe ends and sockets must be prepared in accordance with the general installation instructions using a spigot mechanical peeler, 90% Isopropyl alcohol wipes and we recommend using the Friamat fusion control unit to achieve correct preheating and logging the full range of weld data available.

Product Code	dn	D1	L	L1	L2	Z	Availability in Hong Kong
P3326.119.032	32	43	102	44	21	8	Ex-Stock
P3326.119.050	50	66	136	54	32	13	Ex-Stock
P3326.119.063	63	82	158	62	34	14	Ex-Stock
P3326.119.090	90	115	232	79	45	35	Ex-Stock
P3326.119.125	125	157	279	87	44	46	Ex-Stock
P3326.119.180	180	228	382	97	65	83	Ex-Stock

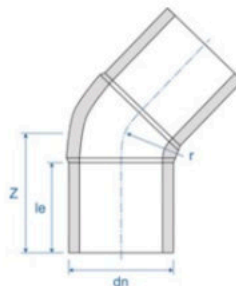
For larger sizes, use a spigot elbow or bend from the tables below and *blue couplers* to join.



## Blue 45° Injection Moulded Spigot Elbows / PN16 / SDR11

Mill-Pro PE100 RC Injection moulded spigot elbows are manufactured using Mill-Pro's own tooling under our continuous inspection. They feature long spigots for electrofusion joining and built-in reinforcement that exceeds the type testing requirements of BS EN 12201-2 and ISO 4427-3. Mill-Pro fittings feature hard moulded brand, batch numbers for compliance checking and 1D and 2D bar code stickers for complete product traceability. All elbows are sealed in individual plastic bags for protection on site. Spigot fittings are joined by Electrofusion Couplers or Butt Fusion.

Product Code	dn	le	r	Z	Availability in Hong Kong
P5826.119.250	250	132	125	158	Ex-Stock
P5826.119.315	315	152	158	198	Ex-Stock



## Blue / Purple 45° Segmented Spigot Bends / PN16 / SDR11

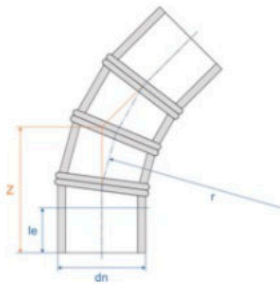
Segmented three mitre spigot bends are manufactured from Mill-Pro M10 PE100 RC SDR11 blue or purple pipe and fabricated according to BS EN 12201-3, clause B.3, using butt weld techniques according to BS ISO 21307. They feature long spigots for electrofusion or butt fusion joining and 1D and 2D bar code stickers for complete product traceability. All bends are sealed in individual plastic bags for protection on site.

Segmented bends are manufactured from a pipe, with cut angles  $\leq 7.5^\circ$  and therefore are not subject to pressure de-rating factor required in BS EN 12201 Clause B.3. Generally, the internal weld beads are removed where possible and external weld beads are not removed unless ordered otherwise.

Any bend angle from  $31^\circ$  to  $45^\circ$  can be custom manufactured, standard angle for a three mitre bend is  $45^\circ$  with a radius of  $2.5 \times OD$ .

PN16 Purple	PN16 Blue	dn	le	r = 2.5 dn	z - 45° Triple mitre	Availability in Hong Kong
P5K66.287.250	P5K26.287.250	250	250	625	509	6-8 weeks
P5K66.287.315	P5K26.287.315	315	300	788	626	6-8 weeks
P5K66.287.355	P5K26.287.355	355	300	888	668	6-8 weeks
P5K66.287.450	P5K26.287.450	450	300	1125	766	6-8 weeks
P5K66.287.500	P5K26.287.500	500	350	1250	868	6-8 weeks
P5K66.287.560	P5K26.287.560	560	350	1400	930	6-8 weeks
P5K66.287.630	P5K26.287.630	630	350	1575	1002	6-8 weeks
P5K66.287.710	P5K26.287.710	710	350	1775	1085	6-8 weeks
P5K66.287.800	P5K26.287.800	800	350	2000	1178	6-8 weeks
P5K66.287.900	P5K26.287.900	900	400	2250	1332	6-8 weeks
P5K66.287.1000	P5K26.287.1000	1000	400	2500	1436	6-8 weeks

Fabricated bends are made from pipe, so sizes up to dn1000 in PN16/SDR11 rating are available in blue or purple colour.





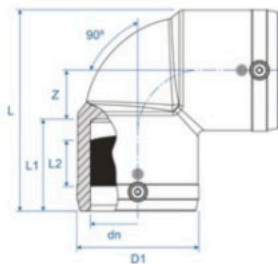
## Blue 90° Injection Moulded Electrofusion Elbows / PN16 / SDR11

Friatec's PE100 RC Injection moulded electrofusion elbows are suitable for fusing pipes from SDR11 to SDR17.6 Electrofusion sockets feature all the same performance benefits found in blue couplers along with built-in reinforcement, so no de-rating is required.

NOTE: The pipe ends and sockets must be prepared in accordance with the general installation instructions using a spigot mechanical peeler, 90% Isopropyl alcohol wipes and we recommend using the Friamat fusion control unit to achieve correct preheating and logging the full range of weld data available.

Product Code	dn	D1	L	L1	L2	Z	Availability in Hong Kong
P3326.115.032	32	43	82	44	21	16	Ex-Stock
P3326.115.050	50	66	113	55	32	26	Ex-Stock
P3326.115.063	63	83	136	62	30	33	Ex-Stock
P3326.115.090	90	115	202	75	45	65	Ex-Stock
P3326.115.125	125	157	254	87	44	89	Ex-Stock
P3326.115.180	180	228	354	94	65	146	Ex-Stock

For other sizes, use a spigot elbow or bend from the tables below and *blue couplers* to join.

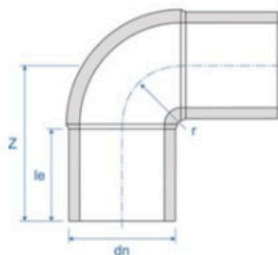


## Blue 90° Injection Moulded Spigot Elbows / PN16 / SDR11

Mill-Pro PE100 RC Injection moulded spigot elbows are manufactured using Mill-Pro's own tooling under our continuous inspection. They feature long spigots for electrofusion or butt fusion joining and built-in reinforcement that exceeds the type testing requirements of BS EN 12201-2 and ISO 4427-3.

Mill-Pro fittings feature hard moulded brand, batch numbers for compliance checking and 1D and 2D bar code stickers for complete product traceability. All elbows are sealed in individual plastic bags for protection on site. Spigot fittings are joined by Electrofusion Couplers or Butt Fusion.

Product Code	dn	le	r	Z	Availability in Hong Kong
P5826.115.250	250	135	125	295	Ex-Stock
P5826.115.315	315	155	158	356	Ex-Stock



## Blue / Purple 90° Segmented Spigot Bends / PN16 / SDR11

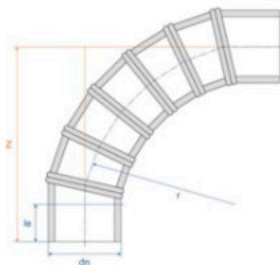
Mill-Pro's segmented spigot bends are manufactured from Mill-Pro M10 PE100 RC SDR11 blue or purple pipe and fabricated according to BS EN 12201-3, clause B.3, using butt weld techniques according to BS ISO 21307. They feature long spigots for electrofusion joining and 1D and 2D bar code stickers for complete product traceability. All bends are sealed in individual plastic bags for protection on site.

Segmented bends are manufactured from a pipe, with cut angles  $\leq 7.5^\circ$  and therefore are not subject to pressure de-rating factor required in BS EN 12201 Clause B.3. Generally, the internal weld beads are removed where possible and external weld beads are not removed unless ordered otherwise.

Any bend angle from  $46^\circ$  to  $90^\circ$  can be custom manufactured, however, the number of mitres required increases as the bend angle increases. In order to maintain a cut angle  $\leq 7.5^\circ$ , the standard angle for a four mitre bend is  $46^\circ$  to  $60^\circ$ , for a five mitre bend is  $61^\circ$  to  $75^\circ$  and for a six mitre bend is  $76^\circ$  to  $90^\circ$ . All bends have a radius of  $2.5 \times OD$ .

PN16 Purple	PN16 Blue	dn	le	r = 2.5 dn	z - 90° Six mitre	Availability in Hong Kong
P5K66.289.250	P5K26.289.250	250	250	625	875	6-8 weeks
P5K66.289.315	P5K26.289.315	315	300	788	1088	6-8 weeks
P5K66.289.355	P5K26.289.355	355	300	888	1188	6-8 weeks
P5K66.289.450	P5K26.289.450	450	300	1125	1425	6-8 weeks
P5K66.289.500	P5K26.289.500	500	350	1250	1600	6-8 weeks
P5K66.289.560	P5K26.289.560	560	350	1400	1750	6-8 weeks
P5K66.289.630	P5K26.289.630	630	350	1575	1925	6-8 weeks
P5K66.289.710	P5K26.289.710	710	350	1775	2125	6-8 weeks
P5K66.289.800	P5K26.289.800	800	350	2000	2350	6-8 weeks
P5K66.289.900	P5K26.289.900	900	400	2250	2650	6-8 weeks
P5K66.289.1000	P5K26.289.1000	1000	400	2500	2900	6-8 weeks
P5K66.289.1200	P5K26.289.1200	1200	400	3000	3400	6-8 weeks

Fabricated bends are made from pipe, so sizes up to dn1000 in PN16/SDR11 rating are available in blue or purple colour.



## Black 90° Segmented Spigot Bends / PN20 / SDR9

PN20 / SDR9 segmented bends can be used for above-ground installations exposed to direct sunlight in a PN16 pipeline, where the pipes surface temperature may exceed 40°C. The higher pressure rating allows for thermal de-ration due to prolonged elevated operating temperatures.

Mill-Pro's fabricated spigot bends are manufactured from Mill-Pro M100 PE100 RC SDR9 black pipe and fabricated according to BS EN 12201-3, clause B.3, using butt weld techniques according to BS ISO 21307. They feature long spigots for electrofusion or butt fusion joining and 1D and 2D bar code stickers for complete product traceability. All bends are sealed in individual plastic bags for protection on site.

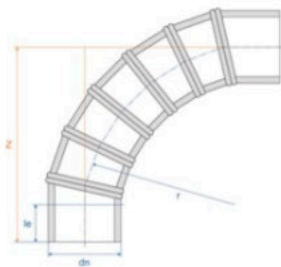
Segmented bends are manufactured from a pipe, with cut angles  $\leq 7.5^\circ$  and therefore are not subject to pressure de-ration factor required in BS EN 12201 Clause B.3. Generally, the internal weld beads are removed where possible and external weld beads are not removed unless ordered otherwise.

Any bend angle from 46° to 90° can be custom manufactured, however, the number of mitres required increases as the bend angle increases. In order to maintain a cut angle  $\leq 7.5^\circ$ , the angle for a four mitre bend is between 46° to 60°, for a five mitre bend between 61° to 75° and for a six mitre bend between 76° to 90°. All bends have a radius of 2.5 x OD.

Product Code	dn	le	r = 2.5 dn	Z – 90° 6 mitre	Availability in Hong Kong
P5817.289.090	90	150	225	280	4-6 Weeks
P5817.289.125	125	150	313	330	4-6 Weeks
P5817.289.180	180	150	450	410	4-6 Weeks
P5817.289.250	250	250	625	611	Contact Us
P5817.289.315	315	300	788	755	Contact Us
P5817.289.355	355	300	888	1188	Contact Us
P5817.289.450	450	300	1125	1425	Contact Us
P5817.289.500	500	350	1250	1600	Contact Us
P5817.289.560	560	350	1400	1750	Contact Us
P5817.289.630	630	350	1575	1925	Contact Us
P5817.289.710	710	350	1775	2125	Contact Us
P5817.289.800	800	350	2000	2350	Contact Us

dn800 is the largest size bends available in SDR9.

Supply of Bends in sizes  $\geq$  dn250 is subject to the availability of SDR9 pipe.



## Black 11° Fabricated Spigot Elbows / PN10-PN16 / SDR17-SDR11

Fabricated elbows are manufactured from black PE100+ compound. They feature long spigots for electrofusion or butt fusion joining on site. Any fabricated elbow angle from 1° to 45° can be manufactured. Tables below show standard 11° elbow with a radius of ~0.5xOD for reference.

PN10 SDR17	PN16 SDR11	d1	le1	r	z1 - 11°	Availability in Hong Kong
P5314.76.355	P5316.76.355	355	200	177	309	14-16 weeks
P5314.76.400	P5316.76.400	400	300	200	411	14-16 weeks
P5314.76.450	P5316.76.450	450	300	225	413	14-16 weeks
P5314.76.500	P5316.76.500	500	350	250	476	14-16 weeks
P5314.76.560	P5316.76.560	560	350	280	501	14-16 weeks
P5314.76.630	P5316.76.630	630	350	315	510	14-16 weeks
P5314.76.710	P5316.76.710	710	500	355	662	14-16 weeks
P5314.76.800	P5316.76.800	800	500	400	663	14-16 weeks
P5314.76.900	P5316.76.900	900	500	450	732	14-16 weeks
P5314.76.1000	P5316.76.1000	1000	500	500	741	14-16 weeks
P5314.76.1200	-	1200	500	600	709	14-16 weeks

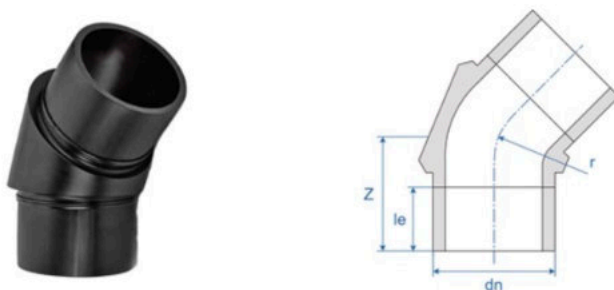
Custom fabricated elbows do not require pipe to manufacture. Individual elbows may be ordered in any angle.

## Black 22° Fabricated Spigot Elbows / PN10-PN16 / SDR17-SDR11

Fabricated elbows are manufactured from black PE100+ compound. They feature long spigots for electrofusion or butt fusion joining on site. Any fabricated elbow angle from 1° to 45° can be manufactured. Tables below show standard 22° elbow with a radius of ~0.5xOD for reference.

PN10 SDR17	PN16 SDR11	d1	le1	r	z1 - 22°	Availability in Hong Kong
P5314.77.355	P5316.77.355	355	200	177	326	14-16 weeks
P5314.77.400	P5316.77.400	400	300	200	431	14-16 weeks
P5314.77.450	P5316.77.450	450	300	225	436	14-16 weeks
P5314.77.500	P5316.77.500	500	350	250	500	14-16 weeks
P5314.77.560	P5316.77.560	560	350	280	528	14-16 weeks
P5314.77.630	P5316.77.630	630	350	315	541	14-16 weeks
P5314.77.710	P5316.77.710	710	500	355	697	14-16 weeks
P5314.77.800	P5316.77.800	800	500	400	702	14-16 weeks
P5314.77.900	P5316.77.900	900	500	450	776	14-16 weeks
P5314.77.1000	P5316.77.1000	1000	500	500	790	14-16 weeks
P5314.77.1200	-	1200	500	600	768	14-16 weeks

Custom fabricated elbows do not require pipe to manufacture. Individual elbows may be ordered in any angle.



## Black 30° Fabricated Spigot Elbows / PN10-PN16 / SDR17-SDR11

Fabricated elbows are manufactured from black PE100+ compound. They feature long spigots for electrofusion or butt fusion joining on site. Any fabricated elbow angle from 1° to 45° can be manufactured. Tables below show standard 30° elbow with a radius of ~0.5xOD for reference.

SDR17 PN10	SDR11 PN16	d1	le1	r	z1 - 30°	Availability in Hong Kong
P5314.78.355	P5316.78.355	355	200	177	339	14-16 weeks
P5314.78.400	P5316.78.400	400	300	200	446	14-16 weeks
P5314.78.450	P5316.78.450	450	300	225	452	14-16 weeks
P5314.78.500	P5316.78.500	500	350	250	518	14-16 weeks
P5314.78.560	P5316.78.560	560	350	280	549	14-16 weeks
P5314.78.630	P5316.78.630	630	350	315	564	14-16 weeks
P5314.78.710	P5316.78.710	710	500	355	723	14-16 weeks
P5314.78.800	P5316.78.800	800	500	400	731	14-16 weeks
P5314.78.900	P5316.78.900	900	500	450	809	14-16 weeks
P5314.78.1000	P5316.78.1000	1000	500	500	827	14-16 weeks
P5314.78.1200	-	1200	500	600	812	14-16 weeks

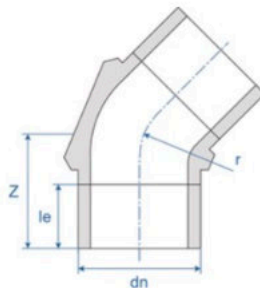
Custom fabricated elbows do not require pipe to manufacture. Individual elbows may be ordered in any angle.

## Black 45° Fabricated Spigot Elbows / PN10-PN16 / SDR17-SDR11

Fabricated elbows are manufactured from black PE100+ compound. They feature long spigots for electrofusion or butt fusion joining on site. Any fabricated elbow angle from 1° to 45° can be manufactured. Tables below show standard 45° elbow with a radius of ~0.5xOD for reference.

PN10 SDR17	PN16 SDR11	d1	le1	r	z1 - 45°	Availability in Hong Kong
P5314.79.355	P5316.79.355	355	200	177	365	14-16 weeks
P5314.79.400	P5316.79.400	400	300	200	475	14-16 weeks
P5314.79.450	P5316.79.450	450	300	225	485	14-16 weeks
P5314.79.500	P5316.79.500	500	350	250	555	14-16 weeks
P5314.79.560	P5316.79.560	560	350	280	590	14-16 weeks
P5314.79.630	P5316.79.630	630	350	315	610	14-16 weeks
P5314.79.710	P5316.79.710	710	500	355	775	14-16 weeks
P5314.79.800	P5316.79.800	800	500	400	790	14-16 weeks
P5314.79.900	P5316.79.900	900	500	450	875	14-16 weeks
P5314.79.1000	P5316.79.1000	1000	500	500	900	14-16 weeks
P5314.79.1200	-	1200	500	600	900	14-16 weeks

Custom fabricated elbows do not require pipe to manufacture. Individual elbows may be ordered in any angle.



## Black 60° Fabricated Spigot Elbows / PN10-PN16 / SDR17-SDR11

Fabricated elbows are manufactured from black PE100+ compound. They feature long spigots for electrofusion or butt fusion joining on site. Any fabricated elbow angle from 1° to 45° can be manufactured. Tables below show standard 60° elbow with a radius of ~0.5xOD for reference.

SDR17 PN10	SDR11 PN16	d1	le1	r	z1 - 60°	Availability in Hong Kong
P5314.80.355	P5316.80.355	355	200	177	485	14-16 weeks
P5314.80.400	P5316.80.400	400	300	200	600	14-16 weeks
P5314.80.450	P5316.80.450	450	300	225	614	14-16 weeks
P5314.80.500	P5316.80.500	500	350	250	697	14-16 weeks
P5314.80.560	P5316.80.560	560	350	280	760	14-16 weeks
P5314.80.630	P5316.80.630	630	350	315	791	14-16 weeks
P5314.80.710	P5316.80.710	710	500	355	961	14-16 weeks
P5314.80.800	P5316.80.800	800	500	400	980	14-16 weeks
P5314.80.900	P5316.80.900	900	500	450	1137	14-16 weeks
P5314.80.1000	P5316.80.1000	1000	500	500	1174	14-16 weeks
P5314.80.1200	-	1200	500	600	1149	14-16 weeks

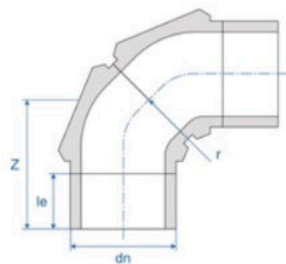
Custom fabricated elbows do not require pipe to manufacture. Individual elbows may be ordered in any angle.

## Black 90° Fabricated Spigot Elbows / PN10-PN16 / SDR17-SDR11

Fabricated 90° elbows are manufactured by factory butt welding two 45° elbows together. Elbows are machined from black PE100+ compound. They feature long spigots for electrofusion or butt fusion joining on site. Any fabricated elbow angle from 1° to 45° can be manufactured. Tables below show standard 90° elbow with a radius of ~0.5xOD for reference.

PN10 SDR17	PN16 SDR11	d1	le1	r	z1 - 90°	Availability in Hong Kong
P5314.81.355	P5316.81.355	355	200	177	560	14-16 weeks
P5314.81.400	P5316.81.400	400	300	200	684	14-16 weeks
P5314.81.450	P5316.81.450	450	300	225	709	14-16 weeks
P5314.81.500	P5316.81.500	500	350	250	803	14-16 weeks
P5314.81.560	P5316.81.560	560	350	280	878	14-16 weeks
P5314.81.630	P5316.81.630	630	350	315	924	14-16 weeks
P5314.81.710	P5316.81.710	710	500	355	1111	14-16 weeks
P5314.81.800	P5316.81.800	800	500	400	1149	14-16 weeks
P5314.81.900	P5316.81.900	900	500	450	1327	14-16 weeks
P5314.81.1000	P5316.81.1000	1000	500	500	1386	14-16 weeks
P5314.81.1200	-	1200	500	600	1403	14-16 weeks

Custom fabricated elbows do not require pipe to manufacture. Individual elbows may be ordered in any angle.





## Tees & Offtakes

Mill-Pro offers a wide range of injection moulded and fabricated tee pieces in both Blue and Black including:

- Moulded Electrofusion Tees
- Moulded Spigot Tees
- Electrofusion Saddles
- Fabricated Tees

**Injection moulded electrofusion tees** are used for smaller diameter pipelines ( $\leq 315$  OD). Moulded in a single shot and in both equal and reducing offtakes. They do not contain angled butt welds and do not require de-ration.

**Injection moulded spigot tees** are available in larger sizes up to DN/OD 450 SDR11, however generally not listed for water supply as the Minimum Order Quantity (MOQ) makes sizes  $> dn315$  uneconomic. We recommend using fabricated tees, however, a list of larger size black moulded spigot tees can be found in our **Wastewater Pressure** section of our website.

**Electrofusion saddles** are not covered under the WSD PS and are generally not used in Hong Kong unless special approval is provided. Saddles are ideal to conduct live cut-ins to existing PE pipelines and install air valves in locations where clearance above the pipe crown is limited.

**Fabricated tees** in sizes from dn355 are manufactured by CNC machining a 'Fitting Body' from extruded hollow PE bar then pipe spigots are factory butt-welded on. The required tee reinforcement is incorporated directly into the fitting body during machining, therefore they do not require de-ration (see Fig.1 below). Any custom tee design can be made in any size, including reducing, scour and angled off takes. Fabricated tees are ideal for use in valve and pump chambers, where unique one-off components can be manufactured, eliminating Ductile Iron fittings to reduce long term maintenance.

**Note:** The specifications for fabrication and type testing for the supply of fabricated fittings to ensure their performance, are given in the Hong Kong Water Supplies Department, WSD Appendix 22.09, Clause 5.5.7.

**Segmented tees** are prohibited in the Hong Kong Water Supplies Department (WSD) network. WSD Particular Specification PS22.09, Clause 5.5.6 prohibits the use of segmented tees. A segmented Tee is manufactured by cutting PE pipe at a  $45^\circ$  angle and butt welding the pipe segments together (described in BS EN 12201-3 Annex B5). Refer fabricated bends Fig.2 for a more detailed explanation of de-ration). According to BS EN 12210-3 Annex A, Figure B.4 A segmented Tee fabricated from PN16 pipe must have a de-rating factor of 0.6x (60%) applied to the original pipes PN rating, so a segmented tee fabricated from PN16 pipe must be derated to PN9.6, this makes segmented tee's unusable in a PN16 water network.

*Product specifications and dimensions are subject to change without notice.*

*For the latest information refer to our website: [www.millpro.com.hk](http://www.millpro.com.hk) or contact our [sales team](#).*



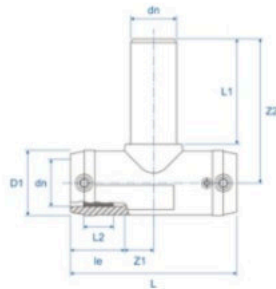
*This mark is used to identify Mill-Pro products that meet the requirements of the Water Supplies Department PS Appendix 22.09. The use of this mark is not endorsed by the WSD and is not intended to infer approval by the WSD.*

## Blue Electrofusion Equal Tee – Spigot Offtake / TA / PN16 / SDR11

Friatec's PE100 RC Injection moulded electrofusion Tees are suitable for fusing pipes from SDR11 to SDR17.6 Electrofusion sockets feature the same performance benefits found in blue couplers, along with built-in reinforcement, so no de-ration is required.

This is an injection moulded tee piece, with electrofusion sockets on the main way and an extra-long spigot offtake, for connection using a blue MB coupler.

Product Code	dn	D1	L	L1	L2	le	Z1	Z2	Availability in Hong Kong
P3326.120.032	32	44	116	39	22	80	19	109.0	Ex-Stock
P3326.120.050	50	67	175	49	29	110	38	152.5	Ex-Stock
P3326.120.063	63	81	197	56	33	115	42	162.5	Ex-Stock

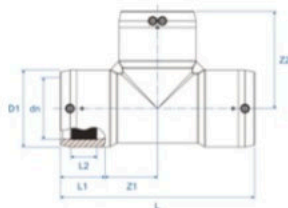


## Blue Electrofusion Equal Tee / T / PN16 / SDR11

Friatec's PE100 RC Injection moulded electrofusion Tees are suitable for fusing pipes from SDR11 to SDR17.6 Electrofusion sockets feature all the same performance benefits found in blue couplers along with built-in reinforcement, so no de-ration is required.

Product Code	dn	D1	L	L1	L2	Z1	Z2	Availability in Hong Kong
P3326.122.090	90	117	305	79	44	73.5	73.5	Ex-Stock
P3326.122.125	125	160	384	87	44	105.0	105.0	Ex-Stock
P3326.122.180	180	228	480	103	62	137.0	137.0	Ex-Stock

For sizes, DN/OD 250 & 315, use a blue moulded equal spigot Tee below and *blue couplers*.





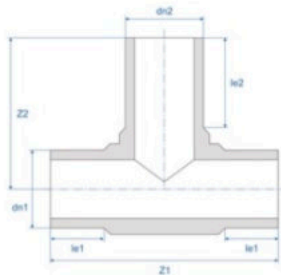
## Blue Spigot Equal Tee / PN16 / SDR11

Mill-Pro PE100 RC Injection moulded spigot Tees are manufactured using Mill-Pro's own tooling under our continuous inspection. They feature long spigots for electrofusion or butt fusion joining and built-in reinforcement that exceeds the type testing requirements of BS EN 12201-2 and ISO 4427-3.

Mill-Pro fittings feature hard moulded brand, batch numbers for compliance checking and 1D and 2D bar code stickers for complete product traceability. All elbows are sealed in individual plastic bags for protection on site. Spigot fittings are joined by Electrofusion Couplers or Butt Fusion.

Product Code	dn1	dn2	le1	le2	Z1	Z2	Availability in Hong Kong
P5826.122.250	250	250	135	135	610	305	Ex-Stock
P5826.122.315	315	315	155	155	738	369	Ex-Stock

For sizes > DN/OD 315, use a *black fabricated equal tee*.



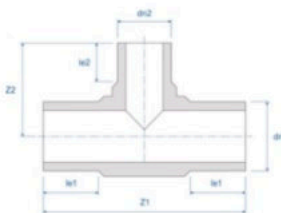
## Blue Spigot Reducing Tees / PN16 / SDR11

Mill-Pro PE100 RC Injection moulded spigot Tees are manufactured using Mill-Pro's own tooling under our continuous inspection. They feature long spigots for electrofusion or butt fusion joining and built-in reinforcement that exceeds the type testing requirements of BS EN 12201-2 and ISO 4427-3. Mill-Pro fittings feature hard moulded brand, batch numbers for compliance checking and 1D and 2D bar code stickers for complete product traceability. All Tee's are sealed in individual plastic bags for protection on site. Spigot fittings are joined by Electrofusion Couplers or Butt Fusion.

Product Code	dn1	dn2	le1	le2	Z1	Z2	Availability in Hong Kong
P5826.22.250090	250	90	135	84	440	249	Ex-Stock
P5826.22.250125	250	125	135	92	457	257	Ex-Stock
P5826.22.250180	250	180	135	110	530	275	Ex-Stock
P5826.22.315090	315	90	155	84	504	294	Ex-Stock
P5826.22.315125	315	125	155	92	539	302	Ex-Stock
P5826.22.315180	315	180	155	110	594	320	Ex-Stock
P5826.22.315250	315	250	155	135	664	345	Ex-Stock

For non-standard off-takes, Mill-Pro can supply fabricated blue tees in any combination, such as a dn63 outlet on DN/OD 315 mainway where space is limited, [contact us](#) for availability.

For sizes > DN/OD 315, use *black fabricated reducing tees*.



## Black Spigot Equal Tee / Fabricated

Fabricated Tee's are manufactured by machining PE100+ hollow bar into a fitting body and welding on spigot ends in according with BS ISO 21307. Fabricated Tee's feature long spigots for electrofusion or butt fusion joining and 1D and 2D bar code stickers for complete product traceability. All Tee's are sealed in individual plastic bags for protection on site.

PN10 SDR17	PN16 SDR11	PN20 SDR9	dn1	dn2	L	le1	le2	Z1	Z2	Availability in Hong Kong
-	-	P5317.40.180	180	180	545	150	220	273	340	6-8 weeks
-	P5316.40.250	P5317.40.250	250	250	830	250	220	415	380	6-8 weeks
-	P5316.40.315	P5317.40.315	315	315	1005	300	220	503	418	6-8 weeks
P5314.40.355	P5316.40.355	P5317.40.355	355	355	1045	300	280	523	498	6-8 weeks
P5314.40.450	P5316.40.450	P5317.40.450	450	450	1160	300	280	580	555	6-8 weeks
P5314.40.500	P5316.40.500	P5317.40.500	500	500	1310	350	320	655	620	6-8 weeks
P5314.40.560	P5316.40.560	P5317.40.560	560	560	1380	350	320	690	655	6-8 weeks
P5314.40.630	P5316.40.630	P5317.40.630	630	630	1450	350	320	725	690	6-8 weeks
P5314.40.710	P5316.40.710	P5317.40.710	710	710	1530	350	400	765	810	6-8 weeks
P5314.40.800	P5316.40.800	P5317.40.800	800	800	1660	350	400	830	875	6-8 weeks
P5314.40.900	P5316.40.900	-	900	900	1860	400	500	930	1020	10-12 Weeks
P5314.40.1000	P5316.40.1000	-	1000	1000	1960	400	500	980	1070	10-12 Weeks
P5314.40.1200	-	-	1200	1200	2170	400	600	1085	1270	10-12 Weeks
P2314.40.1400	-	-	1400	1400	AoR	AoR	AoR	AoR	AoR	Contact us
P2314.40.1600	-	-	1600	1600	AoR	AoR	AoR	AoR	AoR	Contact us
P2314.40.1800	-	-	1800	1800	AoR	AoR	AoR	AoR	AoR	Contact us
P2314.40.2000	-	-	2000	2000	AoR	AoR	AoR	AoR	AoR	Contact us

Larger sizes up to dn1000 are available in SDR 11 rating, dimensions on request. For smaller sizes use *electrofusion tees* above.

PN10 SDR17 fully complies with WSD PS, however only where the engineer allows the use of PN10 fittings.

Larger sizes up to dn2000 are available in PN10 SDR17 rating, dimensions on request.

dn800 is the largest sizes pipe in SDR9 rated pipe.

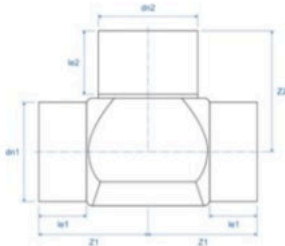


photo: **Reinert-Ritz** world leaders in the manufacture of fabricated PE fittings for water and wastewater.

## Black Reducing Tees / Fabricated

Fabricated Tee's are manufactured by machining PE100+ hollow bar into a fitting body and welding on spigot ends in according with BS ISO 21307. Fabricated Tee's feature long spigots for electrofusion or butt fusion joining and 1D and 2D bar code stickers for complete product traceability.

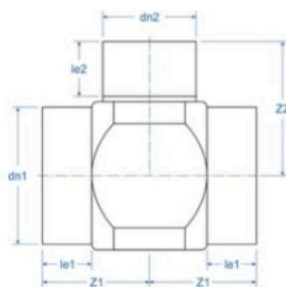
SDR17 PN10	SDR11 PN16	SDR9 PN20	dn1	dn2	L	le1	le2	Z1	Z2	Availability in Hong Kong
-	P5316.41.250063	P5317.41.250063	250	63	620	250	180	310	330	6-8 weeks
-	P5316.41.250090	P5317.41.250090	250	90	645	250	180	323	330	6-8 weeks
-	P5316.41.250125	P5317.41.250125	250	125	680	250	180	340	330	6-8 weeks
-	P5316.41.250180	P5317.41.250180	250	180	750	250	220	375	375	6-8 weeks
-	P5316.41.315063	P5317.41.315063	315	63	730	300	180	365	367.5	6-8 weeks
-	P5316.41.315090	P5317.41.315090	315	90	760	300	180	380	367.5	6-8 weeks
-	P5316.41.315125	P5317.41.315125	315	125	790	300	180	395	367.5	6-8 weeks
-	P5316.41.315180	P5317.41.315180	315	180	860	300	220	430	412.5	6-8 weeks
-	P5316.41.315250	P5317.41.315250	315	250	930	300	220	465	412.5	6-8 weeks
P5314.41.355090	P5316.41.355090	P5317.41.355090	355	90	760	300	180	380	387.5	6-8 weeks
P5314.41.355125	P5316.41.355125	P5317.41.355125	355	125	790	300	180	395	387.5	6-8 weeks
P5314.41.355180	P5316.41.355180	P5317.41.355180	355	180	860	300	220	430	432.5	6-8 weeks
P5314.41.355250	P5316.41.355250	P5317.41.355250	355	250	930	300	220	465	432.5	6-8 weeks
P5314.41.355315	P5316.41.355315	P5317.41.355315	355	315	990	300	220	495	432.5	6-8 weeks
P5314.41.450125	P5316.41.450125	P5317.41.450125	450	125	790	300	180	395	435	6-8 weeks
P5314.41.450180	P5316.41.450180	P5317.41.450180	450	180	860	300	220	430	480	6-8 weeks
P5314.41.450250	P5316.41.450250	P5317.41.450250	450	250	930	300	220	465	480	6-8 weeks
P5314.41.450315	P5316.41.450315	P5317.41.450315	450	315	990	300	220	495	480	6-8 weeks
P5314.41.450355	P5316.41.450355	P5317.41.450355	450	355	1030	300	280	515	540	6-8 weeks
P5314.41.500125	P5316.41.500125	P5317.41.500125	500	125	890	350	180	445	460	6-8 weeks
P5314.41.500180	P5316.41.500180	P5317.41.500180	500	180	960	350	220	480	505	6-8 weeks
P5314.41.500250	P5316.41.500250	P5317.41.500250	500	250	1030	350	220	515	505	6-8 weeks
P5314.41.500315	P5316.41.500315	P5317.41.500315	500	315	1100	350	220	550	505	6-8 weeks
P5314.41.500355	P5316.41.500355	P5317.41.500355	500	355	1140	350	280	570	565	6-8 weeks
P5314.41.560180	P5316.41.560180	P5317.41.560180	560	180	960	350	220	480	535	6-8 weeks
P5314.41.560250	P5316.41.560250	P5317.41.560250	560	250	1030	350	220	515	535	6-8 weeks
P5314.41.560280	P5316.41.560280	P5317.41.560280	560	280	1060	350	220	530	535	6-8 weeks
P5314.41.560315	P5316.41.560315	P5317.41.560315	560	315	1090	350	220	545	535	6-8 weeks
P5314.41.630180	P5316.41.630180	P5317.41.630180	630	180	960	350	220	480	570	6-8 weeks
P5314.41.630250	P5316.41.630250	P5317.41.630250	630	250	1030	350	220	515	570	6-8 weeks
P5314.41.630315	P5316.41.630315	P5317.41.630315	630	315	1090	350	220	545	570	6-8 weeks
P5314.41.630355	P5316.41.630355	P5317.41.630355	630	355	1130	350	280	565	630	6-8 weeks

Larger sizes up to dn1000 with offtakes from dn180 to dn900 are available in PN16 SDR11 rating. Dimensions on request.

PN10 SDR17 fully complies with WSD PS, however only where the engineer allows the use of PN10 fittings.

Larger sizes up to dn2000 with offtakes from dn180 to dn1800 are available in PN10 SDR17 rating. Dimensions available on request.

Larger sizes up to dn800 with offtakes from dn180 to dn700 are available in PN20 SDR9 rating. Dimensions on request.





## Air Valve Offtakes

There are many different configurations and connection methods possible when making air valve connections on PE pipelines. Typically reducing tees or saddles, the choice of which depends if they are being installed as part of the construction (reducing tee) or fitted after the pipeline has been constructed (saddles). WSD Appendix does not cover the use of saddles.

Modern Air Valves (Triple Function Air valves) provide the following three functions in a water supply pipeline:

**Degassing** – the continuous release of small quantities of air bubbles which are created during normal pipeline operation, due to pressure and temperature change.

**Air release** – the infrequent release of large quantities of air, typically as the pipeline is being filled.

**Vacuum break** – allowing atmospheric air back into the pipeline when it is being drained. This prevents the pipeline from collapsing under vacuum conditions and provides efficient draining of the pipeline.



*Product specifications and dimensions are subject to change without notice.*

*For the latest information refer to our website: [www.millpro.com.hk](http://www.millpro.com.hk) or contact our [sales team](#).*



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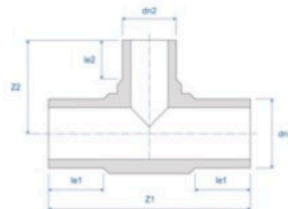
## Blue Moulded Air Valve Tees / PN16 / SDR11

The Mill-Pro PE100 RC Injection moulded spigot air valve Tees are typically used for attaching air valves via a flanged connection, cut into the pipeline or installed during construction. They are manufactured using Mill-Pro's own tooling under our continuous inspection. They feature long spigots for electrofusion or butt fusion joining and built-in reinforcement that exceeds the type testing requirements of BS EN 12201-2 and ISO 4427-3. Mill-Pro fittings feature hard moulded brand, batch numbers for compliance checking and 1D and 2D bar code stickers for complete product traceability. All Tee's are sealed in individual plastic bags for protection on site.

The transition from the Tee to the flange connecting the isolation/air valve assembly is made using a standard Coupler and Flange adaptor onto the Tee's spigot outlet.

Product Code	dn1	dn2	L	le1	le2	Z1	Z2	Availability in Hong Kong
P5826.22.250090	250	90	440	135	84	440	249	Ex-Stock
P5826.22.250125	250	125	475	135	92	475	257	Ex-Stock
P5826.22.315090	315	90	504	155	84	504	293	Ex-Stock
P5826.22.315125	315	125	539	155	92	539	301	Ex-Stock

Table shows DN80 and DN100 offtakes, larger DN150 & DN200 (dn180 & dn250) offtakes are available [here](#).



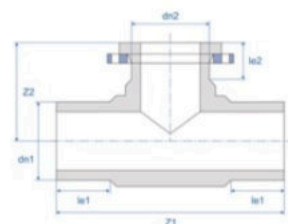
## Air Entrapment Tee / Moulded / PN16 / SDR11 / PN16 EN1092 FBE Flanged Offtake

Fully pressure rated PE100+ fabricated assembly with long spigot ends for electrofusion on-site. Matched with a FBE steel flanged blanking plate and a flanged or threaded reducing outlet for connection to the PE assembly with an O-Ring NBR seal. This fitting can be used for the direct connection of a sewer air valve onto the pipeline or attached to PE flange adaptor and 90° bend, allowing one or more air valves to be located in an alternate location on an air release/intake manifold.

The flange offtake size is configurable in various combinations to suit the application - Refer to the flange blanking plate table below.

Product Code	dn1	dn2	L	le	Z2	Availability in Hong Kong
P5826.A6.250250	250	250 FL 250 PN16	535	130	266	8-12 weeks
P5826.A6.315300	315	315 FL 300 PN16	650	150	317	8-12 weeks

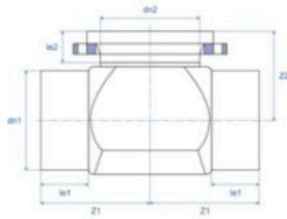
For smaller sizes: use EF tee and LS flange assembly.



## Air Entrapment Tee / Fabricated / PN16 EN1092 316SS Flanged Offtake

As per *Moulded* – using fabricated PE tees which offer PN16 pressure ratings in larger sizes.

PN10 SDR17	PN16 SDR11	dn1	dn2	L	le	Z1	Z2	Availability in Hong Kong
P5314.61.355350	P5316.61.355350	355	355 FL 350 PN16	1045	300	523	374	8-12 weeks
P5314.61.450450	P5316.61.450450	450	450 FL 450 PN16	1160	300	580	448	8-12 weeks
P5314.61.500500	P5316.61.500500	500	500 FL 500 PN16	1310	350	655	489	8-12 weeks
P5314.61.560500	P5316.61.560500	560	560 FL 500 PN16	1380	350	690	532	8-12 weeks
P5314.61.630600	P5316.61.630600	630	630 FL 600 PN16	1450	350	725	601	8-12 weeks
P5314.61.710700	P5316.61.710700	710	710 FL 700 PN16	1530	350	765	695	8-12 weeks
P5314.61.800800	P5316.61.800800	800	800 FL 800 PN16	1660	350	830	773	8-12 weeks
P5314.61.900900	P5316.61.900900	900	900 FL 900 PN16	1860	400	930	855	8-12 weeks
P5314.61.10001000	P5316.61.10001000	1000	1000 FL 1000 PN16	1960	400	980	936	8-12 weeks



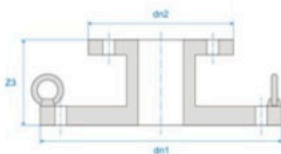
Bayard manufacture a wide range of compact, single and triple function air valves for use in water supply networks.

For the latest information refer to our website: [www.mill-pro.com.hk/water/air-valve-offtakes](http://www.mill-pro.com.hk/water/air-valve-offtakes) or contact our sales team.

## Air Entrapment Blanking Flange with Offtake / PN16 EN1092 316SS

Both flanges are BS EN 1092-1 rated and drilled PN16 unless indicated as a 'BSP' threaded SS socket for DN 50 offtakes. Larger sized flanges supplied with SS lifting hooks blind threaded into the flange.

Product Code	DN1	DN2	Z3	Availability in Hong Kong
P09S6.557.10088	100	50 BSP	102	8-12 weeks
P09S6.G6.100080	100	80	107	8-12 weeks
P09S6.557.15088	150	50 BSP	104	8-12 weeks
P09S6.G6.150080	150	80	109	8-12 weeks
P09S6.G6.150100	150	100	121	8-12 weeks
P09S6.557.20088	200	50 BSP	106	8-12 weeks
P09S6.G6.200080	200	80	111	8-12 weeks
P09S6.G6.200100	200	100	123	8-12 weeks
P09S6.557.25088	250	50 BSP	109	8-12 weeks
P09S6.G6.250080	250	80	114	8-12 weeks
P09S6.G6.250100	250	100	126	8-12 weeks
P09S6.557.30088	300	50 BSP	112	8-12 weeks
P09S6.G6.300080	300	80	117	8-12 weeks
P09S6.G6.300100	300	100	129	8-12 weeks
P09S6.557.35088	350	50 BSP	115	8-12 weeks
P09S6.G6.350080	350	80	120	8-12 weeks
P09S6.G6.350100	350	100	132	8-12 weeks
P09S6.557.40088	400	50 BSP	120	8-12 weeks
P09S6.G6.400080	400	80	125	8-12 weeks
P09S6.G6.400100	400	100	137	8-12 weeks
P09S6.557.45088	450	50 BSP	122	8-12 weeks
P09S6.G6.450080	450	80	127	8-12 weeks
P09S6.G6.450100	450	100	139	8-12 weeks
P09S6.557.50088	500	50 BSP	126	8-12 weeks
P09S6.G6.500080	500	80	131	8-12 weeks
P09S6.G6.500100	500	100	143	8-12 weeks
P09S6.G6.600080	600	80	140	8-12 weeks
P09S6.G6.600100	600	100	152	8-12 weeks
P09S6.G6.710080	710	80	148	8-12 weeks
P09S6.G6.710100	710	100	160	8-12 weeks
P09S6.G6.710150	710	150	187	8-12 weeks
P09S6.G6.800080	800	80	159	8-12 weeks
P09S6.G6.800100	800	100	171	8-12 weeks
P09S6.G6.800150	800	150	198	8-12 weeks
P09S6.G6.900080	900	80	167	8-12 weeks
P09S6.G6.900100	900	100	179	8-12 weeks
P09S6.G6.900150	900	150	206	8-12 weeks
P09S6.G6.1000080	1000	80	175	8-12 weeks
P09S6.G6.1000100	1000	100	187	8-12 weeks
P09S6.G6.1000150	1000	150	214	8-12 weeks



## Fabricated Air Valve Tees / PN16 / SDR11

Fabricated Air Valve Tee's are manufactured by machining PE100+ hollow bar into a fitting body that includes external reinforcement and then welding on CCTV pipe spigot ends in accordance with BS ISO 21307. Fabricated Air Valve Tee's feature long spigots for electrofusion or butt fusion joining and 1D and 2D bar code stickers for complete product traceability.

The main advantage with Fabricated Air Valve tees is regardless of the mainway size, the air offtake size can be small (DN80 offtake on a DN1800 Main). Traditional tees do not offer such large step changes, so require several reducers which take up precious height above the pipeline. The transition from the Tee to the flange connecting the isolation/air valve assembly is made using a standard Coupler and Flange adaptor onto the Tee's spigot outlet or if space is extremely tight, the tee can be fabricated with a flange adaptor butt welded directly to the offtake.

SDR17 PN10	SDR11 PN16	dn1	dn2	L	le1	le2	Z1	Z2	Availability in Hong Kong
-	P5316.41.250090	250	90	645	250	180	323	330	6-8 Weeks
-	P5316.41.250125	250	125	680	250	180	340	330	6-8 Weeks
-	P5316.41.315090	315	90	760	300	180	380	367.5	6-8 Weeks
-	P5316.41.315125	315	125	790	300	180	395	367.5	6-8 Weeks
P5314.41.355090	P5316.41.355090	355	90	760	300	180	380	387.5	6-8 Weeks
P5314.41.355125	P5316.41.355125	355	125	790	300	180	395	387.5	6-8 Weeks
P5314.41.450090	P5316.41.450090	450	90	760	300	180	380	435	6-8 Weeks
P5314.41.450125	P5316.41.450125	450	125	790	300	180	395	435	6-8 Weeks
P5314.41.500090	P5316.41.500090	500	90	860	350	180	430	460	6-8 Weeks
P5314.41.500125	P5316.41.500125	500	125	890	350	180	445	460	6-8 Weeks
P5314.41.560090	P5316.41.560090	560	90	860	350	180	430	490	6-8 Weeks
P5314.41.560125	P5316.41.560125	560	125	890	350	180	445	490	6-8 Weeks
P5314.41.630090	P5316.41.630090	630	90	860	350	180	430	525	6-8 Weeks
P5314.41.630125	P5316.41.630125	630	125	890	350	180	445	525	6-8 Weeks

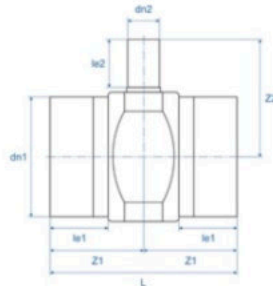
This table shows DN80 and DN100 offtakes, Larger DN150 & DN200 (dn180 & dn250) offtakes are available *here*.

Larger sizes up to dn1000 are available in PN16 SDR11 rating, dimensions on request.

PN16 SDR11 in smaller sizes < dn355 typically use *moulded blue air valve tees*.

PN10 SDR17 fully complies with WSD PS, only where the engineer allows the use of PN10 fittings.

Larger sizes up to dn2000 are available in PN10 SDR17 rating, dimensions on request.







## Reducers

Mill-Pro partners with FRIATEC to offer a wide range of reducers including:

- **Moulded Electrofusion reducers:** Injection moulded in PE100 RC compounds, offering standard reductions in smaller diameter pipes from dn50 to dn90
- **Moulded / Fabricated Spigot reducers:** Either injection moulded using Mill-Pro's own tooling under our continuous inspection or machined from hollow PE100+ bar.

Fabricated reducers can provide large step changes, stepping down several pipe sizes in a single reducer. This can be beneficial where a large reduction needs to take place. For example dn315 to dn90 where space prohibits the connection of 4 standard reducers in a line to make the diameter change.

Step reducers are machined from thickwall hollow bar to accommodate the step change in a short distance. Such special reducers are not listed in the tables but are manufactured to order on request in both blue and black and single piece orders, contact us for special requirements.

Black injection moulded spigot reducers are available in larger sizes up to DN/OD 400, these large sizes are generally not listed for water supply as the Minimum Order Quantity (MOQ) makes their use uneconomic, so fabricated reducers would be supplied. A list of larger size black injection moulded reducers can be found in our wastewater section here.

FRIATEC manufacture a limited range of EF reducers in blue, for the complete EF product range see Electro-fusion fittings / Black or visit Friatec Technical Plastics.



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*For the latest information refer to our website: [www.millpro.com.hk](http://www.millpro.com.hk) or contact our [sales team](#).*



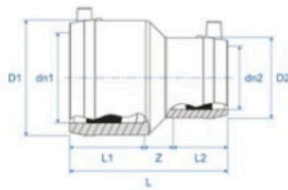
*This mark is used to identify Mill-Pro products that meet the requirements of the Water Supplies Department PS Appendix 22.09. The use of this mark is not endorsed by the WSD and is not intended to infer approval by the WSD.*

## Blue Electrofusion Reducers / MR / PN16 / SDR11

Frialen PE100 RC Injection moulded electrofusion reducers are suitable for fusing pipes from SDR11 to SDR17.6. Electrofusion sockets feature all the same performance benefits found in blue couplers. All reducers are sealed in individual plastic bags for protection on site.

Product Code	dn1	dn2	D1	D2	L	L1	L2	Z	Availability in Hong Kong
P3326.14.050032	50	32	68	45	110	49	39	22	Ex-Stock
P3326.14.063032	63	32	82	45	125	55	44	26	Ex-Stock
P3326.14.063050	63	50	82	68	125	55	48	22	Ex-Stock
P3326.14.090063	90	63	117	82	160	69	55	36	Ex-Stock

For sizes > dn63, use a *spigot reducer* from the table below and *blue couplers*.



## Blue Spigot Reducers / PN16 / SDR11

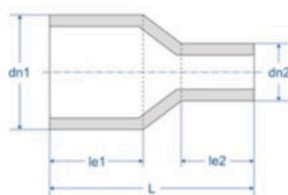
Mill-Pro PE100 RC blue long spigot reducers are generally injection moulded in PE100 RC, however, for small quantities they may be fabricated from blue hollow PE100+ bar. All reducers feature long spigots for electrofusion or butt fusion joining. Standard sizes are shown below, however, fabricated Blue reducers can be manufactured in any size and this allows for significant reductions to be made in any size up to dn1000 in SDR11. 1D and 2D bar code stickers for complete product traceability and are sealed in individual plastic bags for protection on site.

Listed below are standard reductions, however, we manufacture reductions in any combination of dn1 & dn2.

Product Code	dn1	dn2	le1	le2	L	Availability in Hong Kong
P5826.14.090050	90	50	79	65	175	6-8 Weeks
P5826.14.125063	125	63	100	70	208	Ex-Stock
P5826.14.125090	125	90	100	90	211	Ex-Stock
P5826.14.180063	180	63	110	70	235	6-8 Weeks
P5826.14.180090	180	90	110	90	243	Ex-Stock
P5826.14.180125	180	125	110	100	243	Ex-Stock
P5826.14.250125	250	125	135	100	310	6-8 Weeks
P5826.14.250180	250	180	135	110	287	6-8 Weeks
P5826.14.315180	315	180	160	110	338	6-8 Weeks
P5826.14.315250	315	250	160	135	327	6-8 Weeks

For large step sizes and special one-off blue reducers not listed here, [contact us](#).

For sizes > dn315 use *black fabricated reducers*.



## Black Spigot Reducer / PN16 / SDR 11

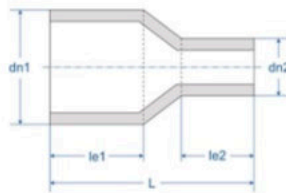
Mill-Pro PE100 black spigot concentric reducers are either injection moulded or machined from extruded hollow bar with factory butt-welded spigots, for electrofusion joining in larger sizes. Standard sizes are shown below, however, fabricated reducers can be manufactured to any size combination. This allows for significant reductions to be made in any size up to dn1000 in SDR11 and dn2000 in SDR 17. All reducers feature 1D and 2D bar code stickers for complete product traceability and are sealed in individual plastic bags for protection on site.

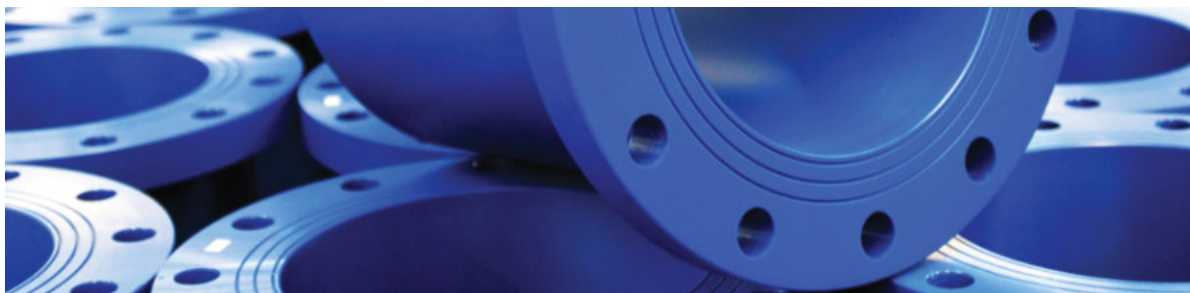
Listed below are standard reductions, however, we manufacture reductions in any combination of dn1 & dn2.

Product Code	dn1	dn2	le1	le2	L	Availability in Hong Kong
P5316.14.355250	355	250	170	130	353	6-8 Weeks
P5316.14.355315	355	315	170	155	345	6-8 Weeks
P5316.14.450315	450	315	200	155	423	6-8 Weeks
P5316.14.450355	450	355	200	170	418	6-8 Weeks
P5316.14.500450	500	450	220	200	445	6-8 Weeks
P5316.14.630450	630	450	260	200	550	6-8 Weeks
P5316.14.630500	630	500	260	220	545	6-8 Weeks
P5316.14.630560	630	560	260	240	535	6-8 Weeks
P5316.14.710630	710	630	280	260	590	6-8 Weeks
P5316.14.800710	800	710	310	280	640	6-8 Weeks

For sizes < dn355 typically *blue reducers* would be used in Hong Kong.

Any reducer can be fabricated. For large step changes and special one-off reducers, [contact us](#).





## Flanged Connections

Mill-Pro supplies a full range of PE100 Flange adaptors (Stub Flanges) manufactured by injection moulding from our own tooling or machined from extruded hollow bar, in accordance with ISO 9624.

- **Flange Adaptor** is a standard PE stub only, complying to ISO 9624, without a backing flange.
- **Flange Assembly** is a PE stub or PE full-face stub, complete with a matching loose backing ring sold as a single item. Our Full Face flange adaptor assemblies are a proprietary Mill-Pro design, they are only sold complete with the matching backing flange.

Flange Adaptors are available from 90mm OD (DN80) to 2000mm OD (DN1800) in pressure ratings from PN4 to PN25. Mill-Pro flange adaptors are designed with extra-long spigots to allow assembly and disassembly using standard bolts after the spigot is fused in position, even when using long series Electrofusion couplers.

Standard loose backing flanges comply to BSEN 1092-1 PN16 drilling and ring thickness. However, other drillings, pressure ratings and dimensions, such as ANSI, JIS, AS/NZS to match other equipment can also be supplied. Loose backing flange materials include:

**Mild steel coated with Fusion Bonded Epoxy (FBE)** a Polymeric anti-corrosion (Barrier) coatings for buried applications, Mill-Pro's coatings are applied and tested in accordance with the UK Water Industry Standard WIS 4-52-01 and 1994 Amendment *WIS 4-52-01* and *WIS 4-52-01a*.

**Stainless Steel** is recommended for exposure above ground and in marine environments.

*Product specifications and dimensions are subject to change without notice.*

*For the latest information refer to our website: [www.millpro.com.hk](http://www.millpro.com.hk) or contact our [sales team](#).*



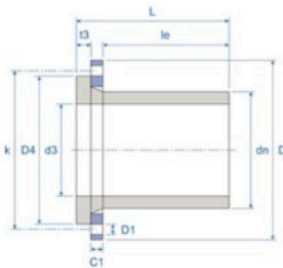
*This mark is used to identify Mill-Pro products that meet the requirements of the Water Supplies Department PS Appendix 22.09. The use of this mark is not endorsed by the WSD and is not intended to infer approval by the WSD.*

## Flange Assembly / Standard / Spigot / PN16 / SDR11

Standard flange adaptor complying to ISO 9624 SDR 11, injection moulded in PE100 RC blue compound, with an extra-long spigot to allow fastener removal once fused in place. Supplied with an FBE coated loose steel backing flange, dimensionally complying to EN 1092-1 PN16 and coated in accordance with WIS 4-52-01. The DN of the loose backing flange matches the PE pipes nominal size (d3), within 10% of the stated DN. Fasteners and gaskets are not included with this flange assembly.

Standard PE Flange Adaptor Blue PN16 SDR11								Loose Backing Flange EN1092 PN16					
Product Code	dn x DN	dn	D4	d3	le	t3	L	DN	D	k	C1	D1	No. of Holes
P5826.J6.090080	90 x 80	90	AoR	72.8	AoR	AoR	127	80	AoR	160	AoR	18	8
P5826.J6.125100	125 x 100	125	AoR	101.1	AoR	AoR	152	100	AoR	180	AoR	18	8
P5826.J6.180150	180 x 150	180	AoR	145.6	AoR	AoR	184	150	AoR	240	AoR	22	8

AoR dimensions are available on request, please [contact us](#).

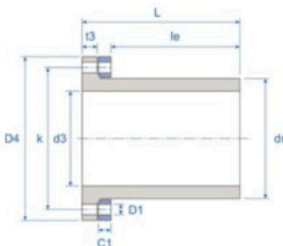


## Flange Assembly / Full Face Straight / Spigot / PN16 / SDR11

Full face flange adaptor, SDR 11 PE drilled to EN 1092-1 PN16. Injection moulded in PE100 RC or machined from PE100+ blue hollow bar with an extra-long spigot to allow fastener removal once fused in place. Supplied with a matching FBE coated loose steel backing flange, complying to EN 1092-1 PN16 and coated in accordance with WIS 4-52-01. The DN of the loose backing flange matches the PE pipes nominal size (d3), within 10% of the stated DN. Fasteners and gaskets are not included with this flange assembly.

Full Face PE Flange Adaptor Blue SDR11 - Drilled EN1092 PN16								Loose Backing Flange EN1092 PN16					
Product Code	dn x DN	dn	D4	d3	le	t3	L	DN	D	k	C1	D1	No. of Holes
P5326.FG.250200	250 x 200	250	AoR	202	AoR	AoR	325	200	AoR	295	AoR	22	12
P5326.FG.315250	315 x 250	315	AoR	255	AoR	AoR	360	250	AoR	355	AoR	26	12

Click [here](#) to understand why Full Face flange adaptors are required.  
AoR dimensions are available on request, please [contact us](#).



## Flange Assembly / Standard / Spigot / PN16 / SDR11

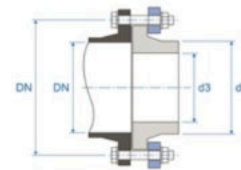
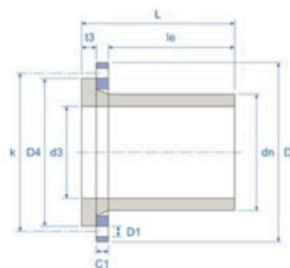
Standard flange adaptor complying to ISO 9624 in SDR 11 rated for PN16. Injection moulded in PE100 RC or machined from PE100+ blue hollow bar, with an extra-long spigot to allow fastener removal once fused in place. Supplied with an FBE coated loose steel backing flange, complying to EN 1092-1 PN16 and coated in accordance with WIS 4-52-01. Fasteners and gaskets are not included with this flange assembly.

The sizes given below are suitable for connecting PE pipe to PE pipe via flanged joints, however, flanged connections to other materials, (such as DI valves and fittings) will create an undesirable internal step at the interface between the PE and DI flanges.

**Example:** In the table below, PE pipe & flange adaptor ID (d3) is 202.3mm (effectively DN200) and the loose steel backing flange bolts to a 250mm DI flange (DN250). This combination creates a 24mm internal step on each side of the joint. Such a joint also requires a larger DN250 valve or fitting to be used in a DN200 pipeline, adding unnecessary cost. The alternate is a full-face flange assembly from the table above which will bolt directly to a DN200 DI valve or fitting.

Standard PE Flange Adaptor Blue PN16 SDR11								Loose Backing Flange EN1092 PN16					
Product Code	dn x DN	dn	D4	d3	le	t3	L	DN	D	k	C1	D1	No. of Holes
P5826.J6.250250	250 x 250	250	AoR	202.3	AoR	AoR	200	250	AoR	355	AoR	26	12
P5826.J6.315300	315 x 300	315	AoR	254.9	AoR	AoR	258	300	AoR	410	AoR	26	12

WSD PS require *Full Face Flange assemblies* to be used on sizes > DN150.  
AoR dimensions are available on request, please [contact us](#).



**FAIL** – Flange bolts align, internal step created

## Flange Assembly / Full Face Straight / Spigot / PN16 / SDR11

Full face flange adaptor drilled to EN 1092-1 PN16. Injection moulded in PE100 RC or machined from PE100+ black hollow bar with an extra-long spigot to allow fastener removal once fused in place. Supplied with a matching FBE coated loose steel backing flange, complying to EN 1092-1 PN16 and coated in accordance with WIS 4-52-01. The flanges DN matches the pipes nominal size (d3). Fasteners and gaskets are not included with this flange assembly.

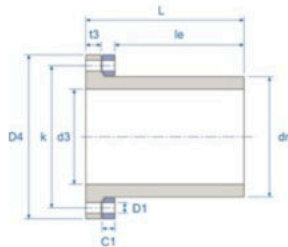
These assemblies are designed to connect PE pipes to DI Valves and other fittings by flange joint, without creating a significant internal step. Below you can see the loose backing flanges nominal dimension (DN) approximately matches the pipes nominal ID (d3) when using full-face flanges. This is not the case when using a standard flange in these sizes.

Full Face Straight Flange Adaptor Black <b>PN16 SDR11</b>								Loose Backing Ring <b>EN1092 PN16</b>					
Product Code	dn x DN	dn	D4	d3	le	t3	L	DN	D	k	C1	D1	No. of Holes
P5316.FG.355300	<b>355 x 300</b>	355	AoR	287	AoR	AoR	395	300	AoR	410	AoR	26	12

Click [here](#) to understand why Full Face flange adaptors are required.

AoR dimensions are available on request, please [contact us](#).

For larger sizes use Full Face Stepped below



## Flange Assembly / Full Face Stepped / Spigot / PN16 / SDR11

Full face stepped flange adaptors are designed to connect PE pipes to DI valves and other fittings in large sizes whilst maintaining the same nominal pipe bore and flange bolting PCD between the PE and DI. This cannot be achieved using a Standard PE flange adaptor.

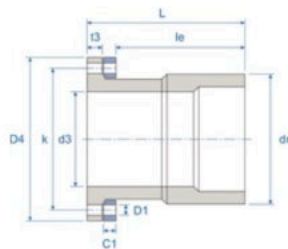
Typically in larger sizes (450 OD PE connecting to DN350 DI) the step is so large that the fasteners through the connecting flange foul on the pipe OD. The Mill-Pro design lengthens the spigot and creates a reduced OD area behind the flange face to provide for fastener clearance. Regardless of the design, all stepped flange adaptors must maintain the same SDR rating as the connecting pipe, throughout the entire spigot length, to ensure the full pressure rating is maintained.

Full face flange adaptors are machined from PE100+ black hollow bar. Supplied complete with a rotatable but non-removable, FBE coated, loose steel backing flange, complying to EN 1092-1 PN16. Steel flanges are coated in accordance with WIS 4-52-01. Fasteners and gaskets are not included.

Full Face Stepped Flange Adaptor Black <b>PN16 SDR11</b>								Loose Backing Flange <b>EN1092 PN16</b>					
Product Code	dn x DN	dn	D4	d3	le	t3	L	DN	D	k	C1	D1	No. of Holes
P5316.EG.450350	<b>450 x 350</b>	450	AoR	334	AoR	AoR	450	350	AoR	470	AoR	26	16
P5316.EG.500400	<b>500 x 400</b>	500	AoR	374	AoR	AoR	500	400	AoR	525	AoR	30	16
P5316.EG.560450	<b>560 x 450</b>	560	AoR	422	AoR	AoR	550	450	AoR	585	AoR	30	20
P5316.EG.630500	<b>630 x 500</b>	630	AoR	470	AoR	AoR	600	500	AoR	650	AoR	33	20
P5316.EG.710600	<b>710 x 600</b>	710	AoR	564	AoR	AoR	670	600	AoR	770	AoR	36	20
P5316.EG.800700	<b>800 x 700</b>	800	AoR	623	AoR	AoR	750	700	AoR	840	AoR	36	24

[Click here](#) to understand why Full Face flange adaptors are required.

AoR dimensions are available on request, please [contact us](#).





## Flange Assembly / Standard / Spigot / PN16 / SDR11

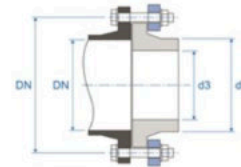
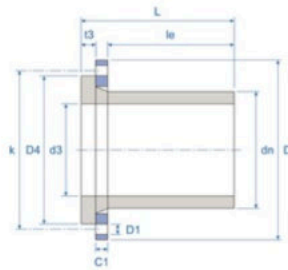
Standard flange adaptor complying to ISO 9624 in SDR 11 rated for PN16. Machined from PE100+ black hollow bar, with an extra-long spigot to allow fastener removal once fused in place. Supplied with an FBE coated loose steel backing flange, complying to EN 1092-1 PN16 and coated in accordance with WIS 4-52-01. Fasteners and gaskets are not included with this flange assembly.

The sizes given below are suitable for connecting PE pipe to PE pipe via flanged joints, however, flanged connections to other materials, (such as DI valves and fittings) will create an undesirable internal step at the interface between the PE and DI flanges.

**Example:** In the table below 710 x 700, the PE pipe & flange adaptor ID (d3) is 574mm (effectively DN600) and the loose steel backing flange bolts to a DN700 DI flange. This combination creates a 63mm internal step on each side of the joint. This joint also requires a larger DN700 valve or fitting to be used in a DN600 pipeline, adding unnecessary cost. The alternate is a full-face flange assembly from the table above where the PE can bolt directly to a DN600 DI valve or fitting, to avoid such internal steps.

Standard Flange Adaptor Black PN16 SDR11								Loose Backing Ring EN1092 PN16					
Product Code	dn x DN	dn	D4	d3	le	t3	L	DN	D	k	C1	D1	No. of Holes
P5316.J6.355350	355 x 350	355	AoR	287	AoR	AoR	260	350	AoR	470	AoR	26	16
P5316.J6.450450	450 x 450	450	AoR	364	AoR	AoR	370	450	AoR	585	AoR	30	20
P5316.J6.500500	500 x 500	500	AoR	405	AoR	AoR	400	500	AoR	650	AoR	33	20
P5316.J6.560600	560 x 600	560	AoR	453	AoR	AoR	435	600	AoR	770	AoR	36	20
P5316.J6.630600	630 x 600	630	AoR	510	AoR	AoR	435	600	AoR	770	AoR	36	20
P5316.J6.710700	710 x 700	710	AoR	574	AoR	AoR	440	700	AoR	840	AoR	36	24
P5316.J6.800800	800 x 800	800	AoR	647	AoR	AoR	445	800	AoR	950	AoR	39	24

WSD PS requires *Full Face Flange assemblies* to be used on sizes > DN150 to DN700.  
AoR dimensions are available on request, please [contact us](#).



**FAIL** – Flange bolts align, internal step created

## Backing Flange / Stainless Steel / EN1092 / PN16

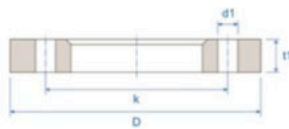
316 Stainless steel loose backing flange dimensions are machined in accordance with BSEN 1092-1 to match an ISO 9624 Standard PE flange adaptor. Flange patterns in addition to BSEN 1092-1 PN16 are available on request.

316 Stainless steel should be used on flanges that are above ground or exposed to harsh environments.

Product Code	DN (Flange)	DN/OD (Pipe)	D	k (PCD)	d2	No. of Bolt Holes	t1
P09.435.063050	50	63	165	125	18	4	AoR
P09.435.075065	65	75	185	145	18	4	AoR
P09.435.090080	80	90	200	160	18	8	AoR
P09.435.110100	100	110	220	180	18	8	AoR
P09.435.125100	100	125	220	180	18	8	AoR
P09.435.140125	125	140	250	210	18	8	AoR
P09.435.160150	150	160	285	240	22	8	AoR
P09.435.180150	150	180	285	240	22	8	AoR
P09.435.200200	200	200	340	295	22	12	AoR
P09.435.225200	200	225	340	295	22	12	AoR
P09.435.250250	250	250	405	355	26	12	AoR
P09.435.280250	250	280	405	355	26	12	AoR
P09.435.315300	300	315	455	410	26	12	AoR
P09.435.355350	350	355	520	470	26	16	AoR
P09.435.400400	400	400	580	525	30	16	AoR
P09.435.450450	450	450	640	585	30	20	AoR
P09.435.500500	500	500	715	650	33	20	AoR
P09.435.560600	600	560	840	770	36	20	AoR
P09.435.630600	600	630	840	770	36	20	AoR
P09.435.710700	700	710	910	840	36	24	AoR
P09.435.800800	800	800	1025	950	39	24	AoR
P09.435.900900	900	900	1125	1050	39	28	AoR
P09.435.10001000	1000	1000	1255	1170	42	28	AoR
P09.435.12001200	1200	1200	1485	1390	48	32	TBC
P09.435.14001400	1400	1400	1685	1590	48	36	TBC
P09.435.16001600	1600	1600	1930	1820	56	40	TBC
P09.435.18001800	1800	1800	2130	2020	56	44	TBC
P09.435.20002000	2000	2000	2345	2230	62	48	TBC

TBC - Dimension to be supplied by the purchaser depending on the design Maximum Operating Pressure (MOP).

AoR dimensions are available on request, please [contact us](#).





## Mechanical Connections

There are circumstances where the use of electrofusion fittings or butt-welding of Polyethylene pipes is simply not possible, typically because moisture is present - such as in emergency repair situations where the site or pipe cannot be successfully de-watered to allow dry fusion welding to occur and for temporary works where disassembly may be required.

In these circumstances, mechanical connectors are a fast and efficient joining method. Mechanical connectors for Polyethylene differ to typical socket connections used on DI and PVC pipe, mechanical connectors for PE must have two elements present:

- A socket/sealing system to contain the pressure (in the same style as a DI or PVC socket joint,
- A suitable mechanical restraint system to anchor the PE pipe into the fitting and maintain the 'end to end' restraint.

Mechanical restraint allows the forces generated in a PE network (thermal, soil, pressure forces etc) to be transferred through the mechanical fitting and along the pipeline or into a fixed point. In accordance with UK Water Industry Standard WIS 4-24-01, there are three definitions of mechanical restraint joints suitable for use with PE, each carries a different designation depending on its ability to maintain the transfer of lineal forces within a PE pipeline;

**Type 1 fittings:** where "the end-load resistance of the joint is greater than the longitudinal strength of the pipe". Meaning that if the pipe and fitting are pulled apart in tension, the pipe will always fail (yield) before it separates from the mechanical joint or leaks, regardless of the system being pressurised or not. This is the equivalent of a welded joint. (Note: it is much harder to pass this test if the system is unpressurised, as internal pressure holds the pipe tight against its mechanical gripping mechanism).

**Type 2 fittings:** where "the end-load resistance of the joint is greater than the maximum axial forces assumed to be acting on the joint" (See IGN 4-01-02v3) Meaning the joint will provide restraint at the maximum operating pressure and temperature under normal operating conditions, but excludes additional loads on the joint such as from ground movement/settlement.

**Type 3 fittings:** where "the end-load resistance of the joint is less than that required for Type 2 fittings". Meaning no mechanical restraint - a typical rubber ring socketed joint that does not provide any end load restraint and requires anchor blocks is a Type 3 Fitting.

*Product specifications and dimensions are subject to change without notice.*

*For the latest information refer to our website: [www.millpro.com.hk](http://www.millpro.com.hk) or contact our [sales team](#).*



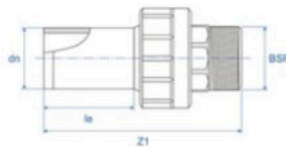
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## Threaded Transition Adaptor / UAN / Male / PN16 / SDR11

The Friatec male threaded transition adaptor is a WIS 4-24-01 Type 1 compliant spigot fitting, with an Eco Brass, dezincification resistant, lead-free copper alloy male thread. The thread is non-rotatable and is not removable from the adaptor. The adaptor is fused to the PE pipe using an MB coupler to provide a threaded connection for small diameter copper alloy valves.

**Note:** Friatec transition adaptors are NOT suitable for use in Flushing/saltwater systems when connecting directly (without insulation) to a BS EN 1982 CC419K 'Red Brass' valves, as Galvanic corrosion may occur.

Product Code	dn	BSP	le	Z1	Availability in Hong Kong
P5316.55.02584	25	3/4"	44	92	8-12 Weeks
P5316.55.03285	32	1"	47	104	Ex-Stock
P5316.55.05087	50	1 1/2"	57	123	Ex-Stock
P5316.55.06387	63	1 1/2"	63	136	8-12 Weeks
P5316.55.06388	63	2"	63	140	Ex-Stock
P5316.55.06390	90	3"	78	172	8-12 Weeks
P5316.55.12591	125	4"	92	200	8-12 Weeks

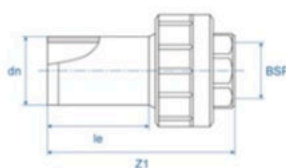


## Threaded transition Adaptor / UAM / Female / PN16 / SDR11

The Friatec threaded female transition adaptor is a WIS 4-24-01 Type 1 compliant spigot fitting, with an Eco Brass, dezincification resistant, lead-free copper alloy female thread. The thread is non-rotatable and is not removable from the adaptor. The adaptor is fused to the PE pipe using an MB coupler to provide a threaded connection for small diameter copper alloy valves.

**Note:** Friatec transition adaptors are NOT suitable for use in Flushing/saltwater systems when connecting directly (without insulation) to a BS EN 1982 CC419K 'Red Brass' valves, as Galvanic corrosion is likely to occur.

Product Code	dn	BSP	le	Z1	Availability in Hong Kong
P5316.56.02584	25	3/4"	44	77	8-12 Weeks
P5316.56.03285	32	1"	47	88	Ex-Stock
P5316.56.05087	50	1 1/2"	57	102	Ex-Stock
P5316.56.06387	63	1 1/2"	63	115	8-12 Weeks
P5316.56.06388	63	2"	63	120	Ex-Stock
P5316.56.09090	90	3"	78	144	8-12 Weeks
P5316.56.12591	125	4"	92	161	8-12 Weeks



## Pushfit Compression Joint fittings

A fast and easy method to connect small diameter ( $\leq$ DN/OD 63) PE pipes, with no requirement to tighten external nuts to affect a seal. Simply push the PE pipe into the fitting. The fittings tensile restraint and hydraulic seal on the pipe increase with water pressure and tensile load. This means that the PE pipe will burst or neck before the joint fails. The Talbot Pushfit fitting is pressure rated PN 16.

Pushfit fittings do not require de-rating and can be used with PN20 pipes operating at PN16 for above-ground service. They are ideal for connection in flushing water systems to CC419K Red Brass valves to avoid the risk of Galvanic Corrosion.

Pushfit fittings are manufactured from high performance materials for resistance to distortion and corrosion and for strong threaded connections, they have Type 1 pull out resistance according to UK WIS 4-32-11 and have been used in the UK and around the world for more than 40 years. They meet the performance requirements of the following standards;

ISO 3458, 3459, 3501, 3503, DIN 8076, UK WIS 4-23-04, KIWA BRL 534/03, AS/NZS 4129, BS EN 1254-3 and are WRAS BS6920 approved.

# Pushfit

## Connectors / PE-PE / PN16

PE to PE connector supplied complete with SDR11 inserts

Pushfit Compression Joint fittings comply with Water Supplies Department WSD PS Appendix 22.09 Clause 5.7. Liners are required to be inserted into the pipe ends for pipes SDR11 or greater.

Product Code	dn	Availability in Hong Kong
P4316.100.025	25	Ex-Stock
P4316.100.032	32	Ex-Stock
P4316.100.050	50	Ex-Stock
P4316.100.063	63	Ex-Stock



## Reducing Connectors / PE-PE / PN16

PE to PE reducing connector supplied complete with SDR11 inserts

Pushfit Compression Joint fittings comply with Water Supplies Department WSD PS Appendix 22.09 Clause 5.7. Liners are required to be inserted into the pipe ends for pipes SDR11 or greater.

Product Code	dn1	dn2	Availability in Hong Kong
P4316.14.032025	32	25	Ex-Stock
P4316.14.050025	50	25	Ex-Stock
P4316.14.050032	50	32	Ex-Stock
P4316.14.063025	63	25	Ex-Stock
P4316.14.063032	63	32	Ex-Stock
P4316.14.063050	63	50	Ex-Stock



## Adaptors / Male / BSP-PE / PN16

BSP threaded male adaptor supplied complete with SDR11 insert, BS EN 10226-1 Tapered threads

Pushfit Compression Joint fittings comply with Water Supplies Department WSD PS Appendix 22.09 Clause 5.7. Liners are required to be inserted into the pipe ends for pipes SDR11 or greater.

Product Code	dn1	dn2	Availability in Hong Kong
P4316.51.02584	25	20 / 3/4"	Ex-Stock
P4316.51.03285	32	25 / 1"	Ex-Stock
P4316.51.05087	50	40 / 1 1/2"	Ex-Stock
P4316.51.06388	63	50 / 2"	Ex-Stock





## Adaptors / Female / BSP-PE / PN16

BSP threaded female adaptor supplied complete with SDR11 insert, BS EN 10226-1 parallel threads. Pushfit Compression Joint fittings comply with Water Supplies Department WSD PS Appendix 22.09 Clause 5.7. Liners are required to be inserted into the pipe ends for pipes SDR11 or greater.

Product Code	dn1	dn2	Availability in Hong Kong
P4316.53.02584	25	20 / 3/4"	Ex-Stock
P4316.53.03285	32	25 / 1"	Ex-Stock
P4316.53.05087	50	40 / 1 1/2"	Ex-Stock
P4316.53.06388	63	50 / 2"	Ex-Stock



## Elbows 90° / PE-PE / PN16

PE pushfit 90° elbow. Supplied complete with SDR11 insert.

Pushfit Compression Joint fittings comply with Water Supplies Department WSD PS Appendix 22.09 Clause 5.7. Liners are required to be inserted into the pipe ends for pipes SDR11 or greater.

Product Code	dn	Availability in Hong Kong
P4316.115.025	25	Ex-Stock
P4316.115.032	32	Ex-Stock
P4316.115.050	50	Ex-Stock
P4316.115.063	63	Ex-Stock





## Tee Equal / PE-PE-PE / PN16

PE pushfit Tee. Supplied complete with SDR11 insert.

Pushfit Compression Joint fittings comply with Water Supplies Department WSD PS Appendix 22.09 Clause 5.7. Liners are required to be inserted into the pipe ends for pipes SDR11 or greater.

Product Code	dn	Availability in Hong Kong
P4316.122.025	25	Ex-Stock
P4316.122.032	32	Ex-Stock
P4316.122.050	50	Ex-Stock
P4316.122.063	63	Ex-Stock



## Tee Un Equal / PE-PE-BSP / PN16

PE pushfit reducing Tee. Supplied complete with SDR11 insert.

Pushfit Compression Joint fittings comply with Water Supplies Department WSD PS Appendix 22.09 Clause 5.7. Liners are required to be inserted into the pipe ends for pipes SDR11 or greater.

Product Code	dn1	dn2	Availability in Hong Kong
P4316.21.02584	25	20 / 3/4"	Ex-Stock
P4316.21.03285	32	25 / 1"	Ex-Stock
P4316.21.05087	50	40 / 1 1/2"	Ex-Stock
P4316.21.06388	63	50 / 2"	Ex-Stock







# Restraint

## Polyethylene Restraint Theory

End Restraint of Polyethylene Pipes in both pressure and non-pressure applications is essential. Unlike other pipe materials such as PVC or Ductile Iron, PE is an 'End to End' system meaning the various forces (stress) are distributed in theory to the 'ends' of the pipeline. In reality, a large part of the stress is absorbed into the ground due to soil friction acting on the pipeline, however, unlike other pipe materials that have rubber ring sockets and require anchor blocks, the local forces in PE are designed to be re-distributed and balanced throughout the pipeline, due to the continuous nature of the jointing system.

PE is a *viscoelastic material*, meaning it exhibits both viscous and elastic characteristics when undergoing deformation or stress. Due to the viscous characteristic, the ends of a polyethylene pipe must be physically anchored to prevent them from moving. Anchoring pipe to pipe is achieved by fusion (electrofusion or butt fusion) at each joint or by mechanical connection such as a *flanged Adaptor*, *threaded joint* or a *Type 1 Joint*. These joint methods maintain the pipelines mechanical continuity, over which the stresses are transferred along the length pipeline.

Stress in a PE pipeline is typically generated by one or more of the following operating conditions:

- **Internal operating pressure** (creates loads on the ends of the pipes and at changes in direction)
- **External ground loading** (soil weight & traffic loads try to ovalise the pipe)
- **Thermal change** (pipe installed at 50°C, cools to ground temp 15°C is trying to shorten itself 6.5mm for every meter of pipe installed)
- **Ground settlement** (reclaimed land settlement - a slow extension of the pipeline between fixed points)
- **Ground movement** (landslides - significant tension between fixed points due to the pipe pulling through the soil)

When PE pipe undergoes stress from one or more of the events above and the pipe is maintained in that condition (the pipe ends are sufficiently anchored), the stress developed in the pipe wall decays gradually with time. The decrease in stress under constant strain is called 'stress relaxation'. Given enough time, the stress level between the two fixed points approaches equilibrium along the pipeline, this state is maintained as long as the continuity of the joints and pipe anchoring is maintained.

*Product specifications and dimensions are subject to change without notice.  
For the latest information refer to our website: [www.millpro.com.hk](http://www.millpro.com.hk) or contact our [sales team](#).*

## Black Puddle Flange / Long Spigot / PN16 / SDR11 / with optional Waterstop

Puddle flanges perform the same function as their Ductile Iron (DI) counterparts. Designed for encasement in concrete, where PE passes through a structure (typically a concrete wall). Because PE is an 'end to end system' in respect to the transfer of forces (pressure, thermal and ground movement). A puddle flange design must withstand loads that exceed the ultimate tensile strength of the pipe meaning Pipe fails first in a tensile pull to failure.

For this reason, Mill-Pro puddle flanges are either injection moulded in PE100+ or machined from a single piece of extruded PE100+ hollow bar. They contain no welds or joints in the puddle area. (between the tapered sections).

In reclaimed land applications (for which PE is perfectly suited to), designers must consider to total lateral force that may be applied to a concrete structure, by the pipe pulling on the structure as it sinks with the settling ground. Click here for a more detailed presentation on settlement loadings.

Unlike DI, PE will not naturally form a leak-free seal when embedded into the concrete. PE expands when surrounded by mass concrete, due to the increase in temperature of curing concrete. Once the concrete cools, the PE reverts to its original size leaving a small gap between the PE and the concrete, this gap allows water to pass both into or out of the structure.

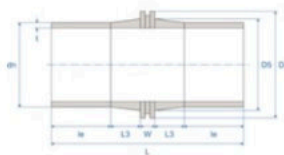
To prevent this a Hydrophilic vulcanized expansive rubber sealing ring is fitted to a groove in the puddles ring. This Hydrophilic ring expands >600% when activated by exposure to moisture. Hydrophilic sealing rings comply with ASTM D471 and must be kept dry in until they are installed and are supplied as standard.

*Note: This product is not suitable for making pressure connections such as the base of a reservoir. Hydrophilic sealing rings are a water stop, not a pressure seal. They are designed to expand into the surrounding structure and provide a barrier to groundwater ingress or egress typically found in chambers or structures, a few meters below ground level.*

non-Waterstop	with Waterstop	dn	t	W	D5	D4	L3	le	L	Availability in Hong Kong
P5316.138.125	P5316.938.125	125	11.4	20	AoR	157	50	150	420	6-8 weeks
P5316.138.180	P5316.938.180	180	16.4	21	AoR	225	50	150	421	6-8 weeks
P5316.138.250	P5316.938.250	250	22.7	29	AoR	313	50	250	629	6-8 weeks
P5316.138.315	P5316.938.315	315	28.6	36	AoR	394	50	300	736	6-8 weeks
P5316.138.355	P5316.938.355	355	32.2	41	AoR	444	82	300	805	6-8 weeks
P5316.138.450	P5316.938.450	450	40.9	52	AoR	563	104	300	860	6-8 weeks
P5316.138.500	P5316.938.500	500	45.4	57	AoR	625	114	350	985	6-8 weeks
P5316.138.560	P5316.938.560	560	50.8	64	AoR	700	128	350	1020	6-8 weeks
P5316.138.630	P5316.938.630	630	57.2	72	AoR	788	144	350	1060	6-8 weeks
P5316.138.710	P5316.938.710	710	64.5	81	AoR	888	162	350	1105	6-8 weeks
P5316.138.800	P5316.938.800	800	72.6	91	AoR	1000	182	350	1155	6-8 weeks

Larger sizes can be found in our *Wastewater* sections.

AoR dimensions are available on request, please [contact us](#).

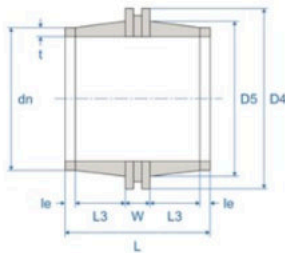


## Puddle Flange / Butt Fusion / PN10 / SDR17 / with optional Waterstop

As above, however, machined to suit SDR 17 pipes with butt fusion ends for site butt welding.

non-Waterstop	with Waterstop	dn	t	W	D5	D4	L3	le	L	Availability in Hong Kong
P2314.138.900	P2314.938.900	900	53.3	67	AoR	1045	134	100	535	6-8 weeks
P2314.138.1000	P2314.938.1000	1000	59.3	74	AoR	1161	148	100	570	6-8 weeks
P2314.138.1200	P2314.938.1200	1200	71.1	89	AoR	1393	178	100	645	6-8 weeks

Above dn800, puddle flanges are supplied with fusion weld ends for factory joining to a pipe to reduce site welds. Long spigots versions are available on request.  
 Other sizes and SDRs are available on request, please [contact us](#).  
 AoR dimensions are available on request, please [contact us](#).



## Flex Restraint

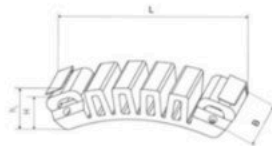
**FRIAFIT FIXBLOC** is used where axial thrust, thermal and tensile forces must be absorbed into a structure to anchor the PE pipe. For example, pipe rehabilitation where the PE exits and enters the host pipe or replacement of a valve inside a chamber, where the PE pipe ends were not anchored in the walls using puddle flanges. (valve removal can cause the flanged ends to pull apart towards the chamber walls due to inherent stresses in PE pipes beyond the chamber)

High levels of push-pull forces of up to 40 kN per FIXBLOC can be absorbed or more when using several FIXBLOCs on the same pipe. Users should consider the ability of the structure to absorb the expected forces.

FIXBLOC assembly using a 50mm tensioning belt or where the pipe circumference is not accessible, using the several clamps unit. Fusion is carried out using standard FRIAMAT fusion units.

The pipe surface must be clean, dry, free of oils and grease and mechanically peeled or scraped prior to fusion.

Product Code	dn	L	H	h1	B	Availability in Hong Kong
P3310.040.1601600	160-1600	220	40	45	60	8-12 weeks



*FIXBLOC is held on the pipe during fusion using a 50mm wide standard tensioning belt.*



*On larger pipes, multiple FIXBLOCs can be fused around the circumference of the pipe.*



*Where circumferential access is not possible FIXBLOC can be clamped to the pipe*



## Specialty Fittings

Polyethylene has incredible fabrication flexibility, it can be machined, extruded, injection moulded and welded into any shape, meaning any fitting which can be imagined, can be manufactured. This section contains a wide range of specialty PE products used in water supply applications.

Polyethylene provides far more flexibility than Ductile Iron which is restricted to casting shapes, making a single product is expensive and DI cannot be reliably welded. Steel offers more ability to create custom solutions however suffers corrosion-related failures. Custom made pressure rated PE fittings can be manufactured to order as shown in the examples below.

Factory fabrication of complex design solutions are possible, below are some examples of the amazing flexibility of Polyethylene in pressure water systems. Contact us to discuss design possibilities for custom fabricated pressure fittings up to 2500mm OD and PN25 pressure ratings.



Examples of complex PE projects designed in full pressure class ratings by Reinert Ritz.



*Product specifications and dimensions are subject to change without notice.  
For the latest information refer to our website: [www.millpro.com.hk](http://www.millpro.com.hk) or contact our [sales team](#).*



*This mark is used to identify Mill-Pro products that meet the requirements of the Water Supplies Department PS Appendix 22.09. The use of this mark is not endorsed by the WSD and is not intended to infer approval by the WSD.*

## Level Invert (Scour/Drain) Tee

**Fabricated** Level invert or Scour Tee's are manufactured by machining PE100+ hollow bar into a fitting body and welding on spigot ends in according with BS ISO 21307. Fabricated Tee's feature long spigots for electrofusion or butt fusion joining and 1D and 2D bar code stickers for complete product traceability.

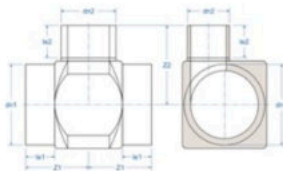
Note: The spigot ends must be prepared in accordance with the *general installation instructions* using a spigot *mechanical peeler*, *90% Isopropyl alcohol wipes* before fusing.

PN10 SDR17	PN16 SDR11	dn1	dn2	L	le1	le2	Z1	Z2	Availability in Hong Kong
-	P5316.42.250063	250	63	670	250	180	335	335	6-8 weeks
-	P5316.42.250090	250	90	690	250	180	345	335	6-8 weeks
-	P5316.42.250125	250	125	710	250	180	355	335	6-8 weeks
-	P5316.42.315063	315	63	790	300	180	395	372.5	6-8 weeks
-	P5316.42.315090	315	90	810	300	180	405	372.5	6-8 weeks
-	P5316.42.315125	315	125	840	300	180	420	372.5	6-8 weeks
P5314.42.355090	P5316.42.355090	355	90	830	300	180	415	392.5	6-8 weeks
P5314.42.355125	P5316.42.355125	355	125	850	300	180	425	392.5	6-8 weeks
P5314.42.355180	P5316.42.355180	355	180	900	300	220	450	437.5	6-8 weeks
P5314.42.450125	P5316.42.450125	450	125	880	300	180	440	445	6-8 weeks
P5314.42.450180	P5316.42.450180	450	180	940	300	220	470	490	6-8 weeks
P5314.42.500125	P5316.42.500125	500	125	1000	350	180	500	470	6-8 weeks
P5314.42.500180	P5316.42.500180	500	180	1050	350	220	525	515	6-8 weeks
P5314.42.500250	P5316.42.500250	500	250	1110	350	220	555	515	6-8 weeks
P5314.42.560180	P5316.42.560180	560	180	1060	350	220	530	545	6-8 weeks
P5314.42.560250	P5316.42.560250	560	250	1110	350	220	555	545	6-8 weeks
P5314.42.630180	P5316.42.630180	630	180	1090	350	220	545	585	6-8 weeks
P5314.42.630250	P5316.42.630250	630	250	1140	350	220	570	585	6-8 weeks
P5314.42.630315	P5316.42.630315	630	315	1190	350	220	595	585	6-8 weeks

Larger sizes up to dn1000 with scour offtakes from dn180 to dn450 are available in PN16 SDR11 rating. Dimensions on request.

PN10 SDR17 fully complies with WSD PS, only where the engineer allows the use of PN10 fittings.

Larger sizes up to dn2000 with offtakes from dn180 to dn1000 are available in PN10 SDR17 rating. Dimensions available on request.



## 45° Branch Reducing Tee

**Fabricated** angled Branch Tee's have a centric offtake manufactured by machining PE100+ hollow bar into a fitting body and welding on spigot ends in according with BS ISO 21307. Fabricated Tee's feature long spigots for electrofusion or butt fusion joining and 1D and 2D bar code stickers for complete product traceability.

Note: The spigot ends must be prepared in accordance with the *general installation instructions* using a spigot *mechanical peeler*, *90% Isopropyl alcohol wipes* before fusing.

PN10 SDR17	PN16 SDR11	dn1	dn2	L	le1	le2	Z1	Z2	Z3	Availability in Hong Kong
P5314.43.250063	P5316.43.250063	250	63	681	200	70	488	372	193	12-14 weeks
P5314.43.250090	P5316.43.250090	250	90	731	200	80	513	404	218	12-14 weeks
P5314.43.250125	P5316.43.250125	250	125	775	200	100	535	469	240	12-14 weeks
P5314.43.250180	P5316.43.250180	250	180	871	200	110	588	516	283	12-14 weeks
P5314.43.250250	P5316.43.250250	250	250	981	200	200	643	726	338	12-14 weeks
P5314.43.280063	P5316.43.280063	280	63	681	200	70	503	393	178	12-14 weeks
P5314.43.280090	P5316.43.280090	280	90	731	200	80	528	425	203	12-14 weeks
P5314.43.280125	P5316.43.280125	280	125	775	200	100	550	490	225	12-14 weeks
P5314.43.280180	P5316.43.280180	280	180	871	200	110	603	537	268	12-14 weeks
P5314.43.280250	P5316.43.280250	280	250	981	200	200	658	747	323	12-14 weeks
P5314.43.315090	P5316.43.315090	315	90	770	200	80	565	450	205	12-14 weeks
P5314.43.315125	P5316.43.315125	315	125	816	200	100	588	515	228	12-14 weeks
P5314.43.315180	P5316.43.315180	315	180	910	200	110	640	562	270	12-14 weeks
P5314.43.315250	P5316.43.315250	315	250	1020	200	200	695	772	325	12-14 weeks
P5314.43.315315	P5316.43.315315	315	315	1130	200	200	750	835	380	12-14 weeks
P5314.43.355090	P5316.43.355090	355	90	770	200	80	585	478	185	12-14 weeks
P5314.43.355125	P5316.43.355125	355	125	816	200	100	608	543	208	12-14 weeks
P5314.43.355180	P5316.43.355180	355	180	910	200	110	660	591	250	12-14 weeks
P5314.43.355250	P5316.43.355250	355	250	1070	200	200	765	836	305	12-14 weeks
P5314.43.355315	P5316.43.355315	355	315	1180	200	200	820	898	360	12-14 weeks
P5314.43.355355	P5316.43.355355	355	355	1220	200	200	830	892	390	12-14 weeks
P5314.43.450125	P5316.43.450125	450	125	1015	300	100	755	611	260	12-14 weeks
P5314.43.450180	P5316.43.450180	450	180	1111	300	110	808	658	303	12-14 weeks
P5314.43.450250	P5316.43.450250	450	250	1221	300	200	863	868	358	12-14 weeks
P5314.43.450315	P5316.43.450315	450	315	1331	300	200	918	930	413	12-14 weeks
P5314.43.450355	P5316.43.450355	450	355	1421	300	200	978	959	443	12-14 weeks
P5314.43.450450	P5316.43.450450	450	450	1561	300	300	1048	1159	513	12-14 weeks
P5314.43.500125	P5316.43.500125	500	125	1015	300	100	780	646	235	12-14 weeks
P5314.43.500180	P5316.43.500180	500	180	1111	300	110	833	693	278	12-14 weeks
P5314.43.500250	P5316.43.500250	500	250	1221	300	200	888	903	333	12-14 weeks
P5314.43.500315	P5316.43.500315	500	315	1331	300	200	943	966	388	12-14 weeks
P5314.43.500355	P5316.43.500355	500	355	1441	300	200	1023	1008	418	12-14 weeks
P5314.43.500450	P5316.43.500450	500	450	1581	300	300	1093	1208	488	12-14 weeks
P5314.43.500500	P5316.43.500500	500	500	1671	300	300	1138	1248	533	12-14 weeks
P5314.43.560180	P5316.43.560180	560	180	1111	300	110	863	735	248	12-14 weeks
P5314.43.560250	P5316.43.560250	560	250	1221	300	200	918	945	303	12-14 weeks
P5314.43.560315	P5316.43.560315	560	315	1331	300	200	973	1008	358	12-14 weeks
P5314.43.560355	P5316.43.560355	560	355	1441	300	200	1053	1051	388	12-14 weeks
P5314.43.560450	P5316.43.560450	560	450	1546	300	300	1123	1196	423	12-14 weeks
P5314.43.560500	P5316.43.560500	560	500	1671	300	300	1168	1291	503	12-14 weeks
P5314.43.560560	P5316.43.560560	560	560	1751	300	300	1198	1342	553	12-14 weeks
P5314.43.630180	P5316.43.630180	630	180	1111	300	110	898	785	213	12-14 weeks
P5314.43.630250	P5316.43.630250	630	250	1221	300	200	953	995	268	12-14 weeks
P5314.43.630315	P5316.43.630315	630	315	1331	300	200	1008	1057	323	12-14 weeks
P5314.43.630355	P5316.43.630355	630	355	1421	300	200	1068	1086	353	12-14 weeks
P5314.43.630450	P5316.43.630450	630	450	1581	300	300	1158	1300	423	12-14 weeks
P5314.43.630500	P5316.43.630500	630	500	1671	300	300	1203	1340	468	12-14 weeks
P5314.43.630560	P5316.43.630560	630	560	1771	300	300	1253	1405	518	12-14 weeks
P5314.43.630630	P5316.43.630630	630	630	1861	300	300	1288	1451	573	12-14 weeks

45° Elbow is used on the outlet to eliminate angled butt welds, prohibited under WSD PS Appendix 22.09 Clause 5.5.7.6.

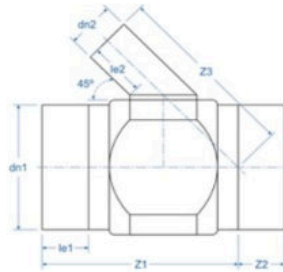
Larger sizes up to dn1000 with offtakes from dn180 to dn710 are available in PN16 SDR11 rating. Dimensions on request.

Larger sizes up to dn1200 with offtakes from dn180 to dn800 are available in PN10 SDR17 rating. Dimensions available on request.

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## 45° Branch Reducing Tee

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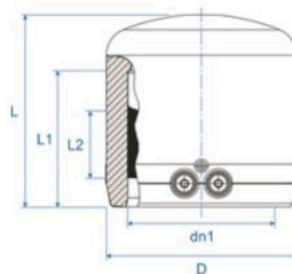


## Black Electrofusion End Cap / MV / EF / PN16 / SDR11

Friatec's PE100 MV Injection moulded end caps for end of line termination are suitable for fusing pipes from SDR11 to SDR17.6 MV end caps feature large insertion depth for pipe stability during fusion and extra wide fusion and cold zones for maximum melt containment. Exposed heating coils for direct heat transmission to the pipe and a small annular gap to ensure optimum joining pressure in the fusion zone. A visual pop up fusion indicator confirms weld pressure and traceability bar codes are included for recording batch GIS and BIM records for each coupler installed. All couplers are sealed in individual plastic bags for protection on site.

Note: The pipe or spigot ends and the coupler must be prepared in accordance with the *general installation instructions* using a spigot mechanical peeler, 90% Isopropyl alcohol wipes and we recommend using the *Friamat fusion control* unit to achieve correct preheating and logging the full range of weld data available.

Product Code	dn1	D	L	L1	L2	Availability in Hong Kong
P3316.140.025	25	35	65	41	22	Ex-Stock
P3316.140.032	32	44	70	44	24	Ex-Stock
P3316.140.050	50	67	80	55	30	Ex-Stock
P3316.140.063	63	84	88	63	31	Ex-Stock
P3316.140.090	90	118	114	79	40	Ex-Stock
P3316.140.125	125	163	135	87	42	Ex-Stock
P3316.140.180	180	225	195	100	50	Ex-Stock





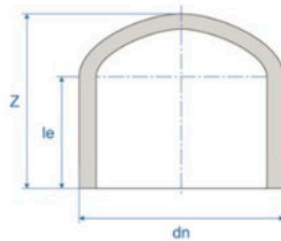
## Blue Spigot End Caps / PN16 / SDR11

Mill-Pro PE100 RC Injection moulded spigot end caps feature long spigots for electrofusion or butt fusion joining. Mill-Pro fittings feature hard moulded brand, batch numbers for compliance checking and 1D and 2D bar code stickers for complete product traceability. All elbows are sealed in individual plastic bags for protection on site. Spigot fittings are joined by Electrofusion Couplers or Butt Fusion.

Note: The pipe and spigot ends must be prepared in accordance with the *general installation instructions* using a spigot *mechanical peeler* and *90% Isopropyl alcohol wipes*.

Product code	dn	le	Z	Availability in Hong Kong
P5826.140.032	32	44	53	Ex-Stock
P5826.140.050	50	56	68	Ex-Stock
P5826.140.063	63	65	78	Ex-Stock
P5826.140.090	90	79	95	Ex-Stock
P5826.140.125	125	88	111	Ex-Stock
P5826.140.180	180	105	140	Ex-Stock
P5826.140.250	250	130	160	Ex-Stock
P5826.140.315	315	150	180	Ex-Stock

Blue moulded end caps may not always be in stock and may be subject to longer lead times. Alternative options in black moulded or fabricated can be provided.



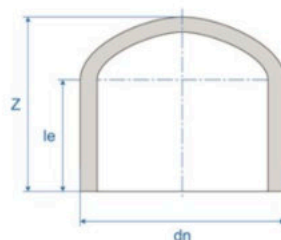
## Black End Cap / SP / PN16 / SDR11

Mill-Pro's injection moulded end caps are manufactured from PE100+ compound according to BS EN 12201-3. They feature long spigots for electrofusion or butt fusion joining and 1D and 2D bar code stickers for complete product traceability. All bends are sealed in individual plastic bags for protection on site.

Note: The pipe and spigot ends must be prepared in accordance with the *general installation instructions* using a spigot *mechanical peeler* and *90% Isopropyl alcohol wipes*.

Product Code	dn	le	Z	Availability in Hong Kong
P5316.140.355	355	220	255	4-6 Weeks
P5316.140.450	450	220	265	4-6 Weeks
P5316.140.500	500	220	270	4-6 Weeks

For larger sizes typically a *flange adaptor* and blank flange are used for end of line termination.



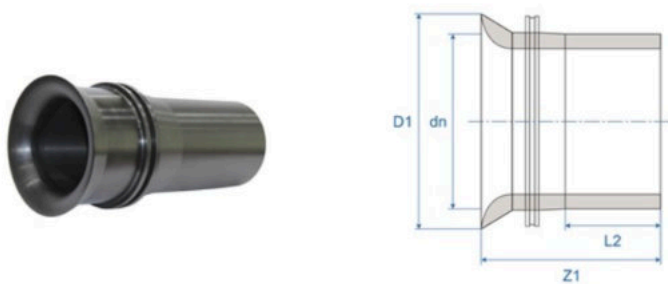
## Black Bellmouth / Long Spigot / PN16 / SDR11

Mill-Pro's fabricated Black PE100+ long spigot Bellmouth fittings are designed for embedment in concrete to replace traditional ductile Iron bellmouth discharge fittings and connect directly by electrofusion to the incoming our outgoing PE pipe. They feature a full tensile strength puddle flange, complete with an integrated waterstop Hydrophilic sealing ring to ensure watertight encasement.

Can be factory fabricated with elbows or other fittings into the required compact design for complete encasement.

Product Code	dn	ID mean	D1	L2	Z1	Availability in Hong Kong
P531G.065.125	125	101	164	150	297	6-8 weeks
P531G.065.180	180	146	236	150	309	6-8 weeks
P531G.065.250	250	202	328	250	425	6-8 weeks
P531G.065.315	315	255	386	300	479	6-8 weeks
P531G.065.355	355	287	435	300	493	6-8 weeks
P531G.065.450	450	364	552	300	531	6-8 weeks
P531G.065.500	500	405	613	350	599	6-8 weeks
P531G.065.560	560	453	687	350	624	6-8 weeks
P531G.065.630	630	510	773	350	651	6-8 weeks
P531G.065.710	710	574	871	350	683	6-8 weeks
P531G.065.800	800	647	981	350	717	6-8 weeks
P531G.065.900	900	728	1104	400	809	6-8 weeks

Bellmouth fittings are not designed for horizontal encasement into the base reservoir walls where significant head may be applied to the waterstop hydrophilic seal. In such applications contact us for alternate designs.

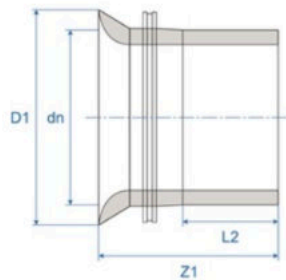


## Black Bellmouth / Butt Fusion / PN16 / SDR11

Mill-Pro's fabricated Black PE100+ butt weld Bellmouth fittings are designed for embedment in concrete to replace traditional ductile Iron bellmouth discharge fittings and connect to other PE components by butt fusion. They feature a full tensile strength puddle flange, complete with an integrated waterstop Hydrophilic sealing ring to ensure watertight encasement.

Typically factory fabricated with elbows or other fittings into the required compact design for complete encasement.

Product Code	dn	ID mean	D1	L2	Z1	Availability in Hong Kong
P231G.065.125	125	101	164	32	179	6-8 weeks
P231G.065.180	180	146	236	45	204	6-8 weeks
P231G.065.250	250	202	328	60	235	6-8 weeks
P231G.065.315	315	255	386	80	259	6-8 weeks
P231G.065.355	355	287	435	90	283	6-8 weeks
P231G.065.450	450	364	552	95	326	6-8 weeks
P231G.065.500	500	405	613	95	344	6-8 weeks
P231G.065.560	560	453	687	95	369	6-8 weeks
P231G.065.630	630	510	773	95	396	6-8 weeks
P231G.065.710	710	574	871	100	433	6-8 weeks
P231G.065.800	800	647	981	100	467	6-8 weeks
P231G.065.900	900	728	1104	100	509	6-8 weeks
P231G.065.1000	1000	809	1227	100	547	6-8 weeks





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