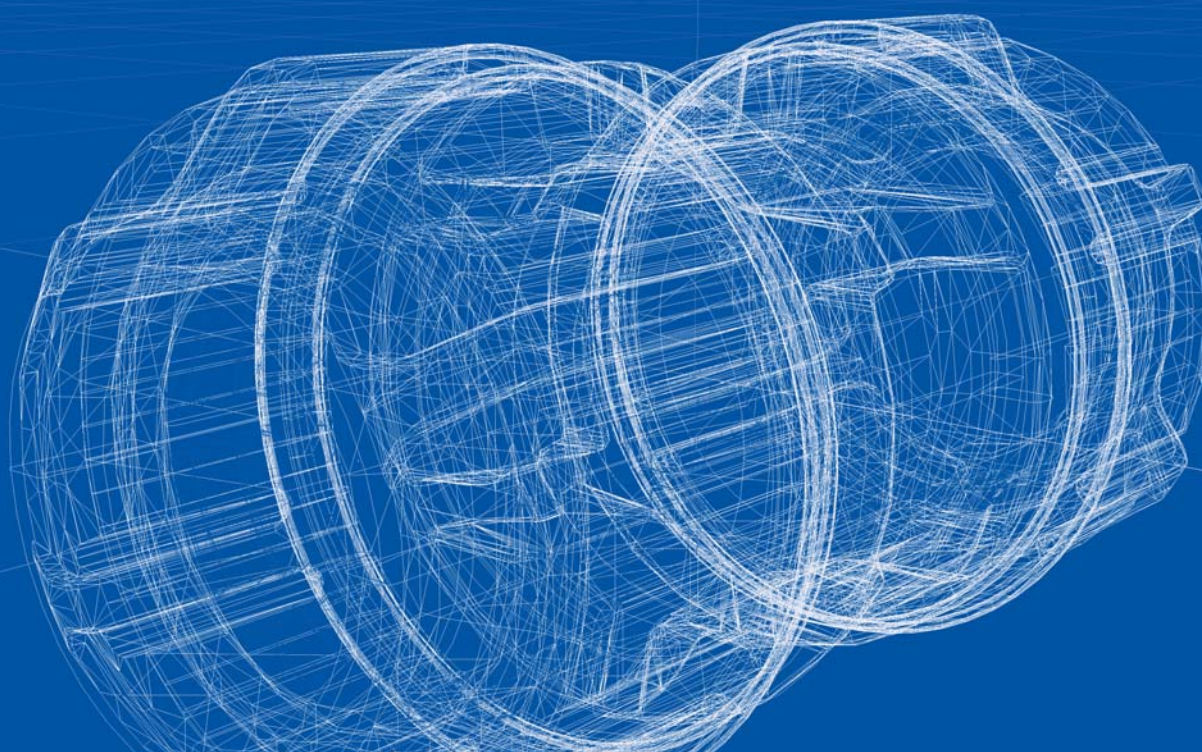


Technical Manual



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Philmac®

The connection you can trust.



Philmac is well renowned for quality products and services. Philmac manufactures pipe fittings and valves under a Quality Assurance System assessed and approved to ISO 9001. Philmac has a NATA accredited laboratory and tests fittings and valves to international and national standards. Third party accreditation is carried out by SAI Global.

CONTENTS

Introduction	2
Benefits	2
Standards	4
Installation	5
Metric/Imperial™	5
Reducing Kit	6
Copper	6
System Design Considerations	7
Materials & Components	8
Principals of Operation	8
Range Dimensions & Weights	9



Disclaimer

Please note that the information, opinions, recommendations and advice given in this manual are supplied only to provide an improved understanding of the technical aspects of fitting systems.

So far as the law allows, Philmac Pty Ltd will not accept liability in respect of any loss or damage of any kind claimed to arise as a result of reliance upon any information claimed in this manual.

Please refer to our Terms and Conditions of sale.

INTRODUCTION

Philmac, the global leader in the design and manufacture of plastic compression fittings, is proud to release the most innovative and revolutionary product of its kind.

Philmac Metric/Imperial™ is the truly universal polyethylene pipe fitting. The culmination of years of exhaustive research and development, utilisation of cutting-edge manufacturing technology and stringent testing, this new range of premium products could well be the biggest breakthrough in water transfer technology where both metric and imperial pipes are in use. Its universal application means this is the only fitting you need carry, reducing costs and streamlining inventory.

Designed to make the job at hand so much easier, the Philmac Metric/Imperial™ plastic compression fitting is the product of Philmac's unrelenting commitment to continuous improvement and a culture based on innovation and ingenuity.

BENEFITS

Flexibility

- **The Metric & Imperial connection:** The new Philmac Metric/Imperial™ compression fitting is a revolutionary step forward for PE pipe jointing. Connections can now be made to both Metric (BS6572/BS6730) and Imperial PE pipe (BS1972/3284 and IRS 135 Heavy Gauge) from the one fitting from either end. And, the innovative design means that inserts are no longer required to connect imperial pipe.

Removing the need for dedicated fittings and inserts, Metric/Imperial™ provides the ultimate in flexibility, reducing both inventory and complexity.

Fast and easy installation

- **Slide & Tighten™ technology:** Metric/Imperial™ incorporates all the benefits of Philmac's unique Slide & Tighten™ technology. No pipe preparation is needed and no force is required to push the pipe past the seal, so installation couldn't be faster or easier. Simply insert the pipe fully into the fitting and then tighten the nut. Assembly is so easy you can even do it under live conditions. No special tools are required, and there is no need to disassemble the fitting before use because the Metric/Imperial™ compression fitting is supplied pre-assembled and ready to use.

- **Compact Design:** The size of the new Philmac Metric/Imperial™ compression fitting has been kept to a minimum, making the fitting ideal to use in confined areas. In addition to making connections with minimal turns of the nut, the design and size of the fitting means that in installations taking place between pipe with two fixed points, the manipulation of the pipe into the fitting becomes easy.

- **Easy disassembly:** The fitting has been designed so the split collet is released as soon as the nut is backed off, making disassembly easy.

Complete security

- **Dynamic sealing method:** The mechanical advantage of the nut thread compresses the seal into position, eliminating resistance when inserting the pipe into the fitting so there is no risk of seal distortion or displacement.

- **No loose components:** If the nut is removed there is no danger of losing components, as the collet and seal ring are retained in the body of the fitting. Losing components in the trench becomes a thing of the past.

- **Designed to minimise pipe twist:** The fitting has been designed to minimise pipe twist as the nut is tightened. Maximum pipe twist is approximately a quarter turn compared to one and a half turns with many other fittings. Pipe twist can impact on not only the connection you have just made but also on the connection at the other end of the line.

- **Approvals:** Philmac fittings are WRAS approved for above and below ground use.



High performance

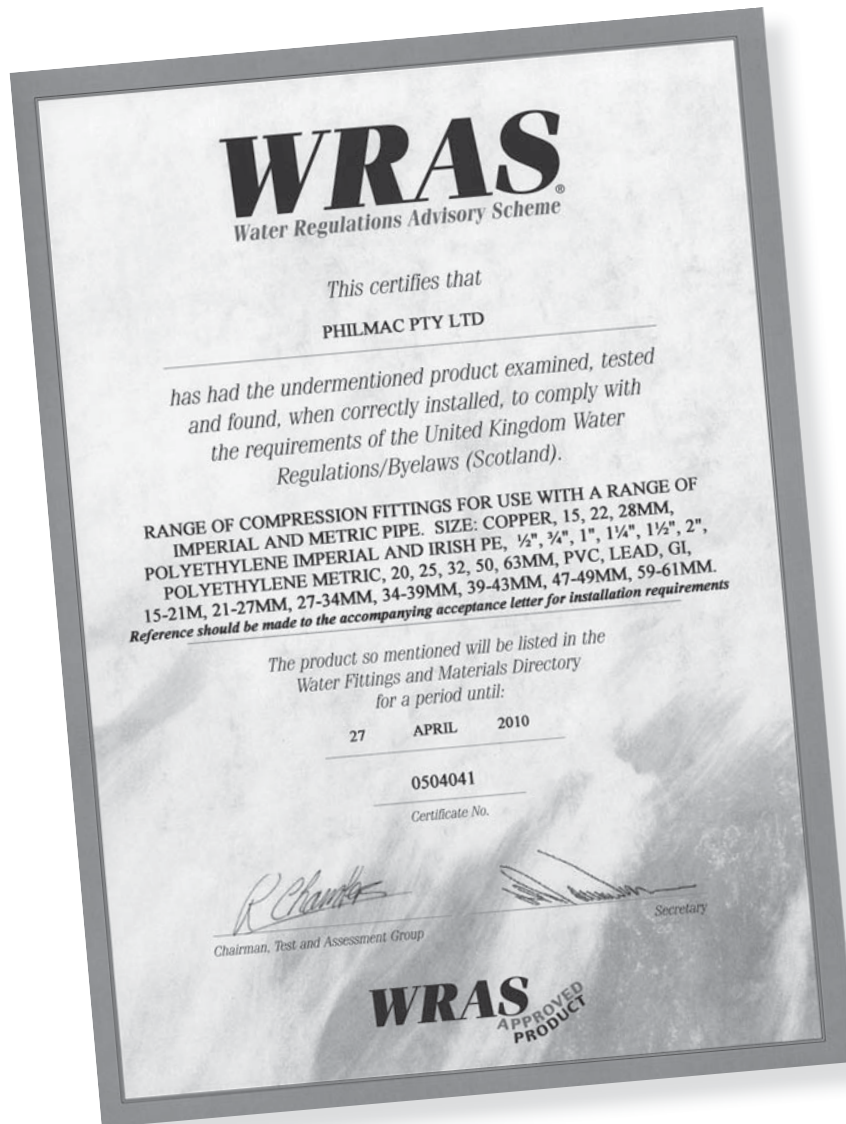
- **Made from advanced thermoplastic materials:** Metric/Imperial™ is manufactured from lightweight high performance thermoplastic materials with outstanding impact, UV, chemical and corrosion resistance. The material is non-toxic and taint-free.
- **Rated to 1600 kpa:** Metric/Imperial™ is pressure rated to 1600 kpa (PN16) to meet the needs of high pressure systems.
- **50 year+ design life:** Built to withstand the toughest conditions to ensure longevity and durability, Metric/Imperial™ has a 50 year+ design life.

Complete coverage

- **Wide range:** The new Philmac Metric/Imperial™ range is comprehensive: straight and reducing joiners, tees, elbows, end connectors and caps ranging from 20mm to 63mm. Also available are copper connection kits, normal gauge (IRS 134) connection kits, reducing kits and blanking plugs, ball valves, stopcocks, wall plate elbows and tank connectors.
- **Copper connection Kits:** Philmac's all new carborundum gripper design has been introduced into the Metric/Imperial™ copper connection kit. With no steel components in the gripping mechanism, there is absolutely no risk of electrolysis.



STANDARDS



The Philmac Metric/Imperial™ range of compression fittings is approved by WRAS for above and below ground use.

METRIC/IMPERIAL™ INSTALLATION INSTRUCTIONS



1. Cut the Pipe Square

Cut the pipe square. There is no need to prepare the pipe end. Chamfering or lubrication is not required.



2. Insert Liner in MDPE pipe

With MDPE pipe a liner must be used to ensure conformance with WRAS.



3. No Liner or Insert Required for Imperial Pipe

For connections to imperial PE pipe (BS1972/3284 and IRS 135 Heavy Gauge) a liner or insert is not required.



4. Ready to Use Position

The fitting is pre-assembled and ready to use, however always ensure the nut is fully relaxed and 2 threads are showing before inserting the pipe.



5. Pipe Insertion

Insert the pipe fully into the fitting to the point where the stop is felt.



6. Nut Tightening

The nut should be tightened by hand and then firmly with a wrench.



7. Fully Installed

Fitting is now fully installed.



8. Imperial Fully Installed

For connections to Imperial PE pipe (BS1972/3284 and IRS 135 Heavy Gauge) steps 5 to 8 are the same as for MDPE connections.



9. Disassembly

To disassemble the fitting simply loosen the nut using a wrench until 2 threads are showing. Pipe will be released and can simply be pulled out of the fitting.

Note: Philmac recommends the use of PTFE tape on BSP threads to ensure a positive seal.

REDUCING & CONNECTION KIT INSTALLATION INSTRUCTIONS



1. Disassembly

Take the Metric/Imperial™ fitting and remove the nut. The split collet and seal ring must then be removed.



2. Position the Connection Kit

Take the appropriate connection kit and place it in the body of the fitting with the tapered end pointing outwards.



3. Ready to Use

Replace the nut on the fitting body. The fitting is now ready for use. Standard installation instructions now apply.

COPPER INSTALLATION INSTRUCTIONS



1. Cut the Pipe Square

Cut the pipe square. There is no need to prepare the pipe end.



2. Ready to Use Position

Prior to pipe insertion ensure the nut is fully relaxed and 2 threads are showing.



3. Witness Mark the Pipe

To ensure the correct insertion depth witness the mark by lining up the pipe against the fitting and using the flange of the body as an indicator.



4. Pipe Insertion

Insert the pipe fully into the fitting up to the witness mark.



5. Nut Tightening

The nut should be tightened by hand and then firmly with a wrench.



6. Fully Installed

The fitting is fully installed when the nut butts against the flange of the body.

SYSTEM DESIGN CONSIDERATIONS

There are generally two types of PE pipe fittings; mechanical and thermofusion. Philmac Metric/Imperial™ is a range of mechanical fittings that offers three distinct advantages over thermofusion fittings;

- **More economical**
- **Quick and easy installation**
- **Quick and easy revision to installation**

This section highlights engineering considerations when designing a PE pipe system with Philmac Metric/Imperial™.

Projected life of Compression fittings

Whilst Philmac Metric/Imperial™ conforms to institutionalised specifications written to have a minimum life of 50 years, its compression fittings are intentionally developed to exceed the expectations of these specifications.

Head losses

The following table offers a guide in estimating head losses in PE pipe systems based on the conveyance of water. Use the following formula to estimate this head loss;

$$L = F \times D$$

where F = fitting constant

D = pipe inner diameter (m)

L = head loss based on
equivalent pipe length (m)

Fitting	Fitting Constant (F)
90° elbow	30
90° tee - straight through	12
90° tee - side branch	60

Resistance to Impact

The thermoplastic materials used in the Philmac Metric/Imperial™ fitting have excellent impact properties.

Abrasion Resistance

Philmac Metric/Imperial™ is suitable for the transportation of abrasive slurries and will withstand normal conditions found in urban, mining, industrial, rural water and waste water systems.

Weathering

The materials used contain pigments to provide excellent protection to degradation due to ultra-violet radiation. Continuous use of the Philmac Metric Imperial™ fitting in systems above ground is therefore permissible without additional protection.

Electrolytic Corrosion

Philmac Metric/Imperial™ is non magnetizing and does not cause electrolytic deterioration. This also applies to the new carborundum copper connection kit.

Thermal Insulation

Polypropylene has natural thermal insulation of 2000 times over copper and 200 times over steel.

Light Transmission

The all black Philmac Metric/Imperial™ does not transmit light, thus protecting the water quality in potable water pipelines from growth of micro organisms.

Effect on Water

Philmac Metric/Imperial™ does not impart to water any odour, taste, colour, or any constituents in concentrations that could be injurious to health.

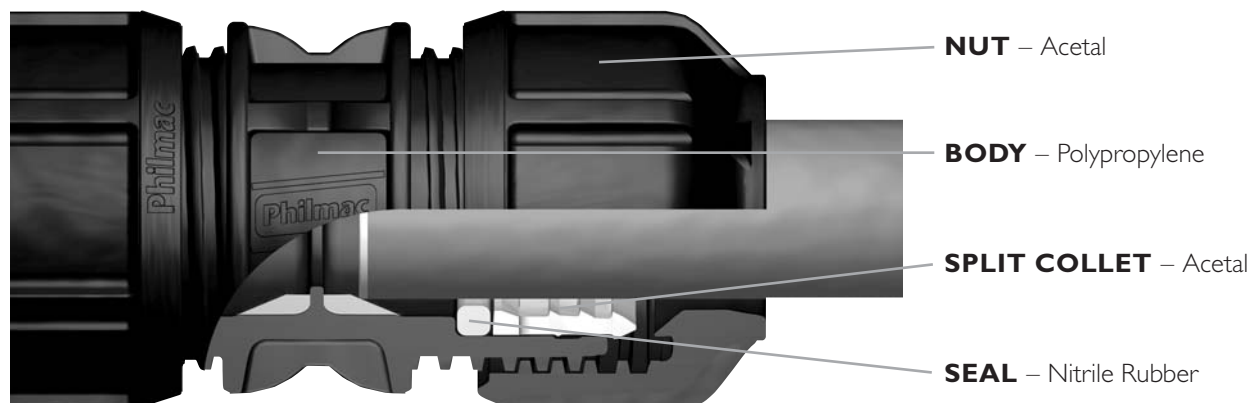
Fluids other than Water

Philmac Metric/Imperial™ may convey a wide variety of fluids. The following table is provided as a guide only for the compatibility of various chemicals to Philmac Metric/Imperial™. Contact Philmac for advice on specific applications.

CHEMICAL RESISTANCE

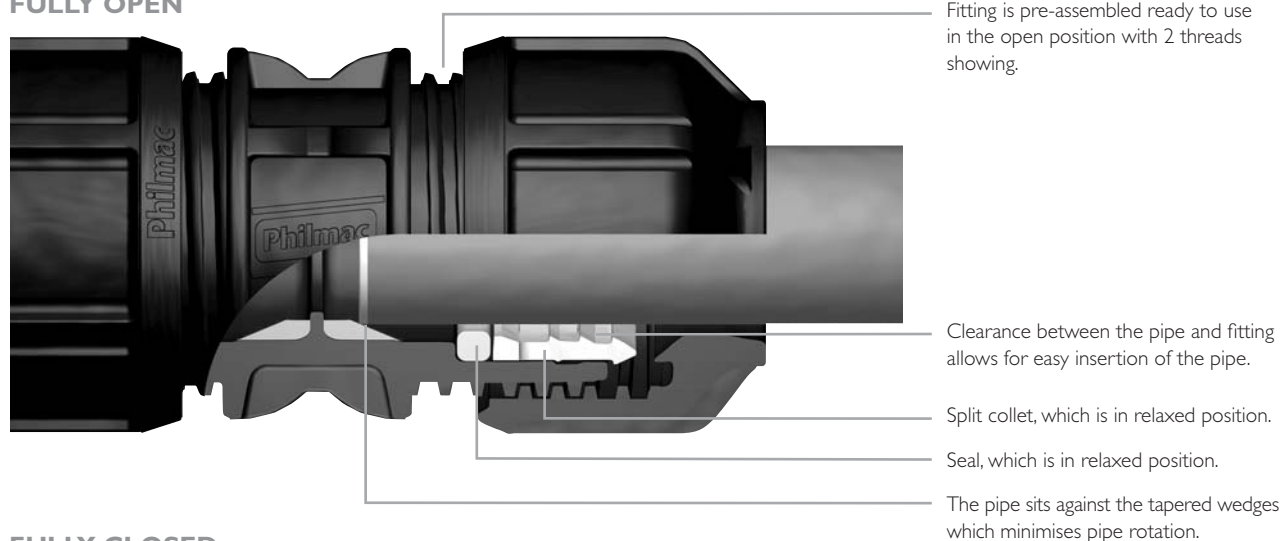
Chemical	Satisfactory	Not Satisfactory
Air	▲	
Ammonium Hydroxide	▲	
Alcohol	▲	
Acetone		▲
Auto Transmission Fluid	▲	
Antifreeze	▲	
Benzene		▲
Butane	▲	
Calcium Salts	▲	
Caustic Soda (40% aqueous)	▲	
Cresol		▲
Citric Acid (10% aqueous)	▲	
Copper Salts	▲	
Ethylene Alcohol	▲	
Ethyl Glycol	▲	
Diesel	▲	
Formic Acid		▲
Gasoline		▲
Hydrochloric Acid		▲
Kerosene		▲
Mineral Oils	▲	
Methane	▲	
Methylene Chloride		▲
Nitric Acid		▲
Petroleum Oils	▲	
Sewerage	▲	
Sodium Cyanide	▲	
Sulphuric Acid		▲
Toluene		▲
Turpentine		▲
Transformer Oil	▲	
Zinc Salt Solution	▲	
Note: Fluid Temperature = 20°C		

MATERIALS & COMPONENTS

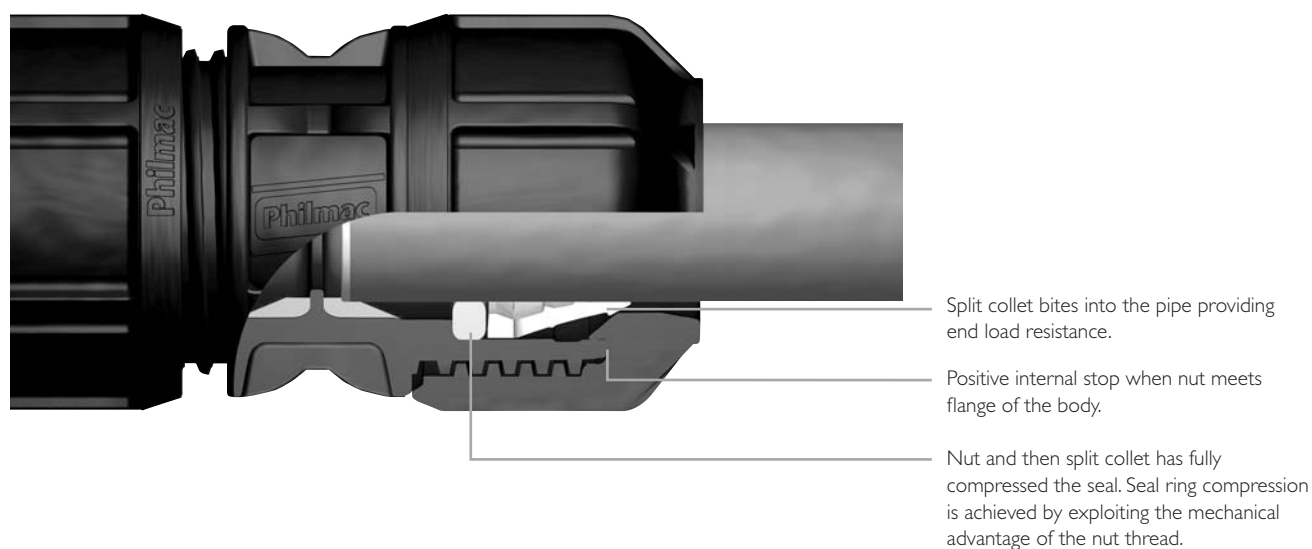


PRINCIPALS OF OPERATION

FULLY OPEN



FULLY CLOSED



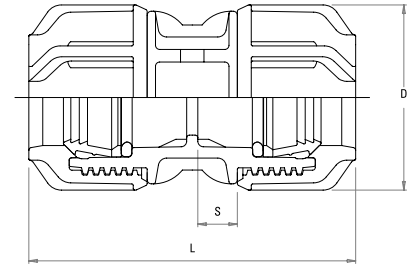
RANGE DIMENSIONS & WEIGHTS



RANGE DIMENSIONS & WEIGHTS

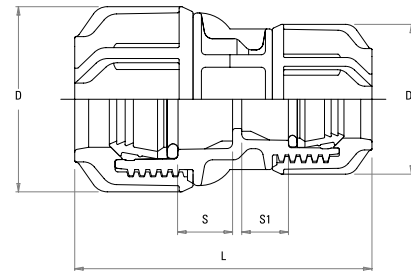
JOINERS (Metric/Imperial X Metric/Imperial)

Size	Dimensions mm.			kg.
	S	D	L	Wt
20/1/2" x 20/1/2"	10	47	90	0.08
25/3/4" x 25/3/4"	11	55	97	0.12
32/1" x 32/1"	14	67	118	0.20
40/1-1/4" x 40/1-1/4"	18	81	136	0.33
50/1-1/2" x 50/1-1/2"	24	94	161	0.52
63/2" x 63/2"	29	110	182	0.76



REDUCING JOINERS (Metric/Imperial X Metric/Imperial)

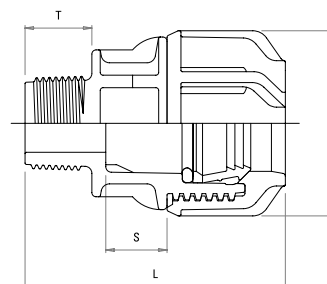
Size	Dimensions mm.					kg.
	S	S1	D	D1	L	Wt
25/3/4" x 20/1/2"	11	10	55	47	94	0.10
32/1" x 20/1/2"	14	10	67	47	110	0.14
32/1" x 25/3/4"	14	11	67	55	108	0.16
40/1-1/4" x 25/3/4"	18	11	81	55	125	0.24
40/1-1/4" x 32/1"	18	14	81	67	128	0.28
50/1-1/2" x 25/3/4"	24	11	94	55	141	0.34
50/1-1/2" x 32/1"	24	14	94	67	150	0.38
50/1-1/2" x 40/1-1/4"	24	18	94	81	149	0.44
63/2" x 32/1"	29	14	110	67	167	0.51
63/2" x 40/1-1/4"	29	18	110	81	173	0.57
63/2" x 50/1-1/2"	29	24	110	94	174	0.66



RANGE DIMENSIONS & WEIGHTS

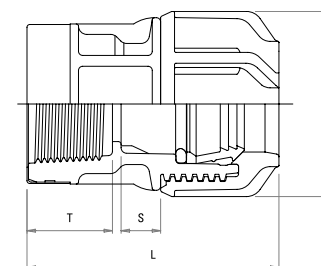
END CONNECTORS (Metric/Imperial X MI BSP)

Size	Dimensions mm.				kg.
	S	D	L	T	Wt
20/1/2" x 1/2"	17	47	73	19.8	0.05
20/1/2" x 3/4"	17	47	75	21.1	0.05
20/1/2" x 1"	17	47	78	24.4	0.05
25/3/4" x 1/2"	19	55	81	19.8	0.07
25/3/4" x 3/4"	19	55	82	21.1	0.07
25/3/4" x 1"	19	55	85	24.4	0.08
32/1" x 3/4"	22	67	91	21.1	0.12
32/1" x 1"	22	67	94	24.4	0.12
32/1" x 1-1/4"	22	67	97	26.7	0.13
32/1" x 1-1/2"	22	67	97	26.7	0.13
40/1-1/4" x 1"	28	81	106	24.4	0.20
40/1-1/4" x 1-1/4"	28	81	109	26.7	0.20
40/1-1/4" x 1-1/2"	28	81	109	26.7	0.20
40/1-1/4" x 2"	28	81	112	31	0.20
50/1-1/2" x 1-1/2"	30	94	118	26.7	0.30
50/1-1/2" x 2"	30	94	119	31	0.31
63/2" x 1-1/2"	36	110	132	26.7	0.40
63/2" x 2"	36	110	127	31	0.41



END CONNECTORS (Metric/Imperial X FI BSP)

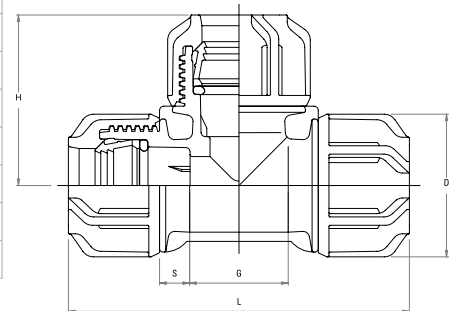
Size	Dimensions mm.				kg.
	S	D	L	T	Wt
20/1/2" x 1/2"	10	47	71	22.8	0.05
20/1/2" x 3/4"	10	47	70	24.1	0.05
20/1/2" x 1"	10	47	73	27.4	0.05
25/3/4" x 1/2"	11	55	74	22.8	0.08
25/3/4" x 3/4"	11	55	71	24.1	0.08
25/3/4" x 1"	11	55	77	27.4	0.08
32/1" x 3/4"	14	67	89	24.1	0.12
32/1" x 1"	14	67	88	27.4	0.13
32/1" x 1-1/4"	14	67	91	30.2	0.13
40/1-1/4" x 1-1/4"	18	81	101	30.2	0.20
40/1-1/4" x 1-1/2"	18	81	101	30.2	0.21
50/1-1/2" x 1-1/2"	24	94	106	30.2	0.29
50/1-1/2" x 2"	24	94	107	34.5	0.30
63/2" x 2"	29	110	121	34.5	0.44



RANGE DIMENSIONS & WEIGHTS

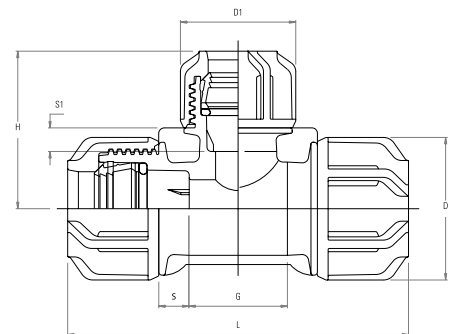
TEES (Metric/Imperial X Metric/Imperial X Metric/Imperial)

Size	Dimensions mm.					kg.
	S	D	H	G	L	Wt
20/1/2" x 20/1/2" x 20/1/2"	10	47	59	31	117	0.12
25/3/4" x 25/3/4" x 25/3/4"	11	55	67	40	134	0.19
32/1" x 32/1" x 32/1"	14	67	80	48	160	0.33
40/1-1/4" x 40/1-1/4" x 40/1-1/4"	18	81	95	50	182	0.53
50/1-1/2" x 50/1-1/2" x 50/1-1/2"	24	94	101	60	202	0.80
63/2" x 63/2" x 63/2"	29	110	118	73	236	1.22



REDUCING TEES (Metric/Imperial X Metric/Imperial X Metric/Imperial)

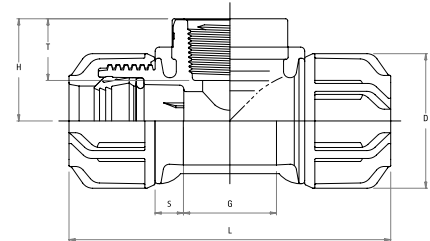
Size	Dimensions mm.							kg.
	S	S1	D	D1	H	G	L	Wt
25/3/4" x 25/3/4" x 20/1/2"	11	10	55	47	64	40	134	0.18
25/3/4" x 25/3/4" x 32/1"	11	14	55	64	69	40	134	0.24
32/1" x 32/1" x 25/3/4"	14	11	67	55	74	40	160	0.30
40/1-1/4" x 40/1-1/4" x 25/3/4"	18	11	81	55	74	34	166	0.40
40/1-1/4" x 40/1-1/4" x 32/1"	18	14	81	67	84	39	171	0.46
50/1-1/2" x 50/1-1/2" x 25/3/4"	20	11	94	55	81	35	182	0.63
50/1-1/2" x 50/1-1/2" x 32/1"	20	14	94	67	90	40	187	0.66
50/1-1/2" x 50/1-1/2" x 40/1-1/4"	24	21	94	81	98	60	197	0.70
63/2" x 63/2" x 25/3/4"	24	11	110	55	88	29	196	0.82
63/2" x 63/2" x 32/1-1/4"	24	14	110	67	98	34	201	0.87
63/2" x 63/2" x 50/1-1/2"	29	24	110	94	111	73	220	1.05



RANGE DIMENSIONS & WEIGHTS

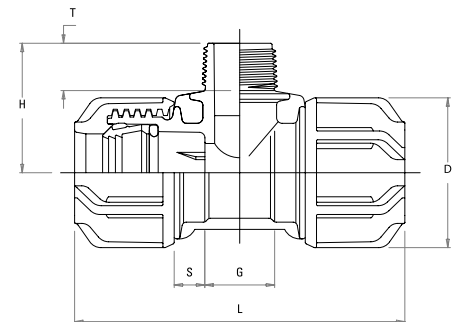
TEES (Metric/Imperial X Metric/Imperial X FI BSP)

Size	Dimensions mm.						kg.
	S	D	H	G	L	T	Wt
20/1/2" x 20/1/2" x 1/2"	10	47	38	31	117	22.8	0.09
20/1/2" x 20/1/2" x 3/4"	10	47	38	31	117	24.1	0.10
25/3/4" x 25/3/4" x 1/2"	11	55	40	40	134	22.8	0.14
25/3/4" x 25/3/4" x 3/4"	11	55	41	40	134	24.1	0.15
25/3/4" x 25/3/4" x 1"	11	55	44	40	134	27.4	0.16
32/1" x 32/1" x 1/2"	14	67	42	20	135	22.8	0.21
32/1" x 32/1" x 3/4"	14	67	44	48	160	24.1	0.24
32/1" x 32/1" x 1"	14	67	44	48	160	27.4	0.25
32/1" x 32/1" x 1-1/4"	14	67	50	48	160	30.2	0.26
40/1-1/4" x 40/1-1/4" x 1/2"	18	81	48	19	151	22.8	0.33
40/1-1/4" x 40/1-1/4" x 3/4"	18	81	50	24	156	24.1	0.34
40/1-1/4" x 40/1-1/4" x 1"	18	81	53	50	182	30.2	0.40
40/1-1/4" x 40/1-1/4" x 1-1/4"	18	81	56	50	182	30.2	0.41
50/1-1/2" x 50/1-1/2" x 1/2"	24	94	54	19	175	22.8	0.51
50/1-1/2" x 50/1-1/2" x 3/4"	24	94	57	24	181	24.1	0.53
50/1-1/2" x 50/1-1/2" x 1-1/2"	24	94	67	60	197	30.2	0.58
50/1-1/2" x 50/1-1/2" x 2"	24	94	71	60	213	34.5	0.63
63/2" x 63/2" x 2"	29	110	77	73	226	34.5	0.89



TEES (Metric/Imperial X Metric/Imperial X MI BSP)

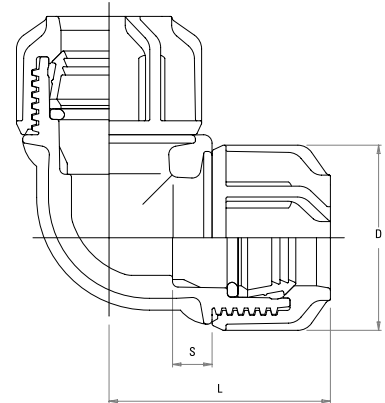
Size	Dimensions mm.						kg.
	S	D	H	G	L	T	Wt
25/3/4" x 25/3/4" x 1/2"	11	55	53	35	114	19.8	0.14
25/3/4" x 25/3/4" x 3/4"	11	55	54	35	114	21.1	0.15



RANGE DIMENSIONS & WEIGHTS

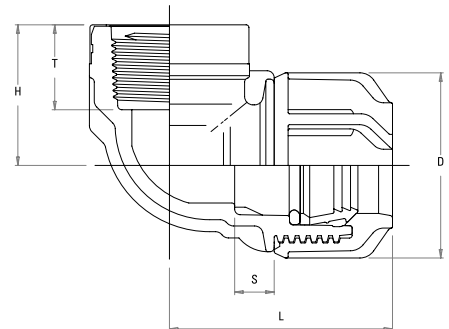
ELBOWS (Metric/Imperial X Metric/Imperial)

Size	Dimensions mm.			kg.
	S	D	L	Wt
20/1/2" x 20/1/2"	10	47	59	0.07
25/3/4" x 20/1/2"	11	55	65	0.08
25/3/4" x 25/3/4"	11	55	67	0.13
32/1" x 32/1"	14	67	80	0.22
40/1-1/4" x 40/1-1/4"	18	81	91	0.36
50/1-1/2" x 50/1-1/2"	24	94	101	0.55
63/2" x 63/2"	29	110	118	0.85



ELBOWS (Metric/Imperial X FI BSP)

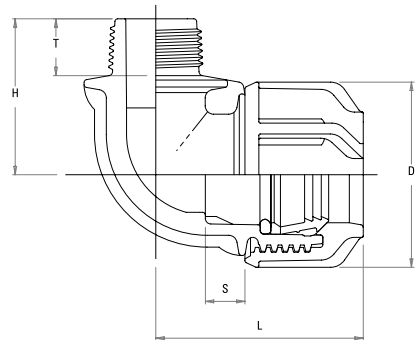
Size	Dimensions mm.					kg.
	S	D	H	L	T	Wt
20/1/2" x 1/2"	10	47	73	59	22.8	0.05
20/1/2" x 3/4"	10	47	73	59	24.1	0.06
25/3/4" x 1/2"	11	55	88	67	22.8	0.08
25/3/4" x 3/4"	11	55	88	67	24.1	0.08
25/3/4" x 1"	11	55	88	67	27.4	0.09
32/1" x 1"	14	67	105	80	27.4	0.14
32/1" x 1-1/4"	14	67	105	81	30.2	0.15
40/1-1/4" x 1-1/4"	18	81	126	91	30.2	0.23
40/1-1/4" x 1-1/2"	18	81	126	91	30.2	0.24
50/1-1/2" x 1-1/2"	24	94	142	101	30.2	0.33
50/1-1/2" x 2"	24	94	142	106	34.5	0.38
63/2" x 2"	29	110	160	113	34.5	0.53



RANGE DIMENSIONS & WEIGHTS

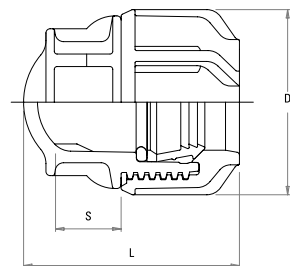
ELBOWS (Metric/Imperial X MI BSP)

Size	Dimensions mm.					kg.
	S	D	H	L	T	Wt
20/1/2" x 1/2"	12	47	43	57	19.8	0.06
25/3/4" x 3/4"	13	55	49	65	21.1	0.07
32/1" x 1"	14	67	68	69	24.1	0.07



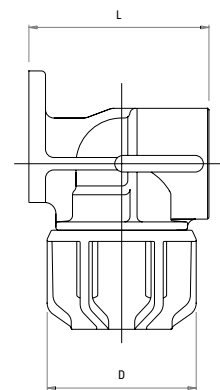
END CAPS (Metric/Imperial)

Size	Dimensions mm.			kg.
	S	D	L	Wt
20/1/2"	19	47	58	0.04
25/3/4"	23	55	68	0.07
32/1"	24	67	78	0.11
40/1-1/4"	31	81	92	0.19
50/1-1/2"	33	94	105	0.29
63/2"	41	110	124	0.45



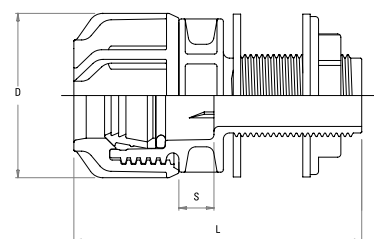
WALL PLATE ELBOWS (Metric/Imperial X FI BSP)

Size	Dimensions mm.	
	D	L
20/1/2" x 1/2"	47	56
25/3/4" x 3/4"	55	65



TANK CONNECTORS (Metric/Imperial X MI BSP)

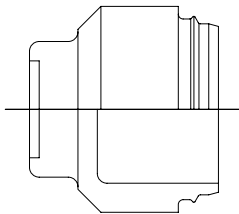
Size	Dimensions mm.			kg.
	S	D	L	Wt
25/3/4" x 3/4"	13	55	109	0.04
32/1" x 1"	14	67	117	0.07



RANGE DIMENSIONS & WEIGHTS

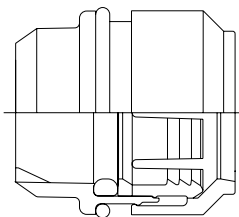
BLANKING PLUGS (Metric/Imperial)

20/1/2"
25/3/4"
32/1"
40/1-1/4"
50/1-1/2"
63/2"



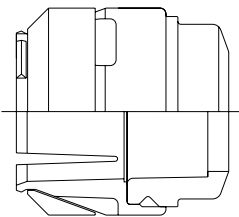
REDUCING SETS (Metric/Imperial to Metric/Imperial)

From	To
20/1/2"	25/3/4"
20/1/2"	32/1"
25/3/4"	32/1"
25/3/4"	50/1-1/2"
32/1"	50/1-1/2"
25/3/4"	63/2"
32/1"	63/2"
50/1-1/2"	63/2"



COPPER CONNECTION KITS (Metric/Imperial to Copper)

From	To
15mm	20/1/2"
15mm	25/3/4"
22mm	25/3/4"
28mm	32/1"



NORMAL GAUGE CONNECTION KITS (Metric/Imperial to Normal Gauge IRS I 34)

From	To
20/1/2"	1/2"
25/3/4"	3/4"
32/1"	1"
40/1-1/4"	1-1/4"
50/1-1/2"	1-1/2"
63/2"	2"

[illegible]

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