TFTM3-PT | OCTOBER 2022

TERRAIN

Terrain FUZE

Design, specification and installation guide

Polypipe
Building Services

1 The Genuit Group

At Genuit Group we help create a better built environment, by developing and producing sustainable solutions to the key challenges faced in water, climate and ventilation management. Sustainability is core to our commercial strategy, driving innovation in both how we run our business and the products we create. We find solutions for the environmental challenges facing our infrastructure, our buildings and our communities, and delivering these at scale.

The Genuit Group of businesses are recognised as professionals and experts in their given markets. From commercial and residential applications, heating and ventilation, fabrications, roads and highways to plumbing, large scale water storage and drainage, tall building applications and green infrastructure solutions. Our goal is to be the leading, UK-focused, sustainable products Group – helping construction build better.

Together, we aim to provide solutions to the sustainability and construction challenges of today and in the future. The increased need for resilient drainage systems, for example, the need for important Green Urbanisation, for cleaner, healthier air, for simpler, faster and more cost-effective drainage installations, for innovative future-ready systems and for low/zero-carbon heating and low-carbon construction.

Helping construction build better is at the heart of what we do. Through our sustainability strategy, the resilient way in which we operate, our capabilities and scalability, and our speed and agility through working together to understand exactly what you need to succeed.

It's an inclusive approach to business – and one our customers trust.

Polypipe Building Products
Polypipe Building Services
Polypipe Civils & Green Urbanisation
nuaire
Manthorpe Building Products
Polypipe Italia
Polypipe Ulster
DOMUS VENTILATION
ADEY
Polypipe International
permavoid
ufcm UnderFloor Climate Management
surestop® Protecting property from the risk of water damage
Polypipe Middle East
ALDERBURGH
Nu-Heat Feel the difference
Polypipe Merchandising Solutions
Polypipe Offsite
PLURA INNOVATIONS POLYDECK

Polypipe Building Services

AT THE HEART OF COMMERCIAL AND TALL BUILDINGS.

At Polypipe Building Services, we harness our ingenuity and creativity to deliver class-leading solutions and product sustainability, with optimised whole-life costs, unrivalled technical support and on-the-ground assistance.

We understand the challenges today's projects face, including climate change, air quality and flooding, and in-industry regulations, skilled labour shortages and the lack of on-site storage facilities. From high-rise residential and commercial office projects to healthcare and leisure facilities, we develop systems that support you, that facitilate easier, more cost-effective ways to install.

Integral to our development process is providing innovative sustainable solutions that support safety, whether from the product itself or in the way it's installed. Our products are designed for a long life, use recycled content and are recyclable at end of life, enabling it to live on in the circular economy. We challenge ourselves on how we help solve on-site problems, whether lack of labour or on-site space, and look to develop solutions that benefit both the installing contractors and the occupants alike.

Polypipe Building Services, part of the Genuit Group. Helping construction build better.

MORE INNOVATION. MORE EXPERTISE. MORE SUPPORT.

Polypipe Building Services is always working to develop more exceptional products and more cost-effective ways to complete your project. For nearly 60 years, our Terrain brand has been the industry benchmark for drainage systems, but we offer so much more, including our award-winning water supply system MecFlow.

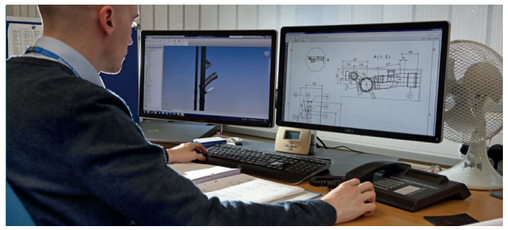
PRODUCTS AND SYSTEMS

Our specialism is tall buildings, so our products, systems and services reflect that, in design, performance and ease of installation. Our Terrain brand of products and systems have been no exception, from our benchmark, FUZE drainage stacks and PVC soil and waste systems, to the Terrain Q noise reducing system, P.A.P.A.® & Pleura Vent Systems and Firetraps.

However, our continued investment in new technologies and more innovative solutions, enables us to increase our category portfolio, including supply applications like MecFlow. We are constantly working to bring to market only the most sustainable, beneficial, and cost-effective products and systems – engineered from the most practical, recycled and recyclable materials. Together with our Advantage Service, fabrication capabilities and customer support, you're never left without a solution – whatever the challenge. Contact our sales team to discover more at **commercial.buildingservices@polypipe.com**

TECHNICAL

All our products and systems are backed by our hands-on technical team, providing expert support to ensure you receive a system that's right for your project. Whether it's a single component, or a fully fabricated system, you can call upon our specialist advice, and rely on us to deliver exactly what you need.



POLYPIPE ADVANTAGE SERVICE

We're constantly working and investing to discover new products and systems that take the complexities out of construction. And we apply that philosophy to ease of installation. Our Polypipe Advantage Service has been specifically introduced to make everything simple from beginning to end. From the design and planning of your project, to ordering, delivery, technical support, and customer service. Through Polypipe Advantage, our drainage stack systems and MecFlow supply systems can be fabricated to your own specification; created off-site, and delivered as a full, ready-to-install system on-site. Facilitating a faster installation process, whilst addressing skilled labour shortages and the lack of on-site storage facilities.

Welcome to Polypipe Building Services.
Delivering more, to achieve more.

POLYPIPE
ADVANTAGE

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2 Introduction to FUZE

A modern high density polyethylene system with many advantages over cast iron and other traditional systems.

Terrain FUZE is a top-to bottom solution for all above and below ground drainage and many chemical waste applications.

Terrain FUZE is manufactured using HDPE for superior performance and exceptional durability. HDPE is resilient to extreme temperatures enabling applications for hot water and within colder environments. For example, without mechanical load, FUZE is able to tolerate temperatures of up to 80°C – even up to 95°C for a maximum of two minutes – against the flow of hot water.

The lightweight nature of Terrain FUZE allows the product to be installed quickly and efficiently, giving direct, resource-saving benefits to specifiers and installers.

For further information see contact details on the back cover of this brochure.

Terrain FUZE Technical Manual 2022

2 Introduction to FUZE

Features and Benefits

TERRAIN HIGH DENSITY POLYETHYLENE HDPE: DENSITY 945 – 965 kg/m³

Polyethylene density varies between 945 – 965kg/m³. Terrain FUZE retains exceptional quality and durability at up to 965kg/m³ giving great confidence to specifiers and installers. HDPE is a lighter material than water, offering direct benefits in handling, transportation and installation.

RESISTANCE TO COLD

Terrain FUZE pipes are resistant to freezing within the pipeline. When tested, the pipes simply expand with the ice and then return to their original dimensions without any damage.

FLEXIBILITY

Flexibility of a pipeline can be a major factor on certain building projects where concern must be given to the route of the pipeline through expansion joints or areas subject to vibrations.

RESISTANCE TO CHEMICALS

Terrain FUZE offers high resistance against chemical corrosion and is insoluble in all inorganic and organic solutions at 20˚C. Terrain FUZE is only susceptible to aliphatic and aromatic carbons and relative chlorination products over 90˚C. The material is also vulnerable to attack by heavily oxidised media conc. HNO3 (chemical equation), conc. H2SO4 (chemical equation) when exposed over long periods at room temperature.

SCOPE OF USE

Terrain FUZE offers exceptional performance as a drainage system. A maximum load of 15m Water Column (1.5 bar) temperature of 30°C (10years) should be considered when utilising the pipes in a low-pressure environment.

RESISTANCE TO IMPACT

Terrain FUZE ensures maximum strength against impact stresses and is unbreakable at room temperature. It still maintains a high impact resistance at temperatures as low as -40˚C thus meets the requirements for outlet pipes.

NON-TOXIC

Terrain FUZE pipes are non-toxic, ensuring safe handling during installation. With no risk of contamination to the flow through the pipeline, HDPE is even suitable for use in the food or liquid transportation industries.

BEHAVIOUR IN FIRE

HDPE in open construction is a flammable material. However, the material has been installed throughout Europe for over 40 years and poses no greater risk to fire spread than other similar plastic based systems when installed in accordance with local fire regulations. For further prevention, Terrain FUZE should be fitted with Terrain fire collars or sleeves (see Terrain Drainage System Price List) and these should be installed in strict accordance with instructions provided.

NOISE

HDPE has a low E-modulus and limits solid-borne conduction along the pipeline. Airborne noise should be insulated by utilising duct wall.

PROTECTION AGAINST BLOCKAGES

Terrain FUZE enables the continual flow of waste through the pipe, reducing the possibility of blockages along the pipeline.

SEALING MATERIAL

The rubber ring on the seal is installed under compression on all sides and is protected from expansion so, although the chemical resistance of the seal does not equate to that of HDPE, there is no risk of the seal being destroyed.

HEAT EXPANSION 0.2mm/m/°C

Expansion of the HDPE pipeline should be anticipated when put under heat stress. As a general rule, an expansion rate of 10mm per linear metre for every 50˚C should be allowed.

WELDING TEMPERATURE

With a much lower welding temperature of 210˚C minimum, HDPE is a much safer and easier material to work with compared to metal. This enables processing of the material using simple tools and in a more energy efficient manner.

NON-CONDUCTIVE

HDPE like most plastics has an exceptional reputation as an insulator.

RESISTANCE TO ABRASION

HDPE offers greater abrasion resistance through increased strength within the walls of the pipeline. This additional protection of the pipe makes HDPE an effective material for branch pipes, soil stacks and ground pipes.

CONDENSATE

Terrain FUZE is a poor heat conductor thus preventing condensation from forming as the pipeline undergoes short periods of intense undercooling.

RESISTANCE TO HOT WATER

Terrain FUZE offers substantial durability against the flow of hot water. A waste pipe with no mechanical load will tolerate temperatures of up to 80˚C and up to 95˚C is permissible for a maximum of two minutes.

EASY HANDLING

Lightweight and quick to install, constructions teams choose Terrain FUZE for its ease-of-use as well as its outstanding performance properties.

3 Soil and waste drainage

A soil and waste system should be installed on a project to facilitate:

- Ease of access and maintenance to all parts of the system
- Flexible expansion of the system and integration with other pipe systems

Straight sections of horizontal pipe must be installed in perfect alignment with the pipe's axis and parallel to the wall. Vertical sections of the pipeline should be fixed in perfect alignment with the axis. Right angle bends must only be used to connect horizontal and vertical pipes and not within horizontal pipe networks.

Branches in the soil stack must be created using swept entry fittings when the branch is equal to the soil stack size. Eccentric reductions must be used, when the pipe diameter varies in the horizontal branch pipes, to ensure a centred connection of the pipes at the axis line. To minimise reductions in speed, sound and other negative effects variances in the direction of the horizontal and vertical pipe system must be kept to a minimum and use large radius bends. The stack vent should protrude by 2m above the roof structure where possible, and never less than 0.3m. Ventilating pipes to the outside air should finish at least 900mm above any opening into the building within 3m.

Access pipes should be installed in the following cases:

- At the beginning of the main manifolds in the waste system and at the base of every internal soil stack
- Access pipes should be installed every 15m for a linear stretch of pipe with a diameter equal to or less than 110mm and every 30m for larger diameter pipes
- Wherever two or more branches connect

Access pipes must be within easy reach throughout the system and must offer sufficient space for the use of utensils to clean the pipes.

The use of HDPE soil & waste pipe and fittings

The elements of the HDPE total pipe system offer direct benefits to the specifier and installer over more traditional materials. These benefits cover:

- Terrain FUZE HDPE is easier than more traditional materials to transport and handle safely due to its light weight.
- Terrain FUZE HDPE is installed quicker and easier than more traditional materials, offering increased time and labour savings on-site
- Terrain FUZE HDPE is resistant to impact shock
- Due to its composition, HDPE is highly resistant to chemical attack and will not erode, ensuring a long life for the system
- Terrain FUZE HDPE offers system flexibility, where alterations can be made easily to a completed system
- A smooth inner surface of the pipe minimises the risk of build-up or scaling
- Terrain FUZE HDPE welded joints will not deteriorate over time as no other materials or solvents are used
- Terrain FUZE HDPE can be used in close proximity to electrical installations or systems as it is not subject to electrolytic action
- Terrain FUZE HDPE offers a broad range of bespoke and fabricated items to be used in conjunction with the product ranges

Terrain FUZE HDPE offers a wide range of additional drains, traps and adaptors to be used with the standard catalogue of pipes and fittings, enabling HDPE products to be connected to other materials such as PVC, cast iron and cement pipes. This enables Terrain FUZE products to be used in an extensive range of applications, for example, in below ground applications when waste pipes with butt welded or electrofusion welded joints are utilised.

For all Terrain FUZE HDPE pipes and fittings, please see pages 20 to 49.

Table A: **Discharge units (DU) Values**

APPLIANCE	SYSTEM III DU l/s
Wash basin, bidet	0.3
Shower without plug	0.4
Shower with plug	1.3
Single urinal with cistern	0.4
Urinal with flushing valve	-
Slab urinal	0.2*
Bath	1.3
Kitchen sink	1.3
Dishwasher (household)	0.2
Washing machine up to 6kg	0.6
Washing machine up to 12Kg	1.2
WC with 4.0L cistern	**
WC with 6.0L cistern	1.2 to 1.7***
WC with 7.5L cistern	1.4 to 1.8***
WC with 9.0L cistern	1.6 to 2.0***
Floor gully DN 50	-
Floor gully DN 70	-
Floor gully DN 100	-

* Per person ** Not permitted - Not used or no data.
*** Depending upon type (valid for WC's with siphon flush cistern only)

Example: 10 storey building with:

2	WC	On each floor	2 x 1.5 = 3.0
4	WHB		4 x 0.3 = 1.2
2	Baths		2 x 1.3 = 2.6
2	Sinks		2 x 1.3 = 2.6
2	W/MC		2 x 0.6 = 1.2
			10.6 x 9 = 95.4 DU

Domestic Building Use K = 0.7

0.7 √95.4 .84 l/s

See Table C and D for capacities of pipes.

Table B: **Typical frequency factors (K)**

USAGE OF APPLIANCES	K
Intermittent use, e.g. in dwelling, guesthouse, office	0.5
Frequent use, e.g. in hospital, school, restaurant, hotel	0.7
Congested use, e.g. in toilets and/or showers open to public	1.0
Special use, e.g. laboratory	1.2

Frequency factor (K)

Typical frequency factors associated with different usage of appliances Table B.

Calculation of flowrate
Waste water flowrate (Qww)

Qww is the expected flowrate of waste water in a part or in the whole drainage system where only domestic sanitary appliances are connected to the system

Qww = K√∑DU where:

Qww	=	Waste water flowrate (L/s)
K	=	Frequency factor
∑DU	=	Sum of discharge units.

NB: Under no circumstances should pipe of a larger diameter be connected to pipe of a smaller diameter in the direction of flow.

3 Soil and waste drainage

Table C: **Stack with only Primary Vent**

STACK & STACK VENT	SYSTEM I, II, III, IV Q MAX (L/S)	
DN	Square # entries	Swept entries
60	0.5	0.7
70	1.5	2.0
80*	2.0	2.6
90*	2.7	3.5
100*	4.0	5.2
125	5.8	7.6
150	9.5	12.4
200	16.0	21.0

* Minimum size where WC's are connected in system II.
** Minimum size where WC's are connected in system I, III, IV. # Equal branch junctions that are more than 45° or has a centre line radius less than the internal pipe diameter.

Table D: **Stack with Secondary Venting**

STACK & STACK VENT	SECONDARY VENT	SYSTEM I, II, III, IV Q MAX (L/S)	
DN	DN	Square # entries	Swept entries
60	50	0.7	0.9
70	50	2.0	2.6
80*	50	2.6	3.4
90*	50	3.5	4.6
100*	50	5.6	7.3
125	70	7.6	10.0
150	80	12.4	18.3
200	100	21.0	27.3

* Minimum size where WC's are connected in system II.
** Minimum size where WC's are connected in system I, III, IV. # Equal branch junctions that are more than 45°, or has a centre line radius less than the internal pipe diameter.

For branch pipe sizing based on System III the following sizing charts should be used.

APPLIANCE	DIA. DN	MIN. TRAP SEAL DEPTH (mm)	MAX. LENGTH (L) OF PIPE FROM TRAP OUTLET TO STACK (m)	PIPE GRADIENT	MAX. NO OF BENDS	MAX. DROP (H) (m)
Limitations for unventilated branch discharge pipes, system III						
Washbasin, bidet (30mm dia. trap)	30	75	1.7	2.2[1]	0	0
Washbasin, bidet (30mm dia. trap)	30	75	1.1	4.4[1]	0	0
Washbasin, bidet (30mm dia. trap)	30	75	0.7	8.7[1]	0	0
Washbasin, bidet (30mm dia. trap)	40	75	3.0	1.8 to 4.4	2	0
Shower, bath	40	50	No Limit[2]	1.8 to 9.0	No Limit	1.5
Bowl urinal	40	75	3.0[3]	1.8 to 9.0	No Limit[4]	1.5
Trough urinal	50	75	3.0[3]	1.8 to 9.0	No Limit[4]	1.5
Slab urinal[3]	60	50	3.0[3]	1.8 to 9.0	No Limit[4]	1.5
Kitchen sink (40mm dia. trap)	40	75	No Limit[2]	1.8 to 9.0	No Limit	1.5
Household dishwasher or washing machine	40	75	3.0	1.8 to 4.4	No Limit	1.5
WC with outlet up to 80mm[6]	75	50	No Limit	1.8 min	No Limit[4]	1.5
WC with outlet greater than 80mm[6]	100	50	No Limit	1.8 min	No Limit[4]	1.5
Food waste disposal[7]	40 min.	75[8]	3.0[3]	13.5 min	No Limit[4]	1.5
Sanitary towel disposal unit	40 min.	75[8]	3.0[3]	5.4 min	No Limit[4]	1.5
Floor drain	50	50	No Limit[3]	1.8 min	No Limit	1.5
Floor drain	50	50	No Limit[3]	1.8 min	No Limit	1.5
Floor drain	100	50	No Limit[3]	1.8 min	No Limit	1.5
4 basins	50	75	4.0	1.8 to 4.4	0	0
Bowl urinals[3]	50	75	No Limit[3]	1.8 to 1.9	No Limit[4]	1.5
Maximum of 8 WC's[6]	100	50	15.0	0.9 to 9.0	2	1.5
Up to 5 spray tap basins[9]	30 max	50	4.5[3]	1.8 to 4.4	No Limit[4]	0

1) Steeper gradient permitted if pipe is less than maximum permitted length.
2) If length is greater than 3m noisy discharge may result with an increased risk of blockage.
3) Should be as short as possible to limit problems with deposition.
4) Sharp throated bends should be avoided.
5) For slab urinal for up to 7 persons. Longer slabs to have more than one outlet.
6) Swept-entry branches serving WC's.
7) Includes small potato-peeling machines.
8) Tubular not bottle or resealing traps.
9) Spray tap basins shall have flush-grated wastes without plugs.

APPLIANCE	DIA. DN	MIN. TRAP SEAL DEPTH (mm)	MAX. LENGTH (L) OF PIPE FROM TRAP OUTLET TO STACK (m)	PIPE GRADIENT	MAX. NO OF BENDS	MAX. DROP (H) (m)
Limitations for ventilated branch discharge pipes, system III						
Washbasin, bidet (30mm dia. trap)	30	75	3.0	1.8 min	2	3.0
Washbasin, bidet (30mm dia. trap)	40	75	3.0	1.8 min	No Limit	0
Shower, bath	40	50	No Limit[2]	1.8 min	No Limit	No Limit
Bowl urinal	40	75	3.0[3]	1.8 min	No Limit[4]	3.0
Trough urinal	50	75	3.0[3]	1.8 min	No Limit[4]	3.0
Slab urinal[3]	60	50	3.0[3]	1.8 min	No Limit[4]	3.0
Kitchen sink (40mm dia. trap)	40	75	No Limit[2]	1.8 min	No Limit	No Limit
Household dishwasher or washing machine	40	75	No Limit[3]	1.8 min	No Limit	No Limit
WC with outlet up to 80mm[6] &[14]	75	50	No Limit	1.8 min	No Limit[4]	1.5
WC with outlet greater than 80mm[6] &[14]	100	50	No Limit	1.8 min	No Limit[4]	1.5
Food waste disposal[7]	40 min.	75[8]	3.0[3]	13.5 min	No Limit[4]	3.0
Sanitary towel disposal unit	40 min.	75[8]	3.0[3]	5.4 min	No Limit[4]	3.0
Bath drain, floor drain	50	50	No Limit[3]	1.8 min	No Limit	No Limit
Floor drain	70	50	No Limit[3]	1.8 min	No Limit	No Limit
Floor drain	100	50	No Limit[3]	1.8 min	No Limit	No Limit
5 basins[9]	50	75	7.0	1.8 to 4.4	[2]	0
10 basins[9] &[10]	50	75	10.0	1.8 to 1.9	No Limit	0
Bowl urinals[9] &[11]	50	70	No Limit[3]	1.8 min	No Limit[4]	No Limit
More than 8 WC's[6]	100	50	No Limit	0.9 min	No Limit	No Limit
Up to 5 spray tap basins[12]	30 max	50	No Limit[3]	1.8 to 4.4	No Limit[4]	0

1) For maximum distances from trap to vent (see Figure 8 of BS EN 1205-2:2000).
2) If length is greater than 3m noisy discharge may result with an increased risk of blockage.
3) Should be as short as possible to limit problems with deposition.
4) Sharp throated bends should be avoided.
5) For slab urinal for up to 7 persons. Longer slabs to have more than one outlet.
6) Swept-entry branches serving WC's.
7) Includes small potato-peeling machines.
8) Tubular not bottle or resealing traps.
9) See Figure 9 of BS EN 12056-2:2000).
10) Every basin shall be individually ventilated.
11) Any number.
12) Spray tap basins shall have flush-grated wastes without plugs.
13) The size of ventilating pipes to branches from appliances can be DN 25 but, if they are longer than 15m or contain more than five bends, a DN 30 pipe shall be used.
14) If the connection of the ventilating pipe is liable to blockage due to repeated splashing or submergence, it should be DN 50, up to 50mm above the spill-over of the appliance.

Ventilated discharge branches: Sizes and limitations upon the use of ventilated discharge branches are given in the tables above. Limitations given in the second table are simplifications, for further information see national and local regulations and practice.

Terrain Drainage Ventilation System

Terrain soil & waste products represent the industry benchmark for quality, installation, flexibility and product innovation, backed by the highest levels of customer service. Terrain systems comprise of an extensive range of soil & waste drainage products, including the Terrain Pleura system, a unique alternative engineered ventilation solution for high-rise buildings.

- Unique products offering unrivalled installation options
- High quality finish
- Suitable for all types of commercial and residential high-rise buildings
- Extensive technical experience to support and advise on all aspects of design and installation
- Terrain P.A.P.A.® Valve accredited to BBA 18/5551

As you would expect from a market leader our products come with all relevant standards including:

Manufacturing Standards

BS EN 12380 A1 Air Admittance Valve (Pleura System)
Terrain FUZE HDPE: BS EN 1519/BBA, Certificate No. 07/4479

Quality Management Systems Standards

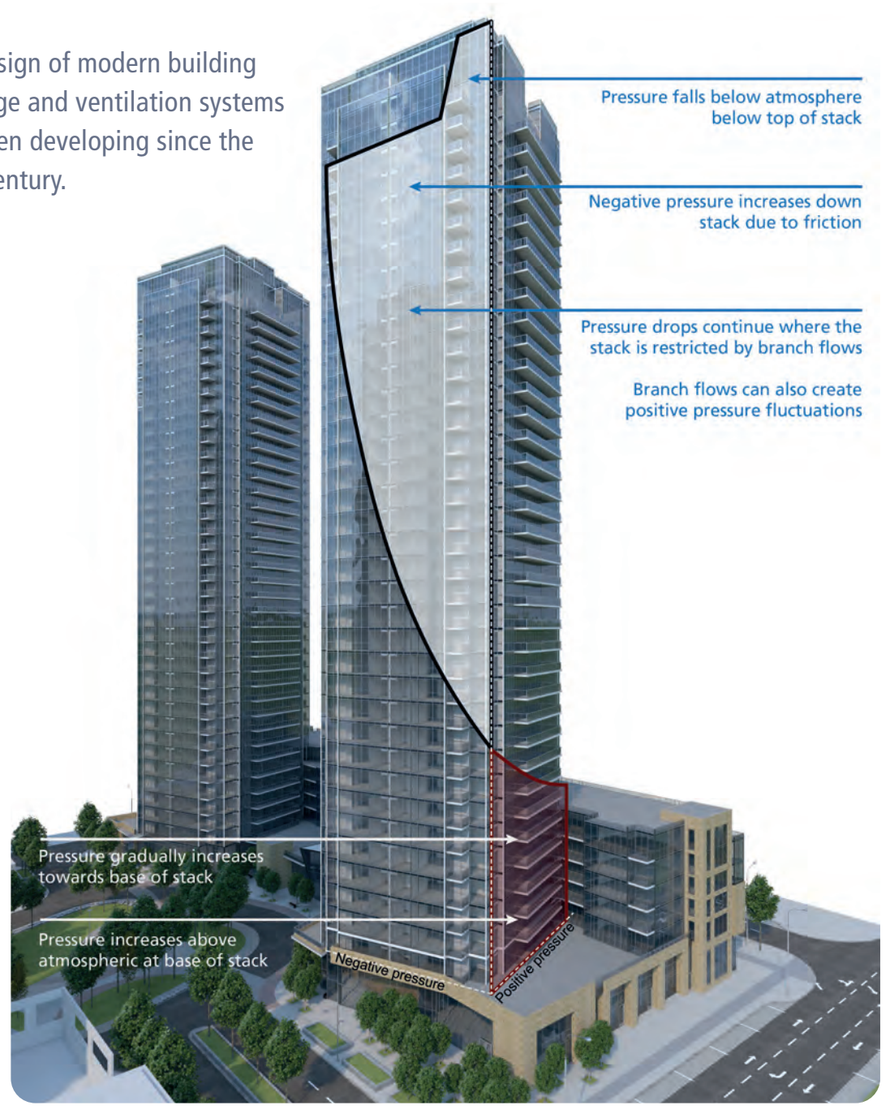
EN ISO 9001:2008 Management System
EN ISO14001:2004 Management System
BS OHSAS 18001:2007 Management System
PASS 99:2006 Integrated Management Registration

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 18/5551

3 Soil and waste drainage

Ventilation Drainage Pipework Systems

The design of modern building drainage and ventilation systems has been developing since the 19th century.



A minimum of 50mm of water is all that protects the occupants of a building from potentially harmful sewer gases and 'particulates'. Therefore, a good design must consider the integrity of the trap seal and protect it from being lost. One way of doing this is to consider the air flow within the system, as this is the primary reason for trap seal breach. The flow of air within the drainage pipework system is equally as important as the flow of water in maintaining a safe and hygienic drainage system. This is because the flow of water creates both positive and negative air fluctuations which can compromise water trap seals and upset the equilibrium in the system. Installation of a secondary stack is traditionally the answer to help alleviate the pressure within the system, however, this modern method of drainage ventilation saves cost, time, floor space and is a more efficient solution.

Terrain P.A.P.A.® & Pleura Drainage Ventilation System

The smarter air pressure and drainage ventilation system for high-rise buildings.

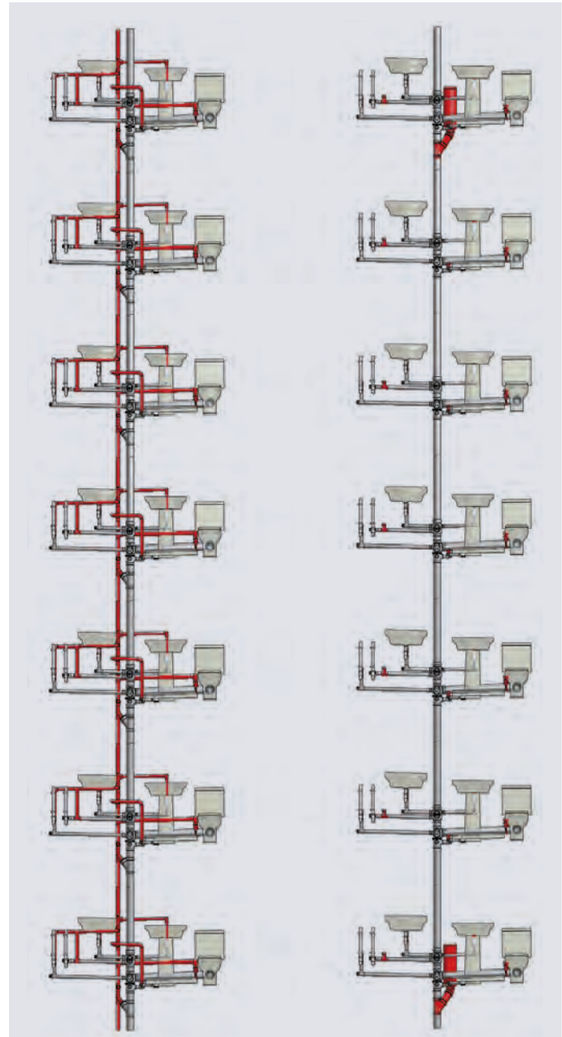
Following several years of theoretical and practical research into both positive and negative transient pressure fluctuations in drainage systems, the Terrain Pleura system provides both an intelligent and integrated solution for balancing the ambient air pressure within a drainage system.

Terrain P.A.P.A® and Pleura drainage ventilation system; how it works:

Terrain Pleura regulators balance negative air pressure fluctuations whilst a positive pressure reduction device (P.A.P.A) balances positive pressures. Together, they protect the water trap seal from damage by forming a highly effective alternative solution for maintaining ambient air pressure within the drainage pipework system – whilst trapping foul air and introducing fresh air into the built environment.

Terrain P.A.P.A can be installed with all of our fabricated soil and waste drainage stacks.

To find out more, visit www.polypipe.com/this-is-our-terrain/terrain-papa-pleura



Conventional stack assembly

Stack assembly using P.A.P.A.® and Pleura venting systems

3 Soil and waste drainage

TERRAIN PLEURA 50

The Terrain Pleura 50 air regulator provides ventilation to branch pipework. It is generally installed on the pipe behind the appliance trap. The Terrain Pleura 50 opens and admits fresh air into the branch pipe when the negative (suction) pressure occurs from an appliance discharging into the pipework system. This equalises the ambient air pressure within the pipework and protects the trap seal. When the flow stops and the internal ambient air pressure in the pipework balances, the Terrain Pleura 50 closes by gravity and prevents foul air entering the built environment.

TERRAIN PLEURA 100

The Terrain Pleura 100 air regulator can be fitted on to the top of a foul or waste stack or at the end of long low gradient branch drains to provide ventilation. The Terrain Pleura 100 opens and admits fresh air under condition of reduced pressure in the discharge pipes and prevents trapped water seals being drawn. As the internal ambient air pressure in the pipework balances, the Terrain Pleura 100 closes by gravity and prevents foul air entering the built environment.

TERRAIN P.A.P.A®

The Terrain P.A.P.A is a positive pressure reduction device, designed to mitigate the affects of positive air fluctuations in the drainage pipework system. As water descends down the drainage stack it creates a negative pressure; if that flow is interrupted or is approaching a change of direction, the negative pressure changes to a positive pressure and moves up the pipe. This low amplitude air wave typically travels at 320m/s, the speed of sound.

As the positive air fluctuation approaches the branch-off point for the Terrain P.A.P.A, the bladder within the unit reacts very quickly, within 0.2 seconds, and starts to expand; this creates a pressure differential at the branch-off point. The branch to the Terrain P.A.P.A then becomes the path of least resistance and the majority of the positive air pressure is absorbed within the unit.

As the ambient air pressure within the pipework starts to equalise, the bladder slowly releases the small volume of air into the pipework system at only 12m/s, which will have no effect on the trap seals.

Terrain P.A.P.A.® 9300.4

Pleura 100 9301.34

Pleura 50 9301.253

Case Studies

DEANSGATE SQUARE, MANCHESTER, UK

A range of Terrain's drainage ventilation and soil and waste systems are installed at Deansgate Square – one of Manchester's most prestigious residential developments. The 1,508-apartment luxury development has been fitted with a Terrain P.A.P.A.® and Pleura Vent System, eliminating the need for a secondary vent system, while Terrain FUZE HDPE drainage stacks and Terrain PVC piping systems helped meet the project's drainage and soil and waste requirements.

MANCHESTER ENGINEERING CAMPUS DEVELOPMENT, UK

The University of Manchester's Engineering Campus Development (MECD) used Polypipe Building Services large diameter Terrain FUZE soil and waste pipes to manage water across the eight-storey, 78,000 square metre building.

THE ROYAL LIVERPOOL UNIVERSITY HOSPITAL, UK

Terrain FUZE, Terrain PVC Vent and Waste Pipes, and Terrain Dilution Traps have been installed in some of the most critical areas of The Royal Liverpool University Hospital, including above surgery theatres, and in the Accident and Emergency Department.

D1 TOWER, DUBAI, UAE

Terrain P.A.P.A is installed in D1 Tower, an 80 floor luxury residential building, providing a simplified, but efficient drainage ventilation system.

P.A.P.A.® is a registered trademark owned by Akatherm BV, part of the Aliaxis Group.

3 Soil and waste drainage

Base of Stack/Transition Areas

When foul water and air discharge down a drainage stack, reaching the base of the stack, it will need to change direction to flow horizontally into either a high-level collector drain or into the below-ground drainage system.

The flow velocity in the horizontal drainage pipework will be controlled by the installed gradient and pipe diameter; this will be appreciably less than the velocity of the vertical drainage stack. At the base of the drainage stack the waste water discharge undergoes a rapid deceleration in velocity, creating an increase in the depth of the flow at the change of direction. This increase in depth is generally sufficient to fill the cross section area of the pipe.

This phenomenon is known as the 'hydraulic jump'.

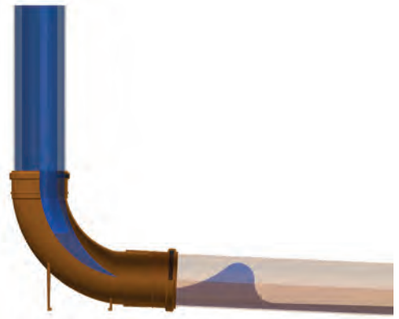
The distance at which the hydraulic jump occurs varies from immediately at the stack change of direction, up to 10 times the diameter of the stack downstream.

This is dependant upon

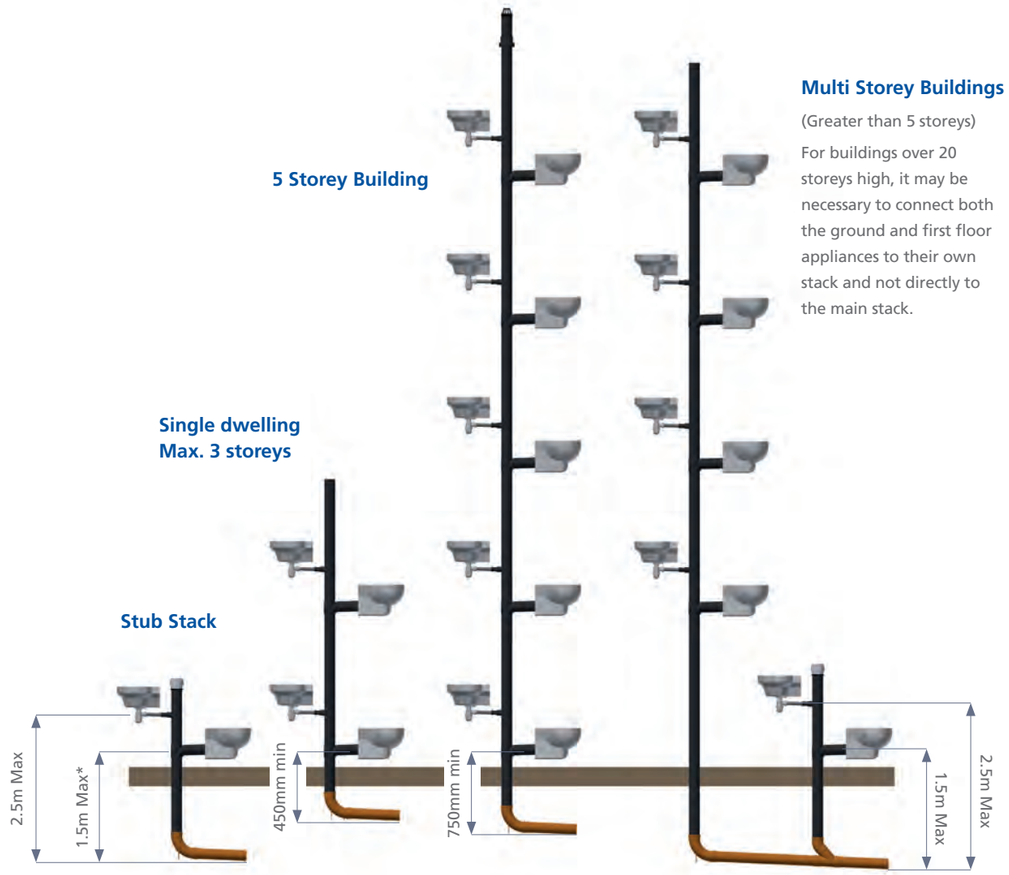
- The entrance velocity
- Depth of water that may already exist within the horizontal drainage pipe
- Roughness co-efficient of the pipe
- Pipe diameter
- Pipe gradient
- Bend formation at the base of the stack

The surged flow condition will extend until the frictional resistance of the pipe reduces the velocity to the designed flow condition.

To mitigate the air fluctuation problems associated at the base of the drainage stack, Building Regulations Approved Document H, states that the following design details are to be incorporated.



Base of Stack Requirements

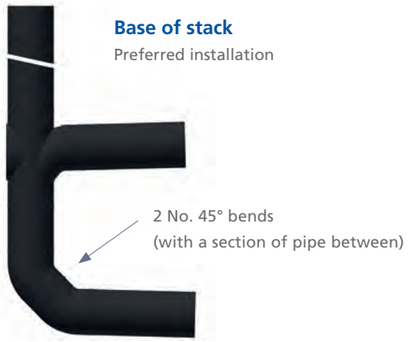


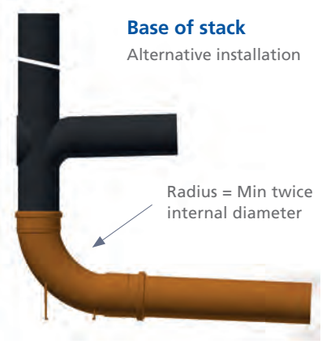
Multi Storey Buildings

(Greater than 5 storeys)

For buildings over 20 storeys high, it may be necessary to connect both the ground and first floor appliances to their own stack and not directly to the main stack.

* BS EN 12056-2 states 1.5m from the invert of the pipe to the centre line of the branch.

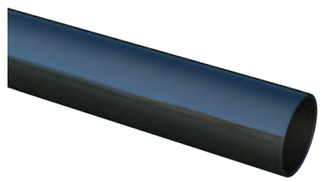


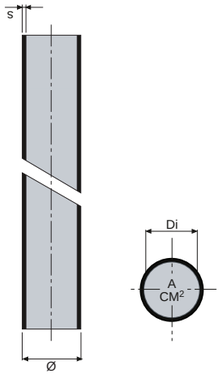


4 Pipes and Fittings

HDPE Pipes

PRODUCT



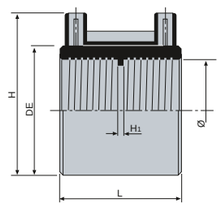


HDPE PIPE (3m length)						
CODE	Ø mm	Di mm	S mm	A cm²	PN	WEIGHT Kg/m
900.40.30B	40	34	3	9	8	0.37
900.50.30B	50	44	3	15.2	6.4	0.46
900.56.30B	56	50	3	19.6	5.7	0.53
900.75.30B	75	69	3	37.3	4.1	0.74
900.110.30B	110	101.4	4.3	80.7	4	1.45
900.160.30B	160	147.6	6.2	171.1	4	3.08

HDPE PIPE (5m length)						
CODE	Ø mm	Di mm	S mm	A cm²	PN	WEIGHT Kg/m
900.40.50B	40	34	3	9	8	0.37
900.50.50B	50	44	3	15.2	6.4	0.46
900.56.50B	56	50	3	19.6	5.7	0.53
900.75.50B	75	69	3	37.3	4.1	0.74
900.110.50B	110	101.4	4.3	80.7	4	1.45
900.160.50B	160	147.6	6.2	171.1	4	3.08
900.200.50B	200	187.6	6.2	276.4	3.2	4.1
900.250.50B	250	234.4	7.8	431.5	3.2	6.1
900.315.50B	315	295.4	9.8	685.3	3.2	9.51

HDPE Fittings

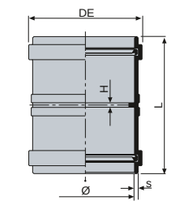
PRODUCT



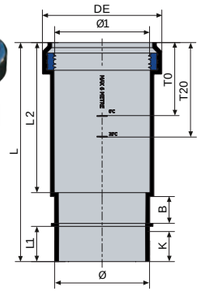
HDPE ELECTROFUSION COUPLINGS						
CODE	Ø mm	L mm	DE mm	H mm	H_1 mm	WEIGHT Kg
910.40B	40	62	54.5	72.6	2	0.075
910.50B	50	61.8	62.2	78	1.8	0.07
910.56B	56	61.8	68.2	84	1.8	0.077
910.75B	75	61.8	87.8	103.5	1.8	0.106
910.110B	110	61.8	176.5	191	1.8	0.283
910.160B	160	153	227.8	242.2	3	1.467
910.200B	200	153	278.5	292.6	3	1.909
910.250B	250	153	345.5	358.3	3	2.496
910.315B	315	153	350	365	3	2.61

HDPE Fittings

PRODUCT

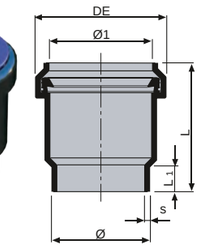


HDPE RING SEAL SOCKET						
CODE	Ø mm	S mm	L mm	H mm	DE mm	WEIGHT Kg
910P.110B	110	4.3	176	6	130	0.43
910P.160B	160	6.7	230	6	185	1.24
910P.200B	200	6.7	270	6	226	1.815
910P.250B	250	8.3	300	7	284	5.14
910P.315B	315	10.4	320	9	354	7.33



HDPE EXPANSION JOINT WITH CAP											
CODE	Ø mm	S mm	DE mm	L mm	L_1 mm	L_2 mm	K mm	B mm	T_0 mm	T_{20} mm	WEIGHT Kg
911.40B	40	3	57	245	35	171	30	35	85	110	0.099
911.50B	50	3	67	245	35	171	30	35	85	110	0.122
911.56B	56	3	73	245	35	171	28	35	85	110	0.136
911.75B	75	3	93	245	35	171	26	35	85	110	0.181
911.110B	110	3.5	130	255	41	174	36	32	85	110	0.521
911.160B	160	6.2	192	264	44	184	35	32	85	110	0.839
911.200B*	200	6.2	228	350	80	-	-	-	85	110	1.85
911.250B°	250	7.8	280	440	183	-	-	-	85	110	3.38
911.315B°	315	9.8	350	480	183	-	-	-	85	110	6.1

° Without cap * For rigid support



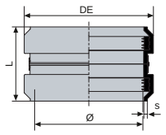
HDPE RING SEAL ADAPTOR WITH CAP						
CODE	Ø/$Ø_1$ mm	S mm	DE mm	L mm	L_1 mm	WEIGHT Kg
927.40B	40	3	57	104	35	0.038
927.50B	50	3	67	104	35	0.053
927.56B	56	3	73	104	35	0.059
927.75B	75	3	93	104	35	0.076
927.110B	110	3.5	130	112	31	0.203
927.160B*	160	6.2	192	184	85	0.785
927.200B	200	6.2	225	170	18	1.075
927.250B°	250	7.8	278	170	22	1.37
927.315B°	315	9.8	350	180	22	1.97

° Without cap * For rigid support

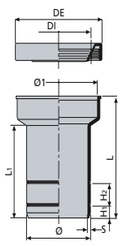
4 Pipes and Fittings

HDPE Fittings

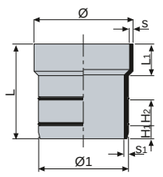
HDPE SLIDING CONNECTOR

PRODUCT	CODE	Ø mm	S mm	L mm	DE mm	WEIGHT Kg
	911S.110B	110	4.3	196	140	1
	911S.160B	160	6.7	110	192	0.936
	911S.200B	200	6.7	270	226	1.445
	911S.250B	250	8.3	300	284	2.91
	911S.315B	315	10.4	320	354	5.1

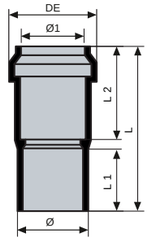
HDPE WC CONNECTOR FOR PVC WITH RING SEAL

PRODUCT	CODE	Ø/Ø$_1$ mm	S mm	DI mm	DE mm	L mm	L$_1$ mm	WEIGHT Kg
	925.110100B	110/100	4.3	102±5	140	166	130	0.39

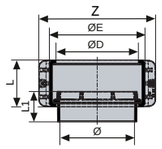
HDPE MALE PVC ADAPTOR WITH RING SEAL

PRODUCT	CODE	Ø/Ø$_1$ mm	S mm	S$_1$ mm	L mm	L$_1$ mm	H$_1$ mm	H$_2$ mm	WEIGHT Kg
	9113.110100B	110/100	4.3	6	105	30	25	25	0.162

HDPE - PVC RING SEAL ADAPTOR

PRODUCT	CODE	Ø/Ø$_1$ mm	S mm	DE mm	L mm	L$_1$ mm	L$_2$ mm	WEIGHT Kg
	927.4036B	40/36	3	49	93	35	53	0.035
	927.5036B	50/36	3	49	93	35	55	0.04
	927.5043B	50/43	3	56	93	35	53	0.041
	927.5636B	56/36	3	49	93	35	53	0.044
	927.5643B	56/43	3	56	93	35	53	0.047

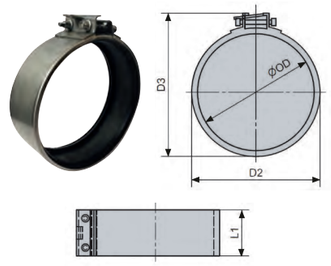
HDPE RIGID FIXING

PRODUCT	CODE	Ø mm	DE mm	ID mm	L mm	L$_1$ mm	Z mm	WEIGHT Kg
	990.110B•	110	144	123	70	90	173	0.354
	990.4B*	110	144	123	70	45	173	0.281

• HDPE to HDPE * HDPE to PVC

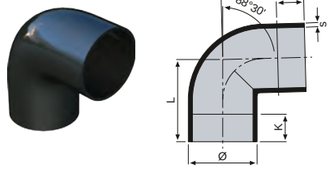
HDPE Fittings

HDPE MECHANICAL COUPLING

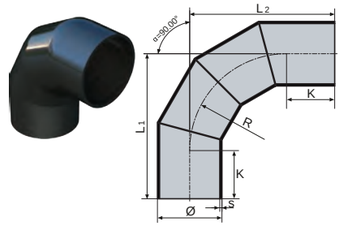
PRODUCT	CODE	Ø OD mm	OD TOLERANCE mm	L$_1$ mm	D$_2$ mm	D$_3$ mm	SCREW SIZE	HEX SOCKET ADAPTER mm	WEIGHT Kg
	9110.110B*	110	109/112	65	121.4	165.4	M6 x 50	5	0.47
	9110.160B*	160	159/162	65	171.4	215.4	M6 x 50	5	0.58
	9110.110C•	114	110/114	65	125.4	169.4	M6 x 50	5	0.52
	9110.160C•	165	160/165	65	176.4	220.4	M6 x 50	5	0.61

* HDPE to HDPE • HDPE to Cast Iron

HDPE 91.5° (88.5°) BEND

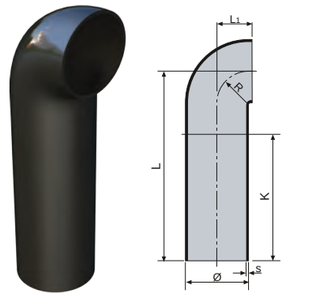
PRODUCT	CODE	Ø mm	S mm	L mm	K mm	WEIGHT Kg
	901.40.92B	40	3	54.6	30	0.038
	901.50.92B	50	3	59.5	30	0.053
	901.56.92B	56	3	62.4	30	0.062
	901.75.92B	75	3	71.7	30	0.09
	901.110.92B	110	4.3	95	30	0.244
	901.160.92B	160	6.2	118.3	30	0.651

HDPE 90° WIDE RADIUS BEND

PRODUCT	CODE	Ø mm	S mm	L$_1$ mm	L$_2$ mm	K mm	R mm	WEIGHT Kg
	907.200.90B*	200	6.2	452	452	150	300	3.05
	907.250.90B*	250	7.8	627	627	250	375	6.4
	907.315.90B*	315	9.8	775	775	300	472.5	12

* Segmented

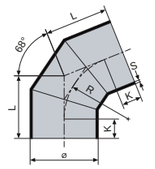
HDPE EXTENDED SPIGOT BEND

PRODUCT	CODE	Ø/Ø$_1$ mm	S mm	DE mm	L mm	L$_1$ mm	R mm	K mm	WEIGHT Kg
	902.56.90B	56	3	50	100	80	-	-	0.085
	902.110.90B	110	4.3	-	300	60	60	220	0.5

4 Pipes and Fittings

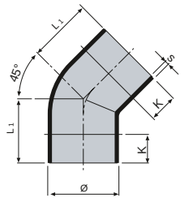
HDPE Fittings

PRODUCT	HDPE 112.5° (67.5°) BEND

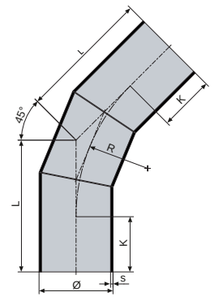


CODE	Ø mm	S mm	L mm	K mm	R mm	WEIGHT Kg
901.110.112B*	110	4.3	125	50	142.5	0.34
901.160.112B*	160	6.2	161	70	167	0.91
901.200.112B*	200	6.2	183	80	188	1.30
901.250.112B*	250	7.8	196	80	204.5	2.19
901.315.112B*	315	9.8	295	139	295.5	5.2

* Segmented

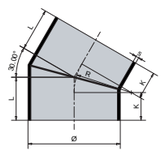


HDPE 45° BEND					
CODE	Ø mm	S mm	L_1 mm	K mm	WEIGHT Kg
901.40.135B	40	3	43.3	30	0.033
901.50.135B	50	3	45.4	30	0.043
901.56.135B	56	3	46.7	30	0.05
901.75.135B	75	3	50.6	30	0.074
901.110.135B	110	4.3	58.8	30	0.167
901.160.135B	160	6.2	73.3	30	0.453



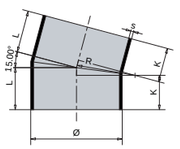
HDPE 45° WIDE RADIUS BEND						
CODE	Ø mm	S mm	L mm	K mm	R mm	WEIGHT Kg
901.200.135B*	200	6.2	358	150	500	2.7
901.250.135B*	250	7.8	510	250	625	6
901.315.135B*	315	9.8	628	300	787.5	11.3

* Segmented



HDPE 150° (30°) BEND						
CODE	Ø mm	S mm	L mm	K mm	R mm	WEIGHT Kg
901.110.150B*	110	4.3	50	35	57	0.15
901.160.150B*	160	6.2	64	42	80.5	0.38
901.200.150B*	200	6.2	113	86	101.5	0.86
901.250.150B*	250	7.8	117	83	125	1.39
901.315.150B*	315	9.8	128	85	160	2.41

* Segmented

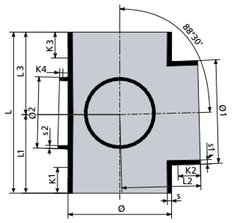


CODE	Ø mm	S mm	L mm	K mm	R mm	WEIGHT Kg
901.110.165B*	110	4.3	43	35	59	0.13
901.160.165B*	160	6.2	50	39	79.5	0.30
901.200.165B*	200	6.2	92	79	97.5	0.70
901.250.165B*	250	7.8	99	82	126	1.18
901.315.165B*	315	9.8	104	84	154	1.97

* Segmented

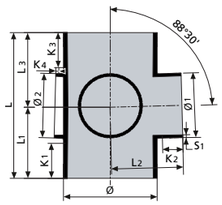
HDPE Fittings

PRODUCT	HDPE 90° BRANCH



CODE	Ø mm	$Ø_1$ mm	$Ø_2$ mm	S mm	S_1 mm	S_2 mm	L mm	L_1 mm	L_2 mm	L_3 mm	K_1 mm	K_2 mm	K_3 mm	K_4 mm	WEIGHT Kg
904.40.90B	40	160	110	3	6.2	4.3	110.2	55.6	60.6	54.6	30	35	40	5	0.06
904.50.90B	50	160	110	3	6.2	4.3	120.2	60.8	65.8	59.4	30	35	40	5	0.085
904.56.90B	56	160	110	3	6.2	4.3	126.3	63.9	68.8	62.4	30	35	40	5	0.105
904.75.90B	75	160	110	3	6.2	4.3	145.4	73.7	77.2	71.7	30	35	40	5	0.145
904.110.90B	110	160	110	4.3	6.2	4.3	223.1	108	91	115.1	30	35	40	5	0.365
904.160.90B	160	160	110	6.2	6.2	4.3	250	122	123	128	40	35	40	5	1.19
904.200.90B*	200	160	110	6.2	6.2	4.3	800	400	400	400	150	35	40	5	1.705
904.250.90B*	250	160	110	7.8	6.2	4.3	800	400	400	400	250	35	40	5	3.1
904.315.90B*	315	160	110	9.8	6.2	4.3	984	492	492	492	300	35	40	5	6.15

* Segmented



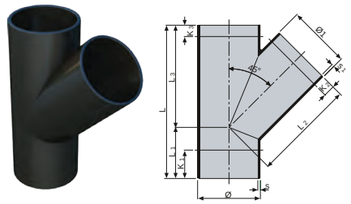
HDPE REDUCING BRANCH 90°											
CODE	$Ø/Ø_1$ mm	S mm	S_1 mm	L mm	L_1 mm	L_2 mm	L_3 mm	K_1 mm	K_2 mm	K_3 mm	WEIGHT Kg
904.5040.90B	50/40	3	3	150	90	-	-	60	25	30	0.08
904.5650.90B	56/50	3	3	175	105	-	-	70	30	35	0.105
904.7540.90B*	75/40	3	3	210	105	107	105	75	60	75	0.18
904.7550.90B*	75/50	3	3	210	105	108	105	75	60	75	0.14
904.7556.90B	75/56	3	3	175	105	-	-	65	25	30	0.14
904.11040.90B	110/40	4.3	3	210	105	91	105	80	30	80	0.32
904.11050.90B	110/50	4.3	3	225	135	-	-	95	25	50	0.345
904.11056.90B	110/56	4.3	3	210	105	91	105	75	30	70	0.323
904.11075.90B	110/75	4.3	3	210	105	91	105	65	30	60	0.324
904.160110.90B	160/110	6.2	4.3	350	210	-	-	135	45	60	1.12
904.200110.90B*	200/110	6.2	4.3	450	225	434	225	150	150	150	2.1
904.200160.90B*	200/160	6.2	6.2	500	250	410	250	150	150	150	2.75
904.250110.90B*	250/110	7.8	4.3	650	325	463	325	250	150	250	4.3
904.250160.90B*	250/160	7.8	6.2	700	350	447	350	250	150	250	5
904.250200.90B*	250/200	7.8	6.2	750	375	425	375	250	150	250	5.4
904.315110.90B*	315/110	9.8	4.3	800	400	498	400	300	150	300	7.6
904.315160.90B*	315/160	9.8	6.2	820	410	486	410	300	150	300	8.2
904.315200.90B*	315/200	9.8	6.2	850	425	472	425	300	150	300	8.7
904.315250.90B*	315/250	9.8	7.8	900	450	446	450	300	250	300	9.1

* Welded

4 Pipes and Fittings

HDPE Fittings

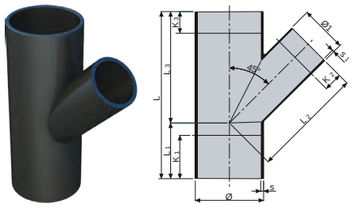
HDPE 45° Y BRANCH



CODE	Ø/Ø$_1$ mm	S/S$_1$ mm	L mm	L$_1$ mm	L$_2$/L$_3$ mm	K$_1$ mm	K$_2$ mm	K$_3$ mm	WEIGHT Kg
904.40.135B	40	3	135	45	90	25	30	30	0.07
904.50.135B	50	3	165	55	110	35	20	20	0.105
904.56.135B	56	3	180	60	120	40	25	25	0.13
904.75.135B	75	3	210	70	140	40	25	25	0.205
904.110.135B	110	4.3	270	90	180	55	20	20	0.53
904.160.135B	160	6.2	375	125	250	75	25	25	1.475
904.200.135B*	200*	6.2	916	458	458	150	150	150	5
904.250.135B*	250*	7.8	1045	448	597	250	250	250	8.5
904.315.135B*	315*	9.8	1153	435	718	300	300	300	15.1

* Segmented

HDPE REDUCING Y BRANCH 45°

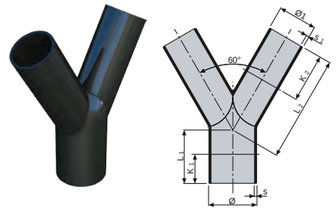


CODE	Ø/Ø$_1$ mm	S mm	S$_1$ mm	L mm	L$_1$ mm	L$_2$ mm	L$_3$ mm	K$_1$ mm	K$_2$ mm	K$_3$ mm	WEIGHT Kg
904.5040.135B	50/40	3	3	165	55	110	110	40	45	45	0.1
904.5650.135B	56/50	3	3	180	60	120	120	40	30	30	0.125
904.7540.135B*	75/40	3	3	210	68	158	142	70	70	70	0.19
904.7550.135B*	75/50	3	3	210	68	158	142	70	70	70	0.2
904.7556.135B	75/56	3	3	210	70	140	-	55	25	35	0.19
904.11040.135B*	110/40	4.3	3	240	59	183	181	70	70	70	0.38
904.11050.135B	110/50	4.3	3	270	90	180	-	95	50	55	0.44
904.11056.135B	110/56	4.3	3	270	90	180	-	90	40	45	0.455
904.11075.135B	110/75	4.3	3	270	90	180	-	75	30	35	0.47
904.16075.135B*	165/75	6.2	3	315	65	253	250	80	75	80	1.03
904.160110.135B	160/110	6.2	4.3	375	125	250	-	110	45	55	1.25
904.20075.135B*	200/75	6.2	3	500	150	604	350	150	150	150	2.246
904.200110.135B*	200/110	6.2	4.3	540	170	587	370	150	150	150	2.4
904.200160.135B*	200/160	6.2	6.2	540	170	562	370	150	150	150	2.7
904.250110.135B*	250/110	7.8	4.3	700	225	622	475	250	150	250	4.4
904.250160.135B*	250/160	7.8	6.2	780	264	597	516	250	150	250	4.85
904.250200.135B*	250/200	7.8	6.2	800	275	577	525	250	150	250	5
904.315110.135B*	315/110	9.8	4.3	850	267	668.5	583	300	150	300	8.6
904.315160.135B*	315/160	9.8	6.2	850	267	643	583	300	150	300	9.15
904.315200.135B*	315/200	9.8	6.2	900	292	623	608	300	150	300	9.45
904.315250.135B*	315/250	9.8	7.8	1000	342	598	658	300	250	300	9.25

* Segmented

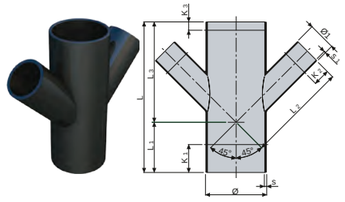
HDPE Fittings

HDPE 60° DOUBLE Y BRANCH



CODE	Ø/Ø$_1$ mm	S mm	S$_1$ mm	L mm	L$_1$ mm	K$_1$ mm	K$_2$ mm	WEIGHT Kg
906.5040.60B	50/40	3	3	55	110	40	50	0.093
906.110.60B	110/110	4.3	4.3	90	120	50	-	0.393

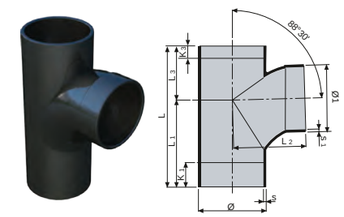
HDPE 45° DOUBLE REDUCING BRANCH



CODE	Ø/Ø$_1$ mm	S mm	S$_1$ mm	L mm	L$_1$ mm	L$_2$ mm	L$_3$ mm	L$_4$ mm	K$_1$ mm	K$_2$ mm	K$_3$ mm	WEIGHT Kg
906.11040.135B*	110/40	4.3	3	240	59	183	183	181	75	75	75	0.42
906.11050.135B*	110/50	4.3	3	238	60	183	190	178	75	75	75	0.43
906.110.135B	110/110	4.3	4.3	338	110	180	180	228	50	30	50	0.738

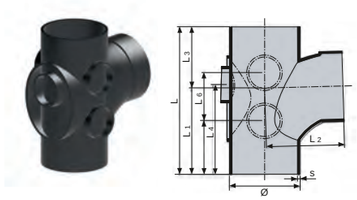
* Segmented

HDPE SWEPT BRANCH FITTING



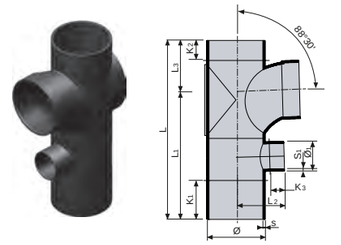
CODE	Ø/Ø$_1$ mm	S/S$_1$ mm	L mm	L$_1$ mm	L$_2$ mm	L$_3$ mm	K$_1$ mm	K$_2$ mm	K$_3$ mm	WEIGHT Kg
904.56.92B	56	3	137	78	70.3	59	25	25	25	0.106
904.110.92B	110/110	4.3	230	140	120	90	90	40	20	0.415

HDPE 92.5° (87.5°) SWEPT ENTRY BOSSED BRANCH



CODE	Ø mm	S mm	L mm	L$_1$ mm	L$_2$ mm	L$_3$ mm	L$_4$ mm	L$_5$ mm	L$_6$ mm	WEIGHT Kg
904.110.925B	110	4.3	225	135.1	119.9	89.9	140	84	75	0.539

HDPE 88° SINGLE BOSS BRANCH

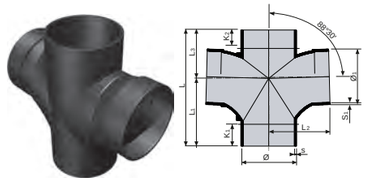


CODE	Ø/Ø$_1$ mm	S mm	S$_1$ mm	L mm	L$_1$ mm	L$_2$ mm	L$_3$ mm	K$_1$ mm	K$_2$ mm	K$_3$ mm	WEIGHT Kg
904.11090.12B	110/56	4.3	3	338	240	90	97	73	37	27	0.575

4 Pipes and Fittings

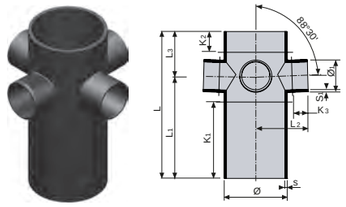
HDPE Fittings

HDPE 88° DOUBLE BRANCH



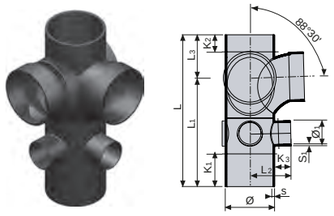
CODE	Ø/Ø1 mm	S mm	L mm	L1 mm	L2 mm	L3 mm	K1 mm	K2 mm	WEIGHT Kg
906.110.92B	110/110	4.3	231	134	120	97	43	37	0.553

HDPE 4 WAY BRANCH



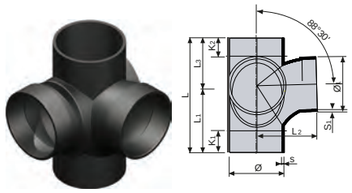
CODE	Ø/Ø1 mm	S mm	S1 mm	L mm	L1 mm	L2 mm	L3 mm	K1 mm	K2 mm	K3 mm	WEIGHT Kg
920.110.56B	110/56	4.3	3	257	177	90	79	133	37	37	0.483
920.160.56B	160/56	6.2	3	146	73	120	73	15	15	15	0.699

HDPE 88° CORNER BOSS BRANCH



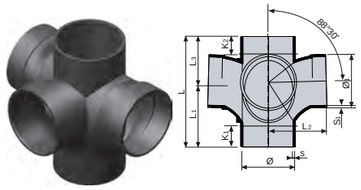
CODE	Ø/Ø1 mm	S mm	S1 mm	L mm	L1 mm	L2 mm	L3 mm	K1 mm	K2 mm	K3 mm	WEIGHT Kg
906.11090.12B	110/56	4.3	3	338	240	90	97	73	37	27	0.71

HDPE 88° CORNER BRANCH



CODE	Ø mm	S mm	L mm	L1 mm	L2 mm	L3 mm	K1 mm	K2 mm	WEIGHT Kg
906.11090.92B	110	4.4	231	134	120	97	43	37	0.479

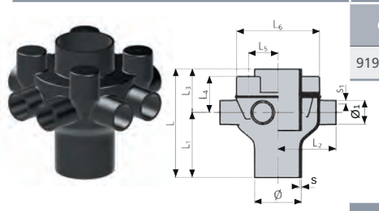
HDPE 88° 3 WAY CORNER BRANCH



CODE	Ø mm	S mm	L mm	L1 mm	L2 mm	L3 mm	K1 mm	K2 mm	WEIGHT Kg
906.11093.92B	110	4.4	231	134	120	97	43	37	0.579

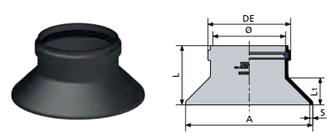
HDPE Fittings

HDPE MANIFOLD



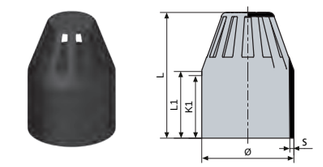
CODE	Ø/Ø1 mm	S mm	S1 mm	L mm	L1 mm	L2 mm	L3 mm	L4 mm	L5 mm	L6 mm
919.110.56B	110/56	4.3	3	255	153	138	102	85	100	200

HDPE WEATHERING APRON



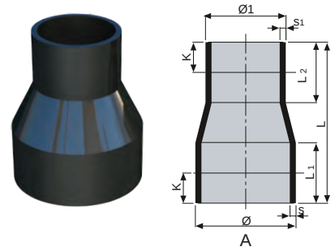
CODE	Ø mm	DE mm	S mm	L mm	L1 mm	A mm	WEIGHT Kg
931.110.200B	110	131	4.3	93.5	42.5	200	0.242

HDPE VENT COWL



CODE	Ø mm	S mm	L mm	L1 mm	K1 mm	WEIGHT Kg
950.75B	75	3	118	68.5	63.5	0.074
950.110B	110	4.3	151	80	75	0.191
950.160B	160	6.2	192	100	95	0.528

HDPE CONCENTRIC REDUCERS



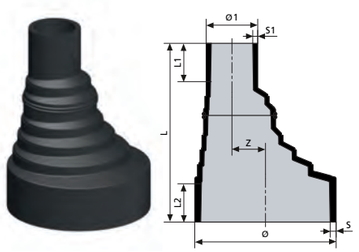
CODE	Ø/Ø1 mm	S mm	S1 mm	L mm	L1 mm	L2 mm	K mm	WEIGHT Kg
924.5040B▼	50/40	3	3	108	30	60	15	0.053
924.5650B▼	56/50	3	3	108	30	60	15	0.061
924.7540B▼	75/40	3	3	80	30	30	15	0.045
924.7550B▼	75/50	3	3	80	30	30	15	0.05
924.7556B▼	75/56	3	3	80	30	30	15	0.06
924.11040B▼	110/40	4.3	3	80	30	30	15	0.09
924.11050B▼	110/50	4.3	3	80	30	30	15	0.115
924.11056B•	110/56	4.3	3	80	30	30	15	0.095
924.11075B ▼	110/75	4.3	3	80	30	30	15	0.125
924.160110B•	160/110	6.2	4.3	115	30	30	15	0.255
924.200160B▼	200/160	9.2	6.2	180	60	60	20	0.325

▼A • B

4 Pipes and Fittings

HDPE Fittings

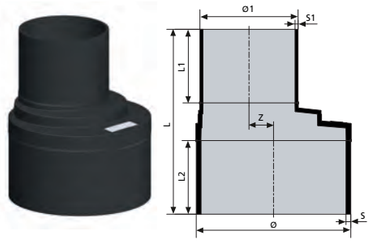
PRODUCT



HDPE ECCENTRIC REDUCER

CODE	Ø/Ø$_1$ mm	S mm	S$_1$ mm	L mm	L$_1$ mm	L$_2$ mm	Z mm	WEIGHT Kg
923.5040B	50/40	3	3	80	35	35	–	0.035
923.5640B	56/40	3.5	3.5	120	64.59	31.05	–	0.064
923.5650B	56/50	3	3	108	35	60	–	0.064
923.7540B	75/40	3	3	80	37	35	–	0.055
923.7550B	75/50	3	3	80	37	35	–	0.05
923.7556B	75/56	3	3	80	37	35	–	0.05
923.11040B*	110/40	4.3	3	140	30	30	26	0.095
923.11050B*	110/50	4.3	3	132	30	30	22	0.125
923.11056B	110/56	4.3	3	80	37	35	–	0.1
923.11075B	110/75	4.3	3	80	37	35	–	0.105
923.160110B	160/110	6.2	4.3	80	37	35	–	0.23

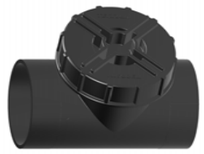
* Segmented

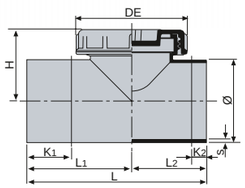


HDPE LONG ECCENTRIC REDUCER

CODE	Ø/Ø$_1$ mm	S mm	S$_1$ mm	L mm	L$_1$ mm	L$_2$ mm	Z mm	WEIGHT Kg
923.160110LB	160/110	6.2	4.3	215	35	37	-	0.43
923.200110LB*	200/110	6.2	4.3	353.5	150	150	39	0.821
923.200160LB*	200/160	6.2	6.2	354	150	150	18	1.084
923.250200LB*	250/200	7.8	6.2	333.5	150	150	22	1.661
923.315200LB*	315/200	9.8	6.2	377	150	150	50	2.658
923.315250LB*	315/250	9.8	7.8	353	150	150	28	2.793

* Segmented





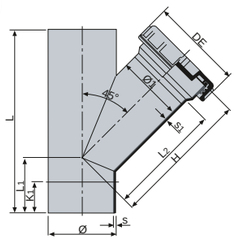
HDPE 90° ACCESS PIPE WITH SCREW CAP

CODE	Ø/Ø$_1$ mm	S mm	L mm	L$_1$ mm	L$_2$ mm	H mm	DE mm	K$_1$ mm	K$_2$ mm	WEIGHT Kg
938.50.90B ▾	50	3	150	90	60	75	82	55	25	0.13
938.56.90B ▾	56	3	175	105	70	84	82	65	30	0.195
938.75.90B ▾	75	3	175	105	70	117	82	55	25	0.365
938.110.90B ▾	110	4.3	240	140	100	94	146	65	20	0.62
938.160.90B ▾	160	6.2	350	210	140	145	146	105	30	1.355
938.200.90B*▾	200	6.2	500	250	250	200	192	150	150	2.73
938.250.90B*▾	250	7.8	700	350	350	226	192	250	250	4.16
938.315.90B*▾	315	9.8	820	410	410	259	192	300	300	7.97

* Segmented ▾Use Canvas style test bung

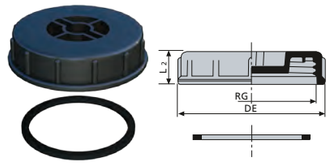
HDPE Fittings

PRODUCT



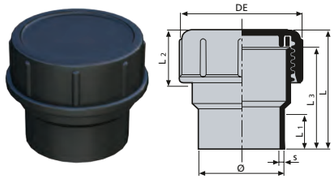
HDPE 45° ACCESS PIPE WITH SCREW CAP

CODE	Ø/Ø$_1$ mm	S mm	S$_1$ mm	L mm	L$_1$ mm	L$_2$ mm	H mm	DE mm	K$_1$ mm	WEIGHT Kg
938.110.135B	110/110	4.3	4.3	270	90	180	220	150	55	0.84
938.160.135B	160/110	6.2	4.3	375	125	275	280	150	110	1.76



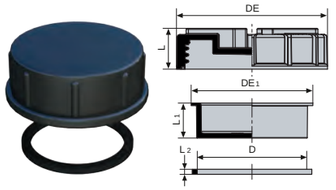
HDPE SHORT END CAP WITH SEAL

CODE	Ø mm	RG mm	DE mm	L$_2$ mm	WEIGHT Kg
9938.110B	110	132	149	33	0.215



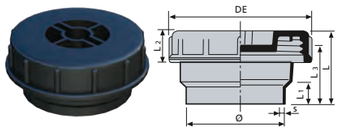
HDPE SCREWED END CAP

CODE	Ø mm	S mm	L mm	L$_1$ mm	L$_2$ mm	L$_3$ mm	DE mm	WEIGHT Kg
936.40B	40	3	75	30	34	66	60	0.075
936.50B	50	3	75	30	33	66	70	0.08
936.56B	56	3	77	30	34	66	80	0.12
936.75B	75	3	103	30	45	87	109	0.28
936.110B	110	4.3	106	30	65	89	144	0.5
936.160B	160	4.3	95	35	48	1	191	0.814



HDPE END CAP WITH SEAL

CODE	D mm	DE mm	DE$_1$ mm	L mm	L$_1$ mm	L$_2$ mm	WEIGHT Kg
9936.56B	56	82	-	39	3.5	-	0.062
9936.110B	110	149	120	41	34.5	5	0.314

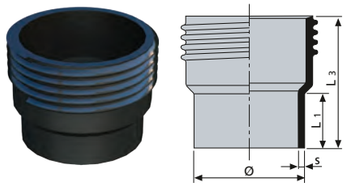


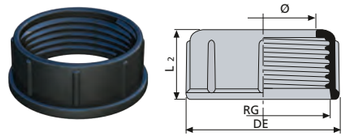
HDPE SHORT SCREWED CAP

CODE	Ø mm	S mm	L mm	L$_1$ mm	L$_2$ mm	DE mm	K mm	WEIGHT Kg
935.110B	110	4.3	63	12	33	50	149	0.315

4 Pipes and Fittings

HDPE Fittings



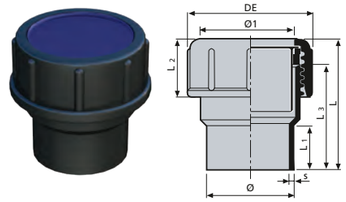


HDPE THREADED UNION

CODE	Ø mm	S mm	L_1 mm	L_2 mm	WEIGHT Kg
9122.50B	50	3	30	66	0.03
9122.56B	56	3	30	66	0.025
9122.75B	75	3	30	87	0.095
9122.110B	110	4.3	30	89	0.17

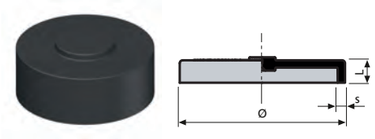
HDPE NUT

CODE	Ø mm	RG mm	DE mm	L_2 mm	WEIGHT Kg
9120.50B	50	62	70	33	0.03
9120.56B	56	71	80	34	0.05
9120.75B	75	96	100	45	0.1
9120.110B	110	132	144	65	0.20



HDPE THREADED COUPLING

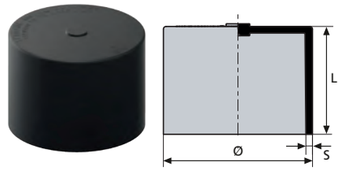
CODE	Ø/$Ø_1$ mm	S mm	L mm	L_1 mm	L_2 mm	L_3 mm	DE mm	WEIGHT Kg
912.40B	40	3	74	30	34	66	60	0.075
912.50B	50	3	76	30	33	66	70	0.08
912.56B	56	3	46	30	34	66	80	0.12
912.5663B	56/63	3	48	-	34	66	80	0.1
912.75B	75	3	106	30	45	87	109	0.25
912.110B	110	4.3	113	30	65	89	144	0.47



HDPE BLANK END

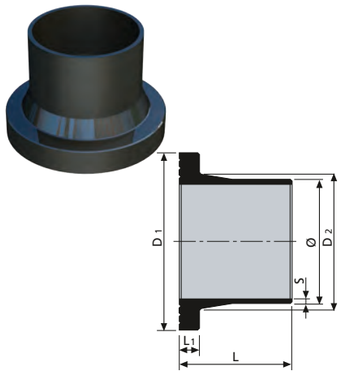
CODE	Ø mm	S mm	L mm	WEIGHT Kg
930.40B	40	3	15	0.009
930.50B	50	3	15	0.013
930.56B	56	3	15	0.016
930.75B	75	3	15	0.024
930.110B	110	4.3	15	0.061
930.160B	160	6.2	15	0.164
930.200B	200	6.2	110	0.56
930.250B	250	7.8	93	0.75
930.315B	315	9.2	117	1.42

HDPE Fittings



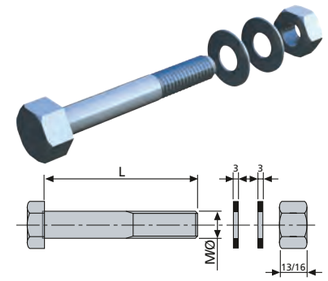
HDPE LONG BLANK END

CODE	Ø mm	S mm	L_1 mm	L_2 mm	WEIGHT Kg
930.40LB	40	3	68.5	66	0.032
930.50LB	50	3	68.5	66	0.042
930.56LB	56	3	68.5	66	0.048
930.75LB	75	3	68.5	66	0.069
930.110LB	110	4.3	80	87	0.17
930.160LB	160	6.2	107	89	0.505



HDPE FLANGE ADAPTORS

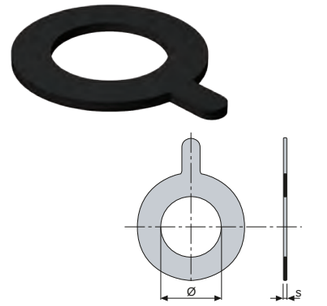
CODE	Ø mm	S mm	D_1 mm	D_2 mm	L mm	L_1 mm	WEIGHT Kg
980.50B	50	3	88	61	52	12	0.075
980.56B	56	3	94	72	90	12	0.115
980.75B	75	3	122	89	90	15	0.185
980.110B	110	4.3	158	120	100	18	0.335
980.160B	160	6.2	212	175	100	18	0.585
980.200B	200	6.2	268	232	100	20	0.92
980.250B	250	7.8	320	285	100	20	1.48
980.315B	315	9.8	370	236	100	20	1.72



HDPE GALVANISED BOLT SET WITH WASHER FOR FLANGE

CODE	MØ mm	L mm	THREAD	FOR FLANGE mm	WEIGHT Kg
984.1650B	16	90	38	50-56	0.215
984.1663B	16	100	38	63-75	0.23
984.16110B	16	100	38	110-125-140	0.25
984.20160B	20	110	46	160	0.41
984.20250B	20	130	58	200-250-315	0.45

Material: Galvanised steel



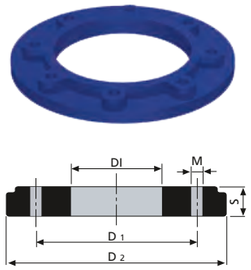
FLAT RUBBER SEAL FOR FLANGE

CODE	Ø mm	S mm	WEIGHT Kg
982.50B	50	3	0.02
982.56B	56	3	0.02
982.75B	75	3	0.03
982.110B	110	3	0.045
982.160B	160	3	0.07
982.200B	200	3	0.11
982.250B	250	3	0.14
982.315B	315	3	0.14

4 Pipes and Fittings

HDPE Fittings

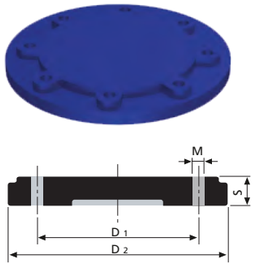
PAINTED ALUMINIUM BACKING FLANGE



CODE	Ø mm	S mm	DI mm	D_1 mm	D_2 mm	M mm	HOLE No	WEIGHT Kg
981.50B	50	20	62	120	150	18	4	0.625
981.56B	56	20	64	123	159	18	4	0.71
981.75B	75	21	93	148	185	18	4	0.885
981.110B	110	22	128	182	220	19	8	1.05
981.160B	160	25	179	240	285	22	8	1.84
981.200B	200	26	235	295	337	22	8	2.325
981.250B	250	30	285	350	396	22	12	3.78
981.315B	315	30	340	400	444	22	12	3.945

Manufactured to EN1092-1/04 PN10/16

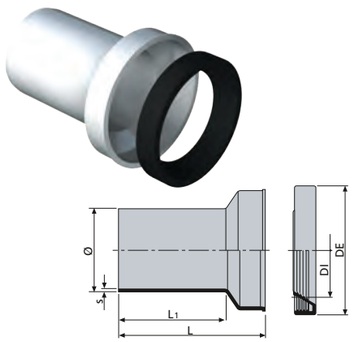
PAINTED ALUMINIUM BLANK FLANGE



CODE	Ø mm	S mm	D_1 mm	D_2 mm	M mm	HOLE No	WEIGHT Kg
983.50B	50	20	120	150	18	4	0.76
983.56B	56	20	123	159	18	4	0.865
983.75B	75	21	148	185	18	4	1.305
983.110B	110	22	176	220	19	8	1.7
983.160B	160	25	240	285	22	8	2.945
983.200B	200	26	295	337	22	8	4.485
983.250B	250	30	350	396	22	12	7.495
983.315B	315	30	400	444	22	12	9.345

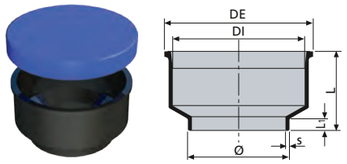
Manufactured to EN1092-1/04 PN10/16

HDPE WC PAN CONNECTOR - WHITE



CODE	Ø mm	S mm	L mm	L_1 mm	R mm	K mm	WEIGHT Kg
925.110W	110	4.3	102±5	140	166	130	0.355

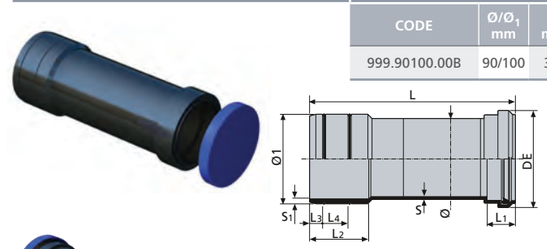
HDPE WC PAN CONNECTOR WITH CAP



CODE	Ø mm	S mm	DI mm	DE mm	L mm	L_1 mm	WEIGHT Kg
925.110B	110	4.3	120	131	68	15	0.13

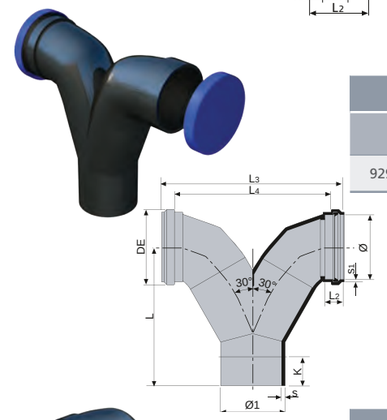
HDPE Fittings

HDPE STRAIGHT WC PAN CONNECTOR WITH SEAL AND CAP



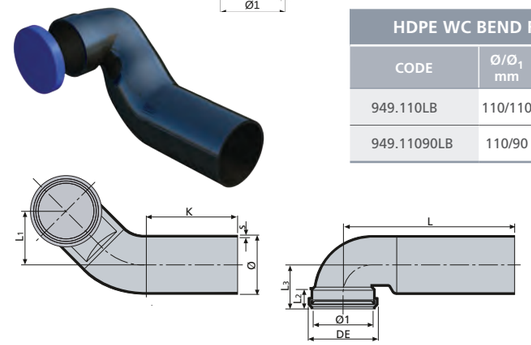
CODE	Ø/$Ø_1$ mm	S mm	S_1 mm	DE mm	L mm	L_1 mm	L_2 mm	L_3 mm	L_4 mm	WEIGHT Kg
999.90100.00B	90/100	3.5	5.5	109	232	31	70	15	28	0.332

HDPE DOUBLE WC PAN CONNECTOR WITH LIP SEALS AND CAPS



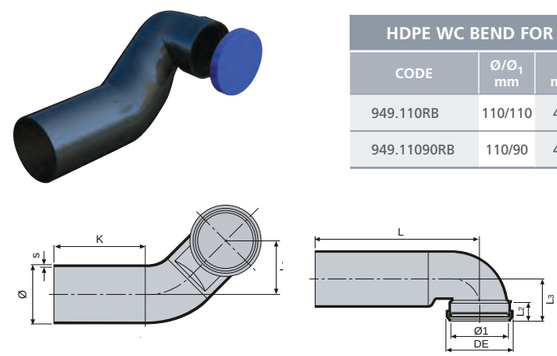
CODE	Ø/$Ø_1$ mm	S mm	S_1 mm	DE mm	L mm	L_2 mm	L_3 mm	L_4 mm	K mm	WEIGHT Kg
929.110.90DB	110/110	4.3	4.3	130	205	37	285	240	50	0.816

HDPE WC BEND FOR HANGING PAN WITH 1-LIP SEAL AND CAP, LEFT



CODE	Ø/$Ø_1$ mm	S mm	DE mm	L mm	L_1 mm	L_2 mm	L_3 mm	K mm	WEIGHT Kg
949.110LB	110/110	4.3	130	320	100	35	85	170	0.72
949.11090LB	110/90	4.3	108	315	100	35	85	170	0.616

HDPE WC BEND FOR HANGING PAN WITH 1-LIP SEAL AND CAP, RIGHT

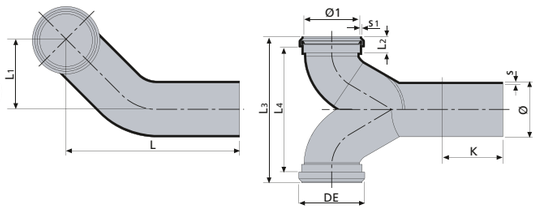


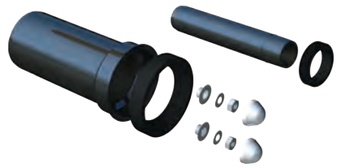
CODE	Ø/$Ø_1$ mm	S mm	DE mm	L mm	L_1 mm	L_2 mm	L_3 mm	K mm	WEIGHT Kg
949.110RB	110/110	4.3	130	320	100	35	85	170	0.72
949.11090RB	110/90	4.3	108	315	100	35	85	170	0.616

4 Pipes and Fittings

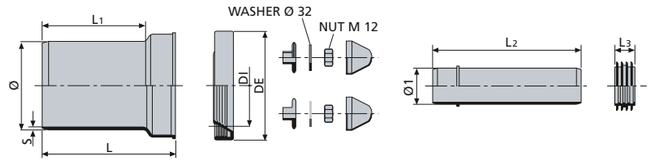
HDPE Fittings

PRODUCT	HDPE WC PAN CONNECTORS											
	CODE	Ø/Ø$_1$ mm	S mm	S$_1$ mm	DE mm	L mm	L$_1$ mm	L$_2$ mm	L$_3$ mm	L$_4$ mm	K mm	WEIGHT Kg
	949.110DB	110/110	4.3	3.5	108	335	100	-	285	-	120	1.02

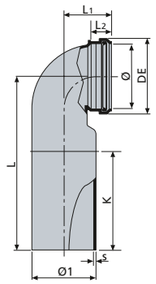




HDPE WC CONNECTOR FOR HANGING PAN WITH SEAL AND WHITE COVERINGS									
CODE	Ø/Ø$_1$ mm	S mm	DI mm	DE mm	L mm	L$_1$ mm	L$_2$ mm	L$_3$ mm	WEIGHT Kg
925.11044B	110/45	4.3	102±5	132	166	129	199	24	0.53

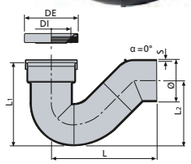


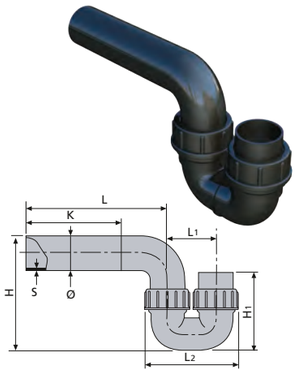
HDPE WC BEND HANGING PAN WITH SEAL AND CAP								
CODE	Ø/Ø$_1$ mm	S mm	L mm	L$_1$ mm	L$_2$ mm	DE mm	K mm	WEIGHT Kg
999.110.90B	110/110	4.3	300	87	40	130	180	0.596



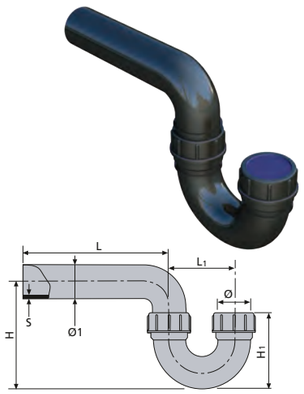
HDPE Fittings

PRODUCT	HDPE TRAP WITH SEAL AND CAP								
	CODE	Ø mm	α	S mm	DI mm	DE mm	L mm	L$_1$ mm	L$_2$ mm	WEIGHT Kg
	9631.110.0B	110	0°	4.3	102±5	140	270	215	170	0.72
	9631.110.45B	110	45°	4.3	102±5	140	240	225	160	1.002
	9631.110.90B	110	90°	4.3	102±5	140	340	225	220	0.99



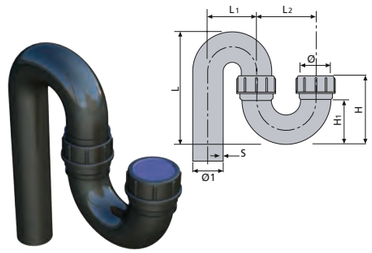


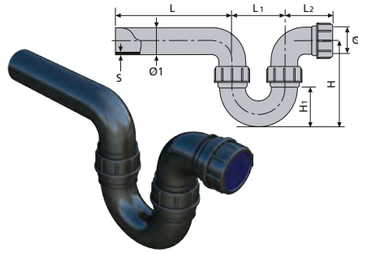
HDPE UNIVERSAL TRAP, VERTICAL INLET AND HORIZONTAL OUTLET									
CODE	Ø mm	S mm	L mm	L$_1$ mm	L$_2$ mm	H mm	H$_1$ mm	K mm	WEIGHT Kg
931.75B	75	3	210	135	245	335	245	140	0.92
931.110B	110	4.3	270	160	310	370	260	220	1.92



HDPE TRAP, VERTICAL INLET AND HORIZONTAL OUTLET							
CODE	Ø/Ø$_1$ mm	S mm	L mm	L$_1$ mm	H mm	H$_1$ mm	WEIGHT Kg
931.4040B	40/40	3	150	80	140	110	0.22
931.4050B	40/50	3	180	80	160	110	0.31
931.4056B	40/56	3	210	80	155	110	0.31
931.5050B	50/50	3	180	100	170	110	0.31
931.5056B	50/56	3	210	100	165	110	0.31

HDPE Fittings

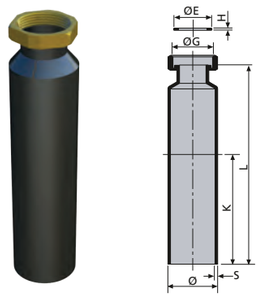
PRODUCT	HDPE TRAP, VERTICAL INLET AND OUTLET								
	CODE	Ø/Ø$_1$ mm	S mm	L mm	L$_1$ mm	L$_2$ mm	H mm	H$_1$ mm	WEIGHT Kg
	932.4040B	40/40	3	160	60	80	110	60	0.235
	932.4050B	40/50	3	180	80	80	110	65	0.34
	932.4056B	40/56	3	238	80	80	110	65	0.34
	932.5050B	50/50	3	180	80	100	110	70	0.34
	932.5056B	50/56	3	190	80	100	120	70	0.37

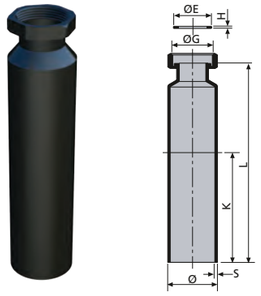
PRODUCT	HDPE TRAP, HORIZONTAL INLET AND OUTLET								
	CODE	Ø/Ø$_1$ mm	S mm	L mm	L$_1$ mm	L$_2$ mm	H mm	H$_1$ mm	WEIGHT Kg
	945.4040B	40/40	3	150	80	90	140	40	0.31
	945.4050B	40/50	3	180	80	90	160	65	0.37
	945.4056B	40/56	3	210	80	90	160	40	0.4
	945.5050B	50/50	3	180	100	90	170	70	0.42

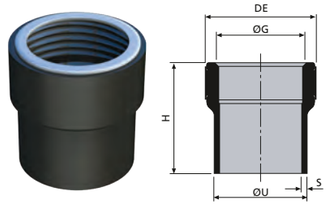
PRODUCT	HDPE FITTING WITH NUT - BRASS							
	CODE	Ø mm	ØG	S mm	L mm	ØE mm	H mm	NUT	WEIGHT Kg
	918.40.125BN	40	1¼"	3	45	40	2	Brass	0.08
	918.40.15BN	40	1½"	3	45	45	2	Brass	0.09
	918.50.125BN	50	1¼"	3	45	40	2	Brass	0.08
	918.50.15BN	50	1½"	3	45	45	2	Brass	0.09

PRODUCT	HDPE FITTING WITH NUT - PLASTIC								
	CODE	Ø mm	ØG	S mm	L mm	ØE mm	H mm	NUT	WEIGHT Kg
	918.40.125PN	40	1¼"	3	45	40	2	Plastic	0.03
	918.40.15PN	40	1½"	3	45	45	2	Plastic	0.03
	918.50.125PN	50	1¼"	3	45	40	2	Plastic	0.03
	918.50.15PN	50	1½"	3	45	45	2	Plastic	0.03

HDPE Fittings

PRODUCT	HDPE EXTENDED FITTING WITH NUT - BRASS									
	CODE	Ø mm	ØG mm	S mm	L mm	ØE mm	H mm	Nut mm	K mm	WEIGHT Kg
	918.40.125EB	40	1¼"	3	195	40	2	Brass	110	0.13
	918.40.15EBN	40	1½"	3	195	45	2	Brass	110	0.145
	918.50.125EBN	50	1¼"	3	195	40	2	Brass	110	0.15
	918.50.15EBN	50	1½"	3	195	45	2	Brass	110	0.155

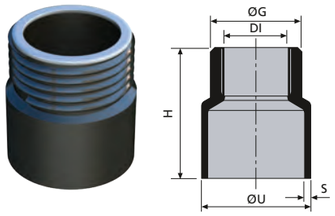
PRODUCT	HDPE EXTENDED FITTING WITH NUT - PLASTIC									
	CODE	Ø mm	ØG mm	S mm	L mm	ØE mm	H mm	Nut mm	K mm	WEIGHT Kg
	918.40.125EPN	40	1¼"	3	195	40	2	Plastic	110	0.08
	918.40.15EPN	40	1½"	3	195	45	2	Plastic	110	0.085
	918.50.125EPN	50	1¼"	3	195	40	2	Plastic	110	0.1
	918.50.15EPN	50	1½"	3	195	45	2	Plastic	110	0.095

PRODUCT	HDPE END WITH INTERNAL THREADING, REINFORCED WITH STEEL RING						
	CODE	ØU mm	ØG mm	S mm	DE mm	H mm	WEIGHT Kg
	916.40.05B	40	½"	3	40.5	55	0.065
	916.40.075B	40	¾"	3	40.5	55	0.06
	916.40.1B	40	1"	3	40.5	55	0.06
	916.50.05B	50	½"	3	50	60	0.075
	916.50.075B	50	¾"	3	50	60	0.075
	916.50.1B	50	1"	3	50	60	0.075
	916.50.125B	50	1¼"	3	50	60	0.07
	916.50.15B	50	1½"	3	58.5	60	0.07
	916.56.2B	56	2"	3	70	65	0.1
	916.75.25B	75	2"½	3	89	70	0.135

4 Pipes and Fittings

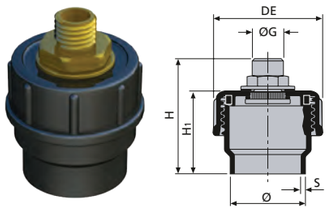
HDPE Fittings

PRODUCT



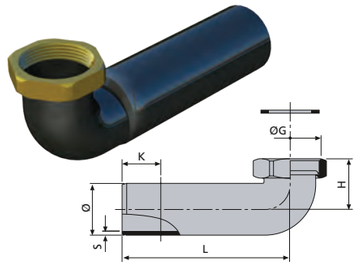
HDPE END WITH EXTERNAL THREADING, REINFORCED WITH STEEL RING

CODE	ØU mm	ØG mm	S mm	DI mm	H mm	WEIGHT Kg
917.50.125B	50	1¼"	3	29	60	0.055
917.50.15B	50	1½"	3	29	60	0.065
917.56.2B	56	2"	3	47	65	0.09
917.75.25B	75	2"½	3	57	70	0.125



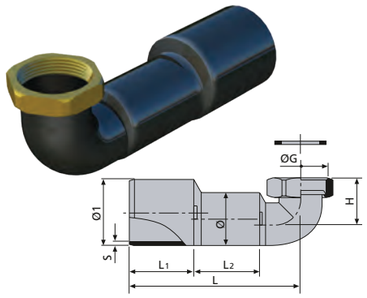
HDPE THREADED FITTING WITH BRASS NIPPLE

CODE	Ø mm	ØG mm	S mm	DE mm	H mm	H_1 mm	WEIGHT Kg
936.40.05NB	40	½" x 15mm	3	60	81	74	0.18
936.40.075NB	40	¾" x 18mm	3	60	84	74	0.24
936.50.05NB	50	½" x 15mm	3	71	92	76	0.15
936.50.075NB	50	¾" x 18mm	3	71	95	76	0.185
936.50.1NB	50	1" x 22mm	3	71	95	76	0.245



HDPE BEND WITH NUT

CODE	Ø mm	ØG mm	S mm	L mm	H mm	Nut mm	K mm	WEIGHT Kg
918.40.125.90BN	40	1¼"	3	130	25	Brass	100	0.1
918.40.15.90BN	40	1½"	3	130	30	Brass	100	0.105
918.40.15.90PN	40	1½"	3	130	30	Plastic	100	0.04

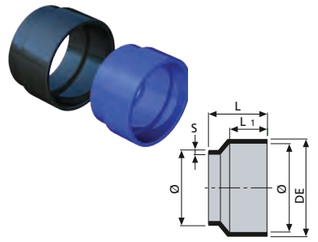


HDPE REDUCING BEND WITH NUT

CODE	Ø mm	ØG mm	S mm	L mm	L_1 mm	H mm	Nut mm	K mm	WEIGHT Kg
918.4050.125.90BN	40/50	1¼"	3	130	50	54	25	Brass	0.11
918.4050.15.90BN	40/50	1½"	3	120	50	N.C.	30	Brass	0.12
918.4050.15.90PN	40/50	1½"	3	120	50	N.C.	30	Plastic	0.055

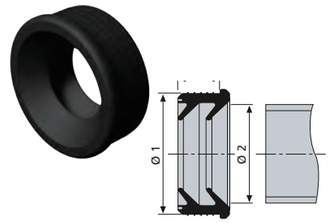
HDPE Fittings

PRODUCT



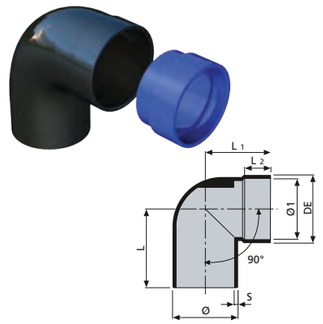
HDPE SLEEVE

CODE	Ø/$Ø_1$ mm	S mm	DE mm	L mm	L_1 mm	WEIGHT Kg
917.4046B	40/46	3	52	30	20	0.015
917.5046B	50/46	3	52	30	20	0.015
917.5058B	50/58	3	64	38	20	0.02
917.5646B	56/46	3	52	38	20	0.02
917.5658B	56/58	3	64	38	20	0.025



GASKET

CODE	$Ø_1$ mm	$Ø_2$ mm	L mm	WEIGHT Kg
917.4624.908B	46	24-46	22	0.01
917.4636.908B	46	36-40	22	0.01
917.5836.908B	58	36-40	22	0.2
917.5847.908B	58	47-50	22	0.3



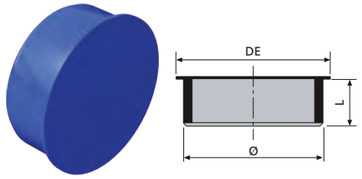
HDPE SPIGOT BEND WITH CAP

CODE	Ø/$Ø_1$ mm	S mm	DE mm	L mm	L_1 mm	L_2 mm	WEIGHT Kg
917.4046.90B	40/46	3	52	60	51	22	0.055
917.5046.90B	50/46	3	52	62	51	22	0.06
917.5058.90B	50/58	3	64	68	55	24	0.07
917.5646.90B	56/46	3	52	64	60	22	0.07
917.5658.90B	56/58	3	64	65	60	22	0.075

4 Pipes and Fittings

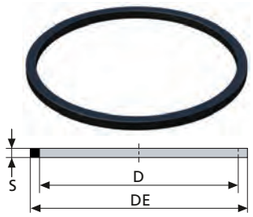
HDPE Spares

PRODUCT



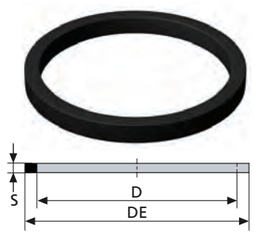
HDPE PROTECTIVE CAP FOR SOCKET

CODE	Ø mm	DE mm	L mm	WEIGHT Kg
9130.40B	40	48	30	0.01
9130.50B	50	60	30	0.01
9130.56B	56	62	25	0.01
9130.75B	75	85	38	0.02
9130.110B	110	123	39	0.04
9130.160B	160	167	36	0.055
9130.200B	200	220	50	0.13



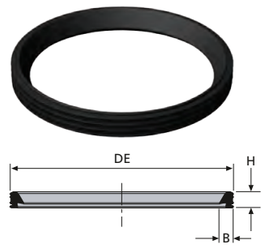
HDPE RING

CODE	D mm	DE mm	S mm	WEIGHT Kg
9118.50B	50	58	3.5	0.003
9118.56B	56	63	3.5	0.003
9118.75B	75	84	4	0.007
9118.110B	110	121	4	0.011



HDPE RING SEAL

CODE	D mm	DE mm	S mm	WEIGHT Kg
9119.50B	50	56	6	0.004
9119.56B	56	61	6	0.004
9119.75B	75	82	10	0.006
9119.110B	110	121	10	0.008

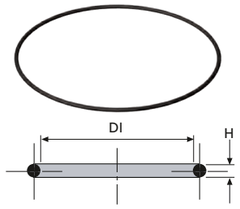


HDPE 1 LIP SEAL FOR SOCKETS

CODE	Ø mm	DE mm	H mm	B mm	WEIGHT Kg
927.100.908B	100	114	9.3	8.2	0.02
927.110.908B	110	123.9	8.9	7.9	0.02
927.160.908B	160	179.8	11.5	10.2	0.045
927.200.908B	200	223.7	12.8	11.2	0.045
927.250.908B	250	282	19.5	1.6	0.5
927.315.908B	315	350	20.5	17.15	0.055

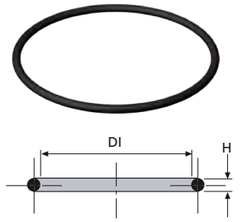
HDPE Spares

PRODUCT



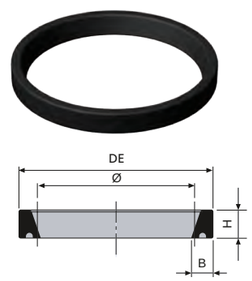
O-RING FOR ADAPTORS (PVC)

CODE	Ø mm	H mm	FOR CODES	WEIGHT Kg
9113.908B	100	2.62	353-354	0.002



HDPE O RING FOR SOCKETS

CODE	Ø mm	DI mm	H mm	WEIGHT Kg
9116.40B	40	39+1	6	0.005
9116.50B	50	49+1	6	0.005
9116.75B	75	79+1	6	0.01
9116.110B	110	109+1.5	7	0.015
9116.160B	160	159+1.5	9	0.035

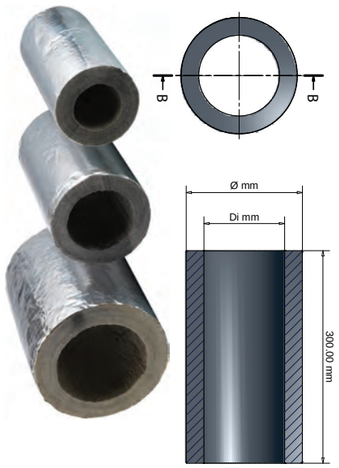


HDPE SEAL FOR EXPANSION SOCKETS

CODE	Ø mm	H mm	B mm	DE mm	WEIGHT Kg
911.40.908B	40	16	12	60	0.025
911.50.908B	50	16	12	70	0.035
911.56.908B	56	16	12	76	0.04
911.75.908B	75	16	12.5	95.5	0.05
911.110.908B	110	16	12.5	130.5	0.07
911.160.908B	160	16	12.5	180.5	0.115
911.200.908B	200	21.8	11.2	223.7	0.045

4 Pipes and Fittings

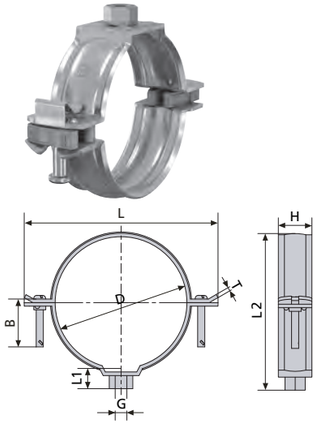
HDPE Firetraps



PRODUCT	FIRETRAP SLEEVE			
CODE	DI mm	ØD mm	H mm	
1925.17	17	67	300	
1925.21	21	71	300	
1925.27	27	77	300	
1925.34	34	84	300	
1925.42	42	92	300	
1925.48	48	98	300	
1925.54	54	104	300	
1925.60	60	110	300	
1925.67	67	117	300	
1925.76	76	126	300	
1925.89	89	139	300	
1925.102	102	152	300	
1925.108	108	158	300	
1925.114	114	164	300	
1925.127	127	177	300	
1925.134	134	184	300	
1925.140	140	190	300	
1925.159	159	209	300	
1925.169	169	219	300	

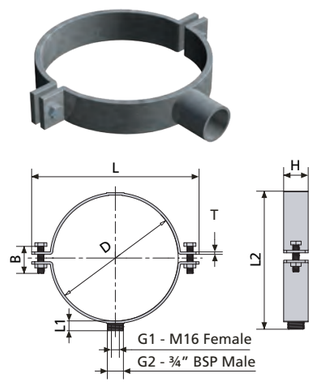
FIRETRAP COLLAR					
CODE	Size mm	ØD mm	H mm	Colour	WEIGHT Kg
1625.40R	40	54	30	RED	0.06
1625.55R	55	69	30	RED	0.08
1625.63R	63	79	30	RED	0.1
1625.75R	75	89	30	RED	0.1
1625.82R	82	96	30	RED	0.1
1625.90R	90	112	30	RED	0.18
1625.110R	110	132	30	RED	0.22
1625.125R	125	147	45	RED	0.34
1625.160R	160	174	45	RED	0.37
1625.200R	200	194	45	RED	0.7
1625.250R	250	300	130	RED	2.9
1625.315R	315	373	130	RED	3.5

HDPE Anchors and Brackets



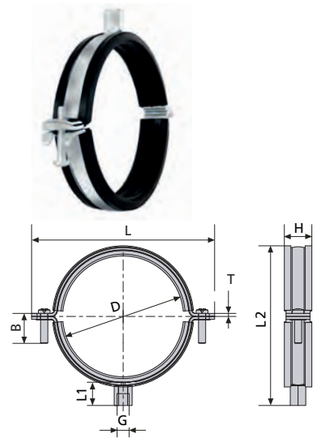
PRODUCT	M10 ANCHOR/GUIDE BRACKET								
CODE	Ø mm	H mm	L mm	L_1 mm	L_2 mm	T mm	G mm	B mm	WEIGHT Kg
9140.40B	40	28	84	11	55	2.5	M10 F	M6 x 30	5.5
9140.50B	50	28	95	11	62	2.5	M10 F	M6 x 30	5.99
9140.56B	56	28	101	11	70	2.5	M10 F	M6 x 30	7.93
9140.75B	75	28	120	11	90	2.5	M10 F	M6 x 40	9.12
9140.110B	110	28	162	17	131	2.5	M10 F	M6 x 40	7.09
9140.160B	160	28	210	17	218	2.5	M10 F	M6 x 40	9.15
9140.200B	200	40	272	20	224	4	M16 F/ ¾" BSP M	M10 x 50	10.8
9140.250B	250	50	354	32	288	6	M16 F/ ¾" BSP M	M12 x 60	6.05
9140.315B	315	50	423	32	353	6	M16 F/ ¾" BSP M	M12 x 60	7.33

To use as an anchor point, remove spacer.
Material: Zinc plated steel.



M16 BRACKET									
CODE	D mm	H mm	L mm	L_1 mm	L_2 mm	T mm	G mm	B mm	WEIGHT Kg
9149.200B	200	40	272	20	224	4	M16 F/ ¾" BSP M	M10 x 50	2.18
9149.250B	250	50	354	32	288	6	M16 F/ ¾" BSP M	M12 x 60	2
9149.315B	315	50	423	32	353	6	M16 F/ ¾" BSP M	M12 x 60	2.414

HDPE pipe anchoring shells not required.
Material: Zinc plated steel.

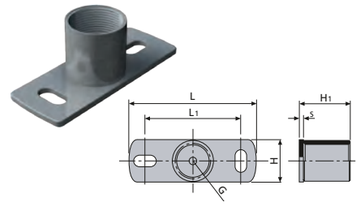


ACOUSTIC PIPE BRACKET									
CODE	Ø mm	H mm	L mm	L_1 mm	L_2 mm	T mm	G mm	B mm	WEIGHT Kg
9140.110R	110	23	153	20	134	2.5	M10 F	M6 x 25	6.46
9140.160R	160	30	220	20	200	2.5	M10 F	M6 x 25	9.07

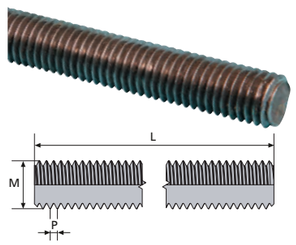
Material: Zinc plated steel.

4 Pipes and Fittings

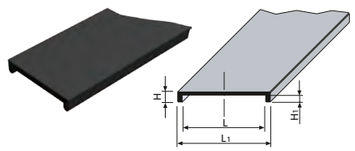
HDPE Anchors and Brackets

PRODUCT	MOUNTING PLATE							
	CODE	L mm	G mm	L_1 mm	H mm	H_1 mm	S mm	WEIGHT Kg
	9148.10B	120	½"	82	40	20	4	0.165
	9148.25B	120	1"	90	40	48	4	0.250

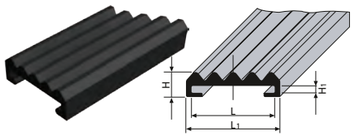
RUBBER FLAT SEAL				
CODE	OD mm	ID mm	S mm	WEIGHT Kg
918.40.908B	38	30	2.4	0.002
918.40.918B	45	36	2	0.001



THREADED BAR				
CODE	D mm	L mm	P mm	WEIGHT Kg
9147B	10	1000	1.5	0.628
9149B	16	1000	2	1.608



RUBBER STRIP INSERT					
CODE	L mm	L_1 mm	H mm	H_1 mm	WEIGHT Kg
9104.40B	30	34	4	2	5.015



ANTI VIBRATION RUBBER INSERT FOR CLIPS (30 METRE LENGTH)					
CODE	L mm	L_1 mm	H mm	H_1 mm	WEIGHT Kg
9105.30B	30	36	9	3	6.11

Terrain FUZE Electrofusion Welding Machine

PRODUCT CODE: 9000.40315.110V

Supplied complete with yellow cable for pipe diameters up to and including 160mm and blue cables for pipe diameters greater than 160mm.

PART NUMBER	DESCRIPTION	PIPE DIAMETERS
AW00-2003	Yellow replacement leads	Up to and including 160mm
AW00-2004	Blue replacement leads	Above 160mm

General properties

- Supply voltage: 110V
- Pipe diameters: 40-315mm
- Supply current: 10A
- Supply power: 3500W
- Supply protection: Class 1 – earthed
- Weight: 15Kg
- Size: 410 x 350 x 200mm
- Protection level: IP65
- Operating temp.: -15oC to +45oC

4 Pipes and Fittings

Tooling

TERRAIN FUZE PIPE CUTTER		
CODE	DESCRIPTION	PIPE DIAMETERS
9500.663T	Pipe Cutter – Model T1	40 to 63mm
9500.50140T	Pipe Cutter – Model T2	50 to140mm
9500.100160T	Pipe Cutter – Model T3	100 to 160mm

General properties

Model T1

- Weight: 0.6Kg
- Pipe diameters: 40-63mm

Model T2

- Weight: 1.4Kg
- Pipe diameters: 50-140mm

Model T3

- Weight: 1.6Kg
- Pipe diameters: 100-160mm

SPARE CUTTING WHEELS	
CODE	PIPE DIAMETERS
9501.168T	50 T0 160mm

TERRAIN FUZE PIPE CHAMFER TOOL		
CODE	DESCRIPTION	PIPE DIAMETERS
9502.32160T	Pipe Chamfer Tool – Model 1	32 to 1603mm
9500.50140T	Pipe Chamfer Tool – Model 2	40 to 250mm

General properties

Model 1

- Weight: 0.8Kg
- Pipe diameters: 32-160mm

Model 2

- Weight: 1.4Kg
- Pipe diameters: 450-250mm

Pipe Scraper

- Product code: 9507T

5 Chemical Resistance

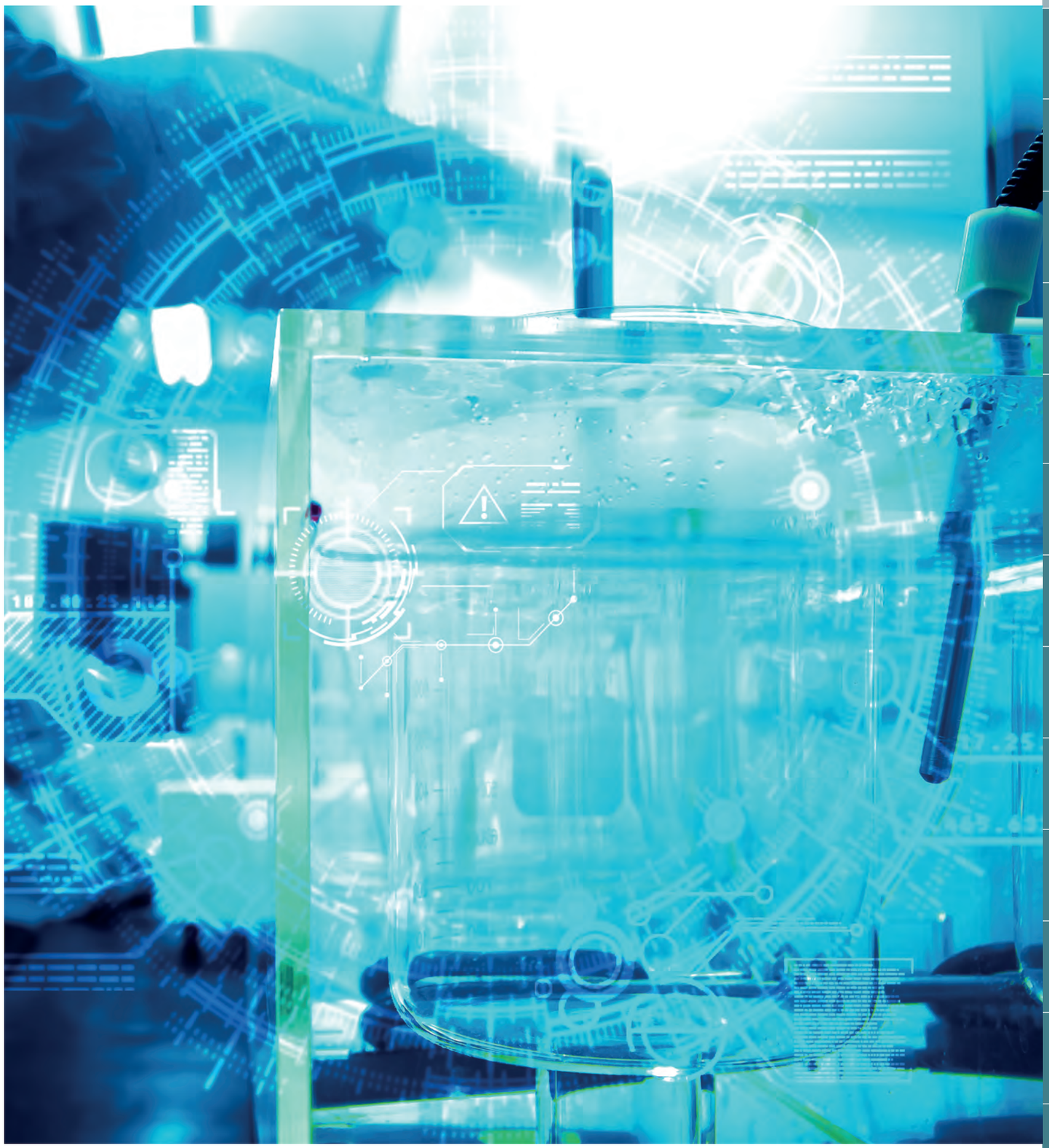
The following tables provide a list of inorganic compounds, which may be conveyed through HDPE systems with no internal pressure or mechanical stress, at temperatures up to 60°C and those fluids which are unsuitable.

The information within this section has been collated from tests carried out by both national and international standards organisations (ISO/TR10358:2021).

TERMINOLOGY FOR CHEMICAL RESISTANCE TABLES	
SYMBOL/TERM	**DESCRIPTION**
	No data
S	Satisfactory
L	Limited
NS	Not satisfactory
Dil. sol.	Dilute aqueous solution at a concentration equal to or less than 10%
Sol.	Aqueous solution at a concentration higher than 10%, but not saturated
Sat. sol.	Saturated aqueous solution, prepared at 20°C
tg-l	Technical grade, liquid
tg-g	Technical grade, gas
Work. sol.	Working solution of the concentration usually used in the industry concerned
Susp.	Suspension of solid in a saturated solution at 20°C

The tests were based on the use of pure chemicals.

For mixed chemicals, we would advise that pilot tests should be undertaken in order to ascertain the resistance of the material under these circumstances.



5 Chemical Resistance

Table of fluids* which can be conveyed through HDPE pipe and fittings with no internal pressure, mechanical stress and temperature up to 60°.

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Acetaldehyde	40	S	L	L
	tg-l	S		
	tg-g		L	L
Acetarnide	5	S	S	S
Acetic acid	Up to 10	S	S	S
	10 to 40	S	S	S
	50	S	S	L
	60	S	L	L
	80	L	L	L
	95	L	L	L
Acetic acid, glacial	>96	S	L	L
Acetic anhydride	tg-l	S	L	L
Acetone	Up to 10	S	S	L
	tg-l	L	L	
	tg-g			L
Acetophenone	tg-l	S	L	L
Acetyl chloride	tg-l	L	NS	
	tg-g			
Acetylene, gas	tg-g	S	S	S
Acrylonitrile	tg-l	S	S	L
Adipic acid	Sat. sol. (1,4%)	S	S	S
Air	tg-g	S	S	S
Allyl alcohol	tg-l	S	S	L
Allyl chloride	Sat. sol.	L	NS	NS
Almond oil	tg-l	S	L	L
Alum (see Aluminium potassium sulphate)				
Aluminium chloride	Sat. sol.	S	S	S
Aluminium fluoride	Susp.	S	S	S
Aluminium hydroxide	Susp.	S	S	S
Aluminium nitrate	Sat. sol.	S	S	S
Aluminium chloride oxyde	Susp.	S	S	S

*Plastic pipe and fittings combined chemical resistance classification table ISO/TR10358:2021

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Aluminium potassium sulphate	Sat.sol.	S	S	S
Aluminium sulphate	Sat. sol.	S	S	S
Ammonia, aqueous	Sat. sol.	S	S	S
Ammonia, dry gas	tg-g	S	S	S
Ammonia, wet gas	tg-g	S	S	S
Ammonium acetate	Sat. sol.	S	S	S
Ammonium bifluoride	Sat. sol.	S	S	S
Ammonium carbonate	Sat. sol.	S	S	S
Ammonium chloride	Sat. sol.	S	S	S
Ammonium fluoride	Up to 20	S	S	S
	25	S	S	S
	Sat.sol.	S	S	S
Ammonium hydrogen carbonate	Sat. sol.	S	S	S
Ammonium metaphosphate	Sat. sol.	S	S	S
Ammonium molybdate	Sat. sol.	S	S	S
Ammonium nitrate	Sat. sol.	S	S	S
Ammonium persulphate	Sat. sol.	S	S	S
Ammonium phosphate	Sat. sol.	S	S	S
Ammonium sulphate	Sat. sol.	S	S	S
Ammonium sulphide	Sat. sol.	S	S	S
Ammonium thiocyanate	Sat sol.	S	S	S
Amyl acetate	tg-l	S	S	L
Amyl alcohol	tg-l	S	S	L
Amyl chloride	tg-l	NS	NS	NS
Aniline	Sat. sol.	S	S	L
	tg-l	S	L	L
Aniline hydrochloride	Sat.sol.	L	L	L
Anisole	tg-l	L	L	NS
Anthraquinone sulphonic acid	Susp.	S	S	S
Antimony (111) chloride	Sat.sol.	S	S	S
Apple juice	Work.sol.	S	S	S
Aqua regia	HCl:HN03 = 3:1	NS	NS	NS

The information in these tables has been supplied by other reputable sources and is to be used ONLY as a guide in selecting equipment for appropriate chemical compatibility. Before permanent installation, test the equipment with the chemicals and under the specific conditions of your application. Ratings of chemical behaviour listed in this chart apply to a 48-hr exposure period, we have no knowledge of possible effects beyond this period. We do not warrant (neither express or implied) that the information in this chart is accurate or complete or that any material is suitable for any purpose.

Table of fluids* which can be conveyed through HDPE pipe and fittings with no internal pressure, mechanical stress and temperature up to 60°.

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Arsenic acid	Sat.sol.	S	S	S
Arsenic trioxide	Sol.	L	L	L
Barium bromide	Sat. sol.	S	S	S
Barium carbonate	Susp.	S	S	S
Barium chloride	Sat. sol.	S	S	S
Barium hydroxide	Sat. sol.	S	S	S
Barium sulphate	Susp.	S	S	S
Barium sulphide	Sat. sol.	S	S	S
Beer	Work. sol.	S	S	S
Benzaldehyde	0,1	S	S	L
	tg-l	S	L	L
Benzene	tg-l	L	L	L
Benzoic acid	Sat.sol.	S	S	S
Benzoyl chloride	tg-l	L	L	L
Benzyl alcohol	tg-l	S	S	L
Benzyl chloride	tg-l	L	NS	NS
Bismuth carbonate	Sat.sol.	S	S	S
Borax	Sol.	S	S	S
Boric acid	Oil. sol.	S	S	S
	Sat. sol.	S	S	S
Boron trifluoride	Sat. sol.	S	S	S
Bromic acid (dee. at 100°C)	10	S	S	S
	50	NS	NS	NS
Bromine, gas	tg-g			NS
Bromine, liquid	tg-l	NS	NS	
Bromine water	Sat. sol.	L	L	NS
Bromoethane	tg-l	NS	NS	
	tg-g			NS
Butadiene, gas	tg-g	L	NS	NS
Butane, gas	tg-g	S	S	S
Butanediol	10	S	S	L
	tg-l	L	L	L
n-Butanol	tg-l	S	S	S
Butyl acetate	tg-l	L	L	L

*Plastic pipe and fittings combined chemical resistance classification table ISO/TR10358:2021

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Butyl glycol	tg-l	S	L	L
Butylphenol	Sat. sol.	S	S	S
Butyl phthalate	tg-l	S	L	L
Butyric acid	20	S	S	L
	tg-l	S	S	L
Butyryl chloride	tg-l	L	L	
Calcium bisulphite	Sat. sal.	S	S	S
Calcium bromide	Sat. sal.	S	S	S
Calcium carbonate	Susp.	S	S	S
Calcium chlorate	Sat. sol.	L	L	L
Calcium chloride	Sat. sol.	S	S	S
Calcium hydroxide	Sat.sol.	S	S	S
Calcium hypochlorite	10	L	L	L
Calcium nitrate	Sat. sol.	S	S	S
Calcium sulphate	Susp.	S	S	S
Calcium sulphide	Dil. sol.	L	L	L
Calcium hydrogen sulphide	Sol.	S	S	S
Camphor oil	tg-l	NS	NS	NS
Carbon dioxide aqueous sol.	Sat.sol.	S	S	S
Carbon dioxide, dry gas	tg-g	S	S	S
Carbon dioxide, wet gas	tg-g	S	S	S
Carbon disulphide	tg-l	L	NS	
	tg-g			NS
Carbon monoxide, gas	tg-g	S	S	S
Carbon tetrachloride	tg-l	L	NS	NS
Castor oil	tg-l	S	S	S
Chlorine, aqueous (see Chlorine water)				
Chlorine, dry gas	tg-g	L	NS	NS
Chlorine water	Sat.sol.	L	L	L
Chlorine, wet gas	tg-g	L	NS	NS

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5 Chemical Resistance

Table of fluids* which can be conveyed through HDPE pipe and fittings with no internal pressure, mechanical stress and temperature up to 60°.

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Chloroacetic acid	Sol.	S	S	S
	Sat.sol.	S	S	S
	50	S	S	S
Chlorobenzene	tg-l	L	NS	NS
Chlorobromo- methane	tg-l	L	L	L
Chloroethanol	tg-l	S	L	L
Chloroform	tg-l	L	L	NS
Chloromethane, gas	tg-g	L	NS	NS
Chloropropanes	tg-l	NS		
	tg-g			
Chlorosulphonic acid	50	NS	NS	NS
Chrome alum (chromium potassium sulphate)	Sol.	S	S	S
	Sat. sol.	S	S	S
Chromic acid	Sat.sol.	L	L	NS
	10	L	L	L
	20	L	L	L
	25	L	L	L
	30	L	L	L
	40	L	L	L
	50	L	L	L
Citric acid	Sat. sol.	S	S	S
Coconut oil	Work. sol.	S	S	L
Cod liver oil	Work. sol.	S	NS	NS
Copper (II) chloride	Sat. sol.	S	S	S
Copper (II) cyanide	Sat. sol.	S	S	S
Copper (II) fluoride	Oil.sol.	S	S	S
	Sat. sol.	S	S	S
	2	S	S	S
Copper (II) nitrate	Sat. sol.	S	S	L
	50	S	S	S
Copper (11) sulphate	Sat. sol.	S	S	S
Corn oil	Work sol.	S	L	L

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Cottonseed oil	Work. sol.	S	S	S
Cresols	tg-l	S	S	L
Cresylic acid	Sat. sol (approx. 2-3%)	L	NS	NS
	50 (tg-l)	L	NS	NS
Crotonaldehyde	Sat. sol. (18%)	S	L	L
	tg-l	S	L	L
Crude oil (free from aromatics)	tg-l	S	L	L
Cyclohexane	tg-l	S	L	L
Cyclohexanol	Sat. sol.	S	S	L
Cyclohexanone	tg-l	S	L	L
Cyclohexylamine	tg-l	L	NS	NS
Decalin	tg-l	S	L	L
Dextrin	Dil. sol.	S	S	S
	Sol.	S	S	S
Dextrose (dee. at 200°C)	Sol.	S	S	S
Diacetone alcohol	tg-l	L	L	L
Diazonium chloride (benzene diazonium chloride)	Work. sol.	L		
Dich loroacetic acid	50	S	S	L
	tg-l	L	L	L
Dichlorobenzene	tg-l	L	NS	NS
Dichloroethylene	tg-l	NS	NS	NS
Dichloromethane (see Methylene chloride)				
Diesel fuel	Work. sol.	L	L	L
Diethanolamine	tg-l	S	L	L
Diethylamine	tg-l	S	L	
	tg-g			NS
Diethyl ether	tg-l	L		
	tg-g		NS	NS
Diethylene glycol	tg-l	S	S	S
Diglycolic acid	Dil. sol.	S	S	S
	Sat. sol.	S	L	L
	18	S	S	S

*Plastic pipe and fittings combined chemical resistance classification table ISO/TR10358:2021

The information in these tables has been supplied by other reputable sources and is to be used ONLY as a guide in selecting equipment for appropriate chemical compatibility. Before permanent installation, test the equipment with the chemicals and under the specific conditions of your application. Ratings of chemical behaviour listed in this chart apply to a 48-hr exposure period, we have no knowledge of possible effects beyond this period. We do not warrant (neither express or implied) that the information in this chart is accurate or complete or that any material is suitable for any purpose.

Table of fluids* which can be conveyed through HDPE pipe and fittings with no internal pressure, mechanical stress and temperature up to 60°.

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Diisooctyl phthalate	tg-l	S	L	L
Dimethylamine	30	S	S	L
Dimethylamine, gas	tg-g	S	S	L
Dimethyl- formamide	tg-l	S	S	L
Dioctyl phthalate	tg-l	S	L	L
Dioxane	tg-l	S	S	S
Diphenylamine	Work. sol.	S	L	L
Ethanol	40	S	L	L
	95	S	S	S
	tg-l	S	S	S
Ethanolamine	tg-l	S	L	
Ethyl acetate	tg-l	S	L	NS
Ethyl acrylate	tg-l	L	L	NS
Ethyl chloride, gas	tg-g	L	NS	NS
Ethylene bromide	tg-l	L	NS	NS
Ethylene chlorohydrin	tg-l	L	L	L
1,1 Ethylene dichloride	tg-l	L	NS	NS
	tg-g			NS
1,2 Ethylene dichloride	tg-l	L	NS	NS
Ethylene glycol	tg-l	S	S	S
Ethyl ether	tg-l	L		
	tg-g		L	L
Ethyl glycol	tg-l	S	L	NS
Ethylene oxide	tg-g	S	S	S
Ferric chloride	Sat. sol.	S	S	S
Ferric nitrate	Sat. sol.	S	S	S
Ferric sulphate	Sat. sol.	S	S	S
Ferrous chloride	Sat. sol.	S	S	S
Ferrous sulphate	Sat. sol.	S	S	S
Fluoboric acid (dee. at 130°C)	Sat.sol.	S	L	L
Fluorine gas, dry	tg-g	NS	NS	NS
Fluorine gas, wet	tg-g	NS	NS	NS

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Fluosilicic acid	Sat.sol.	S	S	L
	25	S		
	32	S		
	40	S		
	50	S	S	L
Formaldehyde	Oil. sol.	S	L	NS
	30 to 40	S	L	L
	50	S	L	NS
Formic acid	10	S	S	L
	40	L	L	L
	50	L	L	L
	85 to tg-l	L	L	L
Freon 12	Work.sol.	L	NS	NS
Freon 22	tg-g	L	L	L
Fructose	Sol.	S	S	S
Fruit juice	Work. sol.	S	S	S
Furfuryl alcohol	tg-l	S	S	L
	tg-g	S		
Gas, natural, dry	tg-g	S		
Gas, natural, wet	tg-g	S	S	S
Gasoline (fuel) (free from aromatics)	Work. sol.	S	S	L
	Sol.	S	S	S
Ginger ale	Work. sol.	S	S	S
Glucose (dee. at> 200°C)	Sol.	S	S	S
Glycerine	tg-l	S	S	S
Glycolic acid	Sol.	L	L	L
	30	L		
	65	L	L	L
Grapefruit juice	Work. sol.	S	S	S
Heptane	tg-l	S	L	NS
Hexadecanol	Work. sol.	S	S	S
Hexane	tg-l	S	L	L

*Plastic pipe and fittings combined chemical resistance classification table ISO/TR10358:2021

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5 Chemical Resistance

Table of fluids* which can be conveyed through HDPE pipe and fittings with no internal pressure, mechanical stress and temperature up to 60°.

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
1-Hexanol	tg-l	S	S	S
Honey	Work. sol.	S	S	S
Horseradish	Work sol.	S	S	S
Hydrobromic acid	Up to 20	S	S	S
	Up to 50	S	S	S
	66	L	L	NS
	tg-g	L	L	L
Hydrochloric acid	Up to 10	S	S	S
	10 to 20	S	S	S
	Up to 25	S	S	S
	30	S	S	S
	33	S	S	L
	36	S	S	L
	37,5	S	S	L
Hydrochloric acid, dry gas	tg-g	S	L	NS
Hydrochloric acid, wet gas	tg-g	S	L	NS
Hydrocyanic acid	Sat.sol.	S	L	NS
	10	S	S	S
	tg-l	S		
	tg-g		L	NS
Hydrofluoric acid	Up to 10	S	S	S
	40	S	S	L
	48	S	L	L
	50	S	L	L
	60	S	L	L
	70	S	L	L
Hydrofluoric acid, gas	tg-g	NS		
Hydrogen	tg-g	S	S	S
Hydrogen peroxide	Up to 10	L	L	L
	30	L	L	L
	50	L	L	NS
	70	L	L	NS
Hydrogen phosphide (see Phosphine)				
Hydrogen sulphide, aqueous	Dil. sol,	S	S	L
	Sat. sol.	S	S	L
	tg-g	S	S	L
Hydrogen sulphide, dry gas	tg-g	S	S	L
Hydroquinone	Sat. sol.	S	L	L
Hypochlorous acid	Sat. sol.	L	NS	NS
	70	L	NS	NS
Iodine (in potassium iodine)	Sat. sol.	NS	NS	NS
Iodine, in alcohol	Work. sol.	NS	NS	NS
Isobutyl alcohol	tg-l	S	S	L
Isobutyronitrile	tg-l	L	L	NS
Isooctane	tg-l	S	L	L
Isopropyl acetate	tg-l	S	L	L
Isopropyl alcohol	tg-l	S	S	S
Isopropyl ether	tg-l	L	L	NS
Kerosene	Work. sol.	S	L	L
Lactic acid	10	S	S	S
	28	S	S	S
	90	S	S	S
	tg-l	S	S	S
Lanolin	Work. sol.	S	L	L
Lauryl chloride	Sat. sol.	L	L	NS
Lead acetate	Dil. sol.	S	S	S
Lead tetraethyl (dee. at 200°C)	tg-l	S	S	
Linseed oil	Work. sol.	S	S	L
Magnesium carbonate	Susp.	S	S	S
Magnesium chloride	Sat. sol.	S	S	S
	50	S	S	S
Magnesium hydroxide	Sat. sol.	S	S	S
Magnesium nitrate	Sat. sol.	S	S	S
Magnesium sulphate	Sat. sol.	S	S	S

*Plastic pipe and fittings combined chemical resistance classification table ISO/TR10358:2021

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Table of fluids* which can be conveyed through HDPE pipe and fittings with no internal pressure, mechanical stress and temperature up to 60°.

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Maleic acid (dee. at 160°C)	Sat. sol.	S	S	S
	50	S	S	S
Malic acid (subl.)	Sol.	S	S	S
	Sat. sol.	S	S	S
Margarine	Work. sol.	S	S	S
Mayonnaise	Work. sol.	S	S	S
Mercuric chloride	Sat. sol.	S	S	S
Mercuric cyanide	Sat. sol.	S	S	S
Mercurous nitrate	Sol.	S	S	S
	Sat. sol.	S	S	S
Mercury	tg-l	S	S	S
Mercury (11) chloride (see Mercuric chloride)				
Mercury (11) cyanide (see Mercuric cyanide)				
Mesityl oxide	Work. sol.	NS	NS	NS
Methane	tg-g	S	L	
Methyl acetate	tg-l	S	S	
	tg-g			
Methyl alcohol	5	S	S	S
	tg-l	S	S	S
Methyl bromide (bromo methane]	tg-g	L	NS	NS
Methyl butyl ketone	tg-l	L	L	NS
Methyl cyclohexanones	tg-l	L	L	
Methyl ethyl ketone	tg-l	S	L	L
Methyl glycol	Work. sol.	S	L	L
Methyl methacrylate	tg-l	S	S	S
Methyl sulphate	Work. sol.	L	L	
Methyl sulphonic acid (dee.)	tg-l	L	L	NS
Methylamine	Up to 32	S	L	L
Methylene chloride	tg-l	L	L	
	tg-g			
Milk	Work. sol.	S	S	S
Mineral oils (free from aromatics)	Work. sol.	S	L	NS
Molasses	Work. sol.	S	L	L
Mustard, aqueous	Work. sol.	S	S	S
Naphtha	Work. sol.	S	L	NS
Naphthalene	Work. sol.	S	L	L
Nickel acetate	Sat. sol.	S	S	S
Nickel chloride	Sat. sol.	S	S	S
Nickel nitrate	Sat. sol.	S	S	S
Nickel sulphate	Sat. sol.	S	S	S
Nicotin acid	Susp.	S	S	S
Nitric acid	5	L	L	L
	10	L	L	L
	20	L	L	NS
	25	L	L	NS
	30	L	NS	NS
	35	L	NS	NS
	40	NS	NS	NS
	45	NS	NS	NS
	50	NS	NS	NS
	60	NS	NS	NS
	85	NS	NS	NS
Nitric acid, fuming (with nitrogen dioxide)		NS	NS	NS
Nitrobenzene	tg-l	S	L	L
Nitro methane	tg-l	S	L	L
Oleic acid	tg-l	S	L	L
Oleum		NS	NS	NS
Olive oil	Work.sol.	S	S	L
Orthophosphoric acid (see Phosphoric acid)				
Oxalic acid (subl.)	Dil. sol.	S	S	S
	Sat. sol.	S	S	S
	50	S	S	S
Oxygen, gas	tg-g	S	L	L
Ozone, gas	Sat. sol.	L	NS	NS
	tg-g	L	NS	NS

*Plastic pipe and fittings combined chemical resistance classification table ISO/TR10358:2021

The information in these tables has been supplied by other reputable sources and is to be used ONLY as a guide in selecting equipment for appropriate chemical compatibility. Before permanent installation, test the equipment with the chemicals and under the specific conditions of your application. Ratings of chemical behaviour listed in this chart apply to a 48-hr exposure period, we have no knowledge of possible effects beyond this period. We do not warrant (neither express or implied) that the information in this chart is accurate or complete or that any material is suitable for any purpose.

5 Chemical Resistance

Table of fluids* which can be conveyed through HDPE pipe and fittings with no internal pressure, mechanical stress and temperature up to 60°.

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Paraffin	tg-l	S	S	L
Paraffin oil (F65)	tg-l	S	L	L
Peanut oil	Work. sol.	S	S	L
Pentane	Work. sol.	S	S	L
Peppermint oil	Work. sol.	S		
Perchloro- ethylene	Work. sol.	L	L	NS
Perchloric acid	10	L	L	L
	(ZN)20	L	L	NS
	70	L	NS	NS
Petrol (aliphatic hydrocarbon/benzene)	80/20	S	L	L
Petroleum ether (ligroin)	Work sol.	S	L	L
Phenol	Sol.	S	S	L
	5	S	S	S
	50	S	S	
	90	S	S	L
	tg-l			
Phenyl hydrazine (dee.)	tg-l	L	L	NS
Phenylhydrazine hydrochloride (subl.)	Oil. sol.	S	L	NS
	97	S	L	NS
Phosphine	tg-g	L	L	L
Phosphoric acid	Up to 50	S	S	S
	50 to 75	S	S	S
	75 to 85	S	S	L
	98	S	S	L
Phosphorus (III) chloride	tg-l	S	S	L
Phosphorus oxychloride	tg-l	S	S	L
Phthalic acid	Susp.	S	S	S
Picric acid (subl.)	Sat. sol.	S	S	L
	10	S		
Potassium aluminium sulphate (see Aluminium potassium sulphate)				
Potassium bicarbonate	Sat. sol.	S	S	S
Potassium bichromate (see Potassium dichromate)				

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Potassium bisulphate	Sat. sol.	S	S	S
Potassium borate	Sat. sol.	S	S	S
Potassium bromate	Sat. sol.	S	S	S
	Up to 10		S	S
Potassium bromide	Sat. sol.	S	S	S
Potassium carbonate	Sat. sol.	S	S	S
Potassium chlorate	Sat. sol.	S	S	L
Potassium chloride	Sat. sol.	S	S	S
Potassium chlorite	Sat.sol.	S	S	S
Potassium chromate	Sat. sol.	S	S	L
	40	S	S	L
Potassium cuprocyanide	Sat. sol.	S	S	S
Potassium cyanide	Sol.	S	S	S
Potassium dichromate	Sat. sol.	S	S	L
	40	S	S	S
Potassium ferricyanide	Sat.sol.	S	S	S
Potassium fluoride	Sat. sol.	S	S	S
Potassium hexacyanoferrate (11) (potassium ferrocyanide)	Sat. sol.	S	S	S
Potassium hexacyanoferrate (111) (see Potassium ferricyanide)				
Potassium hydrogen carbonate (see Potassium bicarbonate)				
Potassium hydrogen sulphate (see Potassium bisulphate)				
Potassium hydrogen sulphite	Sol.	S	S	S
	Sat.sol.	S	S	S
Potassium hydroxide	up to 10	S	S	S
	20	S	S	S
	Up to 50	S	S	S
Potassium hypochlorite	Sol.	L	L	NS
Potassium iodide	Sat. sol.	S	S	S
Potassium nitrate	Sat. sol.	S	S	S
	50	S	S	S
Potassium orthophosphate	Sat. sol.	S	S	S

*Plastic pipe and fittings combined chemical resistance classification table ISO/TR10358:2021

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Table of fluids* which can be conveyed through HDPE pipe and fittings with no internal pressure, mechanical stress and temperature up to 60°.

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Potassium perborate	Sat. sol.	S	S	S
Potassium perchlorate	Sat. sol.	L	L	L
	10	S	S	L
Potassium permanganate	Sat. sol.	L	L	NS
	10	S	L	L
	20	L	L	L
	25	L	L	
Potassium persulphate	Sat. sol.	S	S	S
Potassium sulphate	Sat. sol.	S	S	S
Potassium sulphide	Sat.sol.	S	S	S
Potassium sulphite	Sat. sol.	S	S	S
Potassium, thiosulphate	Sat. sol.	S	S	S
Propane, gas	tg-g	S	S	L
Propionic acid	50	S	S	S
	tg-l	S	L	L
Propyl alcohol	tg-l	S	S	S
Pyridine	tg-l	S	L	L
Salicylic acid (subl.)	Sat. sol.	S	S	S
Selenic acid	Sat. sol.	S	S	S
Silicic acid	Susp.	S	S	S
Silicone oil	tg-l	S	S	S
Silver acetate	Sat. sol.	S	S	S
Silver cyanide	Sat. sol.	S	S	S
Silver nitrate	Sat. sol.	S	S	S
	50	S	S	S
Sodium acetate	Sat. sol.	S	S	S
Sodium acid sulphate (see Sodium				
bisulphate)	Sat sol.	S	S	S
Sodium antimonite	Sat. sol.	S	S	S
Sodium arsenite	Sat. sol.	S	S	S
	35	S	S	S
	50	S	S	S

*Plastic pipe and fittings combined chemical resistance classification table ISO/TR10358:2021

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Sodium bicarbonate	Sat. sol.	S	S	S
Sodium bisulphate	Sat. sol.	S	S	S
	50	S	S	S
Sodium bromide	Sat. sol.	S	S	S
	50	S	S	S
Sodium carbonate	Sat. sol.	S	S	S
	25	S	S	S
	Up to 50	S	S	S
Sodium chlorate	Sat. sol.	S	L	L
Sodium chloride	Sat.sol.	S	S	S
	10	S	S	S
Sodium chlorite	2	S	L	NS
	20	S	L	NS
Sodium chromate	Dil. sol.	S	S	S
Sodium cyanide	Sat. sol.	S	S	S
Sodium dichromate	Sat. sol.	S	L	L
Sodium ferricyanide	Sat. sol.	S	S	S
Sodium ferrocyanide	Sat. sol.	S	S	S
Sodium fluoride	Sat. sol.	S	S	S
Sodium hexacyanoferrate				
(II) (see Sodium ferrocyanide)				
Sodium hexacyanoferrate				
(III) (see Sodium ferricyanide)				
Sodium hydrogen carbonate (see Sodium bicarbonate)				
Sodium hydrogen sulphate (see bisulphate)				
Sodium hydrogen sulphite	Sat. sol.	S	S	S
Sodium hydroxide	Dil. Sol.	S	S	S
	Sat sol.	S	S	S
	1	S	S	S
	5	S	S	S
	10 to 60	S	S	S
Sodium hypochlorite	2%Cl (percentage of free chlorine)	L	L	

The information in these tables has been supplied by other reputable sources and is to be used ONLY as a guide in selecting equipment for appropriate chemical compatibility. Before permanent installation, test the equipment with the chemicals and under the specific conditions of your application. Ratings of chemical behaviour listed in this chart apply to a 48-hr exposure period, we have no knowledge of possible effects beyond this period. We do not warrant (neither express or implied) that the information in this chart is accurate or complete or that any material is suitable for any purpose.

5 Chemical Resistance

Table of fluids* which can be conveyed through HDPE pipe and fittings with no internal pressure, mechanical stress and temperature up to 60°.

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Sodium hypochlorite (cont'd)	12,5 % Cl (percentage of free chlorine)	L	L	
Sodium metaphosphate	Sol.	S	S	S
Sodium nitrate	Sat. sol.	S	L	L
Sodium nitrite	Sat. sol.	S	S	S
Sodium orthophosphate (see Sodium phosphate, neutral)				
Sodium perborate	Sat. sol.	S	S	S
Sodium phosphate, acid	Sat. sol.	S	S	S
Sodium phosphate, neutral	Sat. sol.	S	S	S
Sodium silicate	Sol.	S	S	S
	Sat. sol.	S	S	S
Sodium sulphate	Sat. sol.	S	S	S
	0,1	S	S	S
Sodium sulphide	Sat. sol.	S	S	S
Sodium sulphite	Sat. sol.	S	S	S
	40	S	S	S
Sodium thiosulphate (hyposulphite)	Sat. sol.	S	S	S
	50	S	S	S
Soybean oil	Work. sol.	S	L	L
Stearic acid	Work. sol.	S	L	L
Stearin	Work. sol.	S	L	L
Styrene	Sat. sol.	L	NS	NS
Sugar, aqueous sol.	Sol.	S	S	S
Sulphur dioxide, dry gas	Work. sol.	S	S	S
Sulphur dioxide, wet gas	Work.sol.	S	S	L
Sulphur ether (thioether)	Work.sol.	L	L	NS
Sulphuric acid	10	S	S	S
	15	S	S	S
	30	S	S	S
	50	S	S	S
	70	S	S	L
	80	L	L	NS
	90	L	L	NS
Sulphuric acid (cont'd)	95	NS	NS	NS
	96	NS	NS	NS
	98	NS	NS	NS
	Fuming	NS	NS	NS
Sulphurous acid	Sat.sol.	S	S	L
	Up to 30	S	S	L
Tannie acid	Sol.	S	L	L
	Sat.sol.	S	L	L
Tartaric acid (dee.)	Sol.	S	S	S
	Sat.sol.	S	S	S
Tetrahydrofuran	tg-l	L	NS	NS
Tetralin	tg-l	S	L	NS
Thionyl chloride	tg-l	NS	NS	NS
Thiophene	tg-l	L	L	L
Tin (II) chloride	Sat. sol.	S	S	S
Tin (IV) chloride	Sol.	S	S	S
Toluene	tg-l	L	NS	NS
Tributyl- phosphate	Sat. sol.	S	S	S
Trichloroacetic acid	Up to SO	S		S
Trichloro- benzene	Work. sol.	NS	NS	NS
Trichloro- ethylene	tg-l	NS	NS	NS
Triethanolamine	Sol.	S	S	L
	tg-l	S	S	L
Triethylene glycol	Sol.	S	S	S
Trimethylol- propane	Up to 10	S	S	S
Trisodium phosphate (see Sodium phosphate, neutral)				
Turpentine	tg-l	L	L	NS
Urea	Sol.	S	S	S
	Sat. sol.	S	S	S
	10	S	S	S
Uric acid (dec.at> 400°C)	Work. sol.	S	S	S
Urine	Work. sol.	S	S	S

*Plastic pipe and fittings combined chemical resistance classification table ISO/TR10358:2021

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Table of fluids* which can be conveyed through HDPE pipe and fittings with no internal pressure, mechanical stress and temperature up to 60°.

CHEMICAL	CONCENTRATION %	TEMPERATURE °C		
		20	40	60
Sodium hypochlorite (cont'd)	12,5 % Cl (percentage of free chlorine)	L	L	
Sodium metaphosphate	Sol.	S	S	S
Sodium nitrate	Sat. sol.	S	L	L
Sodium nitrite	Sat. sol.	S	S	S
Sodium orthophosphate (see Sodium phosphate, neutral)				
Sodium perborate	Sat. sol.	S	S	S
Sodium phosphate, acid	Sat. sol.	S	S	S
Sodium phosphate, neutral	Sat. sol.	S	S	S
Sodium silicate	Sol.	S	S	S
	Sat. sol.	S	S	S
Sodium sulphate	Sat. sol.	S	S	S
	0,1	S	S	S
Sodium sulphide	Sat. sol.	S	S	S
Sodium sulphite	Sat. sol.	S	S	S
	40	S	S	S
Sodium thiosulphate (hyposulphite)	Sat. sol.	S	S	S
	50	S	S	S
Soybean oil	Work. sol.	S	L	L
Stearic acid	Work. sol.	S	L	L
Stearin	Work. sol.	S	L	L
Styrene	Sat. sol.	L	NS	NS
Sugar, aqueous sol.	Sol.	S	S	S
Sulphur dioxide, dry gas	Work. sol.	S	S	S
Sulphur dioxide, wet gas	Work.sol.	S	S	L
Sulphur ether (thioether)	Work.sol.	L	L	NS
Sulphuric acid	10	S	S	S
	15	S	S	S
	30	S	S	S
	50	S	S	S
	70	S	S	L
	80	L	L	NS
	90	L	L	NS
Sulphuric acid (cont'd)	95	NS	NS	NS
	96	NS	NS	NS
	98	NS	NS	NS
	Fuming	NS	NS	NS
Sulphurous acid	Sat.sol.	S	S	L
	Up to 30	S	S	L
Tannie acid	Sol.	S	L	L
	Sat.sol.	S	L	L
Tartaric acid (dee.)	Sol.	S	S	S
	Sat.sol.	S	S	S
Tetrahydrofuran	tg-l	L	NS	NS
Tetralin	tg-l	S	L	NS
Thionyl chloride	tg-l	NS	NS	NS
Thiophene	tg-l	L	L	L
Tin (II) chloride	Sat. sol.	S	S	S
Tin (IV) chloride	Sol.	S	S	S
Toluene	tg-l	L	NS	NS
Tributyl- phosphate	Sat. sol.	S	S	S
Trichloroacetic acid	Up to SO	S		S
Trichloro- benzene	Work. sol.	NS	NS	NS
Trichloro- ethylene	tg-l	NS	NS	NS
Triethanolamine	Sol.	S	S	L
	tg-l	S	S	L
Triethylene glycol	Sol.	S	S	S
Trimethylol- propane	Up to 10	S	S	S
Trisodium phosphate (see Sodium phosphate, neutral)				
Turpentine	tg-l	L	L	NS
Urea	Sol.	S	S	S
	Sat. sol.	S	S	S
	10	S	S	S
Uric acid (dec.at> 400°C)	Work. sol.	S	S	S
Urine	Work. sol.	S	S	S

*Plastic pipe and fittings combined chemical resistance classification table ISO/TR10358:2021

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6 Polypipe Advantage

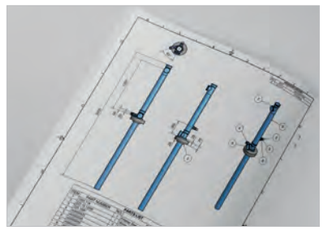
We recognise this is not a fabricated product but our Polypipe Advantage Service is more than fabrication, it is a service that supports and offers design and technical support on your next project. Find out more about how Polypipe Advantage can help you get the results you want.

Visit: polypipe.com/polypipeadvantage
Call us on 01622 795200

POLYPIPE ADVANTAGE

ASSESSMENT AND ESTIMATION

Every good project begins with a thorough plan. The Polypipe Advantage team is on hand from the outset, to appraise your enquiry to identify any unique project requirements before creating a draft estimate.



DESIGN

The Polypipe Advantage team will produce detailed CAD drawings for approval, all designs are compliant to as-drawn dimensions. This means you save vital planning time and won't have to compromise with inappropriate or over-engineered solutions.

ORDERING AND FABRICATION

Once the design is finalised, our state-of-the-art fabrication facility will create your system whilst ensuring only the highest quality for first-fix testing. All solutions comply with existing BS EN 12056 (Parts 2 and 3) and Building Regulations Part H Standards/Regulations.

DISPATCH AND DELIVERY

We know that time and scheduling are critical for any project, so we ensure your system is delivered how and when you need it – while keeping you updated along the way. Our team of logistics experts work with your project timelines to ensure each element of your system arrives to site as scheduled.

MERCHANT INTEGRATION

You can purchase fabricated systems from our approved merchants, who will be happy to take your order, arrange the details with the Polypipe Advantage team – and deliver it in time for your next job.

SUSTAINABILITY

Our streamlined approach to fabrication helps make your projects more efficient, whilst offering wide-reaching sustainability benefits. There are no spare parts or unnecessary extras to dispose of for example, and we've invested heavily to ensure our pipes are 100% recyclable at the end of life.

Terrain FUZE installed throughout major central London residential project

Polypipe Building Services met challenging requirements at a mixed-use housing development in the heart of London's Docklands.

Terrain FUZE fabricated drainage stacks across 42 storeys

Working alongside main contractor Balfour Beatty Construction and M&E contractor Briggs and Forrester MEP Ltd, Polypipe designed and delivered prefabricated drainage stacks utilising its popular Terrain FUZE for the Providence Tower and Bar Building apartment buildings, which stand at 42 and 12 storeys respectively.

Terrain FUZE incorporates a number of engineered fittings to aid installation and is ideally suited to off-site fabrication where repetition is prevalent, such as in high rise buildings.

Unique to this development, which encompasses high-end luxury apartments and affordable housing, was the use of 160mm diameter low entry manifold piping, a wide pipe suitable for the project.

This ability to prefabricate bespoke products off-site, in turn driving quick turn around times, and the reduced labour, made Polypipe a key project partner.

The light weight nature of Terrain FUZE brought many advantages over traditional materials, not least in its manoeuvrability on-site, while the use of prefabrication meant that the system could be installed quickly and efficiently, providing significant time and resource savings.

Paul Campbell, Project Director of Briggs and Forrester MEP Ltd, said: "Whilst there were many benefits to using Terrain FUZE over alternative solutions, it was Polypipe's ability to custom engineer low entry manifold piping that really impressed us. Being engineered specific to the project, in Polypipe's on-site fabrication facilities, meant the turnaround time was minimal, ensuring a smooth installation."

Damian Farrell, London & South East Sales Director, of Polypipe Building Services, said:
"Our experience on delivering on projects of this nature, combined with our extensive system knowledge, means that we can create engineered solutions that meet the needs of the development, such as the 160mm diameter low entry manifold piping that was unique to this project."

CASE STUDY

Project
Providence Tower and Bar Building

Client
Briggs and Forrester MEP Ltd

Application
Fabricated drainage system

Products
Terrain FUZE

6 Polypipe Advantage

Millbrook Tower stands tall following replacement of rainwater drainage stacks

One of the tallest buildings in Southampton has had a complete drainage solution designed and installed without the temporary re-homing of any residents.

Using Polypipe Advantage, the installation of the system was 40% faster than the average for such works.

Formerly the tallest building in Southampton, the Millbrook Tower stands at 240 feet. Built over 50 years ago, the building had a cast iron drainage system installed that had started to rust and fail, causing excessive leaking in the 144 flats in the development. Southampton City Council (SCC) who wanted a complete holistic approach to the design, manufacture and installation of the replacement drainage system, approached Polypipe. In January 2016, eight members of the Direct Labour Organisation (DLO) department of SCC came to Polypipe's Centre of Excellence in Aylesford for training to gain a better understanding of the specification, assembly and installation of plastic fabricated drainage stacks.

Working with SCC, as experts in providing intelligently engineered solutions for the movement of water and air around tall buildings, Polypipe assessed the failing drainage stacks in Millbrook Tower, and designed a new high-density polyethylene system. Terrain FUZE was installed due to a number of its key benefits over other more traditional materials.

Lighter in weight than cast iron, Terrain FUZE can feature longer pipe runs, so less jointing is required. As the system is jointed using electrofusion welding, where the weld area is as strong as the host material, the system integrity is increased and consequently the risk of leaks in the development is dramatically reduced.

As the system is jointed using electrofusion welding, where the weld area is as strong as the host material, the system integrity is increased and consequently the risk of leaks in the development is dramatically reduced. Due to the inherent material characteristics, Terrain FUZE lends itself to fabrication. Utilising the unique Advantage Service, the system was fabricated to exact specification and delivered to the site, where Southampton's DLO were able to complete the installation work across the 144 properties 40% faster than the average for such works. This meant that the residents of Millbrook Tower were able to remain in their properties, a key consideration when designing the drainage stacks of the building.

CASE STUDY

Project
Millbrook Tower, Southampton

Client
Southampton City Council

Application
Live Stack Replacement

Products
Terrain Fuze

Polypipe provides water management solutions for No.1 Old Trafford

Polypipe Building Services, provided an array of key services for mechanical and electrical specialists, Aberla M&E, on a luxurious new development in Manchester.

Major development benefits from market-leading Polypipe products

The £72m No1 Old Trafford development consists of two towers, 15 and 18 storeys, across 214,000 sq ft on the waterfront at Trafford Park. The towers are made up of 354 apartments including six penthouses.

The area around the site is already extensively developed so space was at a premium for Aberla M&E, who decided to use Polypipe's Advantage Service. The Polypipe Advantage off-site fabrication service brings together manufacturing process, project management and logistics methods to provide M&E contractors with a simple, transparent production-based approach that helps to achieve project productivity targets.

Using the Advantage Service, Aberla opted for three market-leading Polypipe products: Terrain FUZE, Terrain PVC and MecFlow - the award-winning water supply system. The project required a fast and reliable installation which was one of the reasons Aberla opted for the MecFlow system.

To save time and space on site, MecFlow components are supplied as a complete Kit – for quick assembly – and connected in position. The use of clip connections also removes the need for clamping and allows for repositioning before the final welding is applied.

This easy installation allows skilled labour to be freed up for other crucial areas and reduces on-site installation time, reduces risk and brings the overall cost down. It's estimated that this technology helps to save when compared to M&E contractors and project managers up to 75% of on-site install time on complex water systems when compared to traditional methods.

The No1 Old Trafford project also used Polypipe Building Services' Terrain FUZE system.

Terrain FUZE is the high performance, modern drainage system used on a wide range of prestigious commercial buildings.

It is manufactured from high density polyethylene (HDPE) so has strong abrasion, chemical and temperature resistance.

Dan Watchorn, Aberla's Project Manager, said: "Working with Polypipe Building Services is always a pleasure. From initial design meetings through to installation. This was the first project we have installed MecFlow and we have already specified to use on our next upcoming projects. The speed and ease which it went in was great and we can confirm there were no failed joints throughout the full works."

HDPE was specifically used in the in lower levels to avoid the risk of leaks with homogenous welding in the commercial and communal spaces such as the reception area.

CASE STUDY

Project
No.1 Old Trafford

Client
Aberla

Application
Tall building water supply and drainage system

Products
MecFlow, Terrain FUZE and Terrain PVC

7 Storage & Handling

Good Site Practice

GOOD SITE PRACTICE

- Pipes should not be thrown, dropped or dragged along hard surfaces
- In case of mechanical handling, use protective slings and padded supports. Metal chains and hooks should not make contact with the pipe

ON-SITE STORAGE

- Stack pipe lengths
  - on a flat base
  - on level ground
  - or on 75mm x 75mm timber at 1m centers (Fig. 1)
- Provide side support with 75mm wide battens at 1m centres (Fig. 1)
- Maximum stack should not exceed 1.5m high
- Ideally, stacks should contain one diameter pipe size only. Where this is not possible, stack largest diameter pipes at base of stack. Small pipes may be nested inside larger pipes
- If stored in the open for long periods or exposed to strong sunlight, cover the stack with opaque sheeting
- Store fittings under cover. Do not remove from cartons or packaging until required

STORAGE IN HOT CLIMATES

- Ultra-violet light can affect pipes and fittings: pipe colour may change and rubber seals may be degraded
- Store accordingly:
  - store all materials in well-ventilated, shady conditions
  - do NOT expose to direct sunlight
  - keep fittings in original packaging until required for use
- Maximum stack (hot conditions): six layers high

SITE SAFETY

- The relevant regulations detailed in the Health & Safety at Work Act 1974, Construction Design and Management Regulations 2015, must be adhered to on-site
- MSDS data sheets are available on request

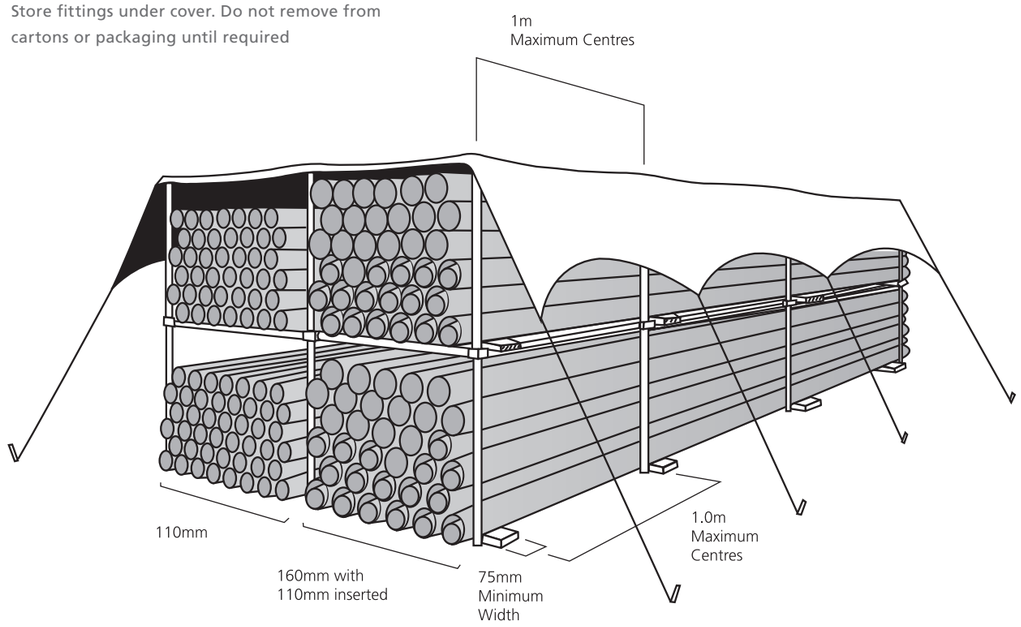


Fig. 1 Pipe stacking

Disposal

POLYPIPE ADVANTAGE SERVICE

Supplying fabricated drainage stacks and water supply systems means less packaging is needed for the pipes and fittings. When customers choose to use our Polypipe Advantage Service, they are dramatically reducing the amount of cardboard and plastic packaging reaching their sites.

PACKAGE RECYCLING

At Polypipe Building Services we aim to re-use and recycle as much of our packaging as possible. We encourage all customers to return both metal and wood stillages and plastic totes as these can be re-used multiple times.

Whilst we try to limit the amount of packaging used when delivering to our sites, we do have to ensure products are safeguarded against damage and arrive in the best condition. We therefore use, where appropriate, cardboard and plastic packaging which can be recycled.

Polypipe Building Services accepts the following packaging to be returned to for recycling;

- Shrink wrap
- Banding
- Cardboard
- Paper labels
- White plastic wrapping

PRODUCT RECYCLING

We can provide a service for all end caps and pipe cut-offs to be returned to Polypipe Building Services, where they will be recycled. Please speak with your Sales representative for further information.

Products can also be recycled via waste recycling centres. Please check with your local recycling centre for accepted materials.

8 Jointing Methods

Terrain FUZE offers workable and effective solutions to a wide range of project constraints through the availability of a number of jointing methods. Each connection is categorised according to its varying properties, with the different classifications assembled as follows:

REMOVABLE

Connections which can be disconnected after assembly.

NON-REMOVABLE

Connections which cannot be disconnected after assembly.

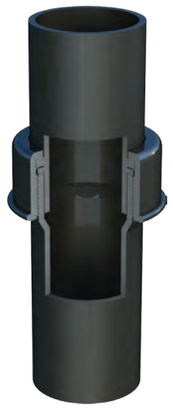
TENSION-RESISTANT

Connections which cannot be disconnected by tensional forces.

NON-TENSION-RESISTANT

Connections which can be disconnected by tensional forces.

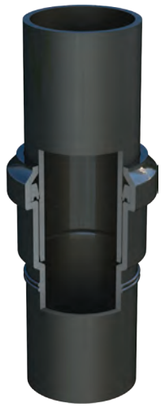
Butt weld



Screw-threaded coupling

Electrofusion coupling

Expansion socket



Ring-seal socket

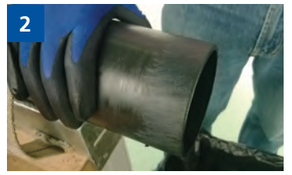
Flange joint

Mechanical

Rigid fixing

Electrofusion Welding

1. Cut the pipe or fitting using the appropriate pipe cutter or saw. Make sure the end of the pipe or fitting is square and clean.
2. Scrape the oxidation layer from the spigot of the pipe or fitting to at least the insertion depth of the coupling using the appropriate pipe scraper. Ensure that the spigot ends and the couplers are kept clean and free from dirt, water and grease.
3. Insert into the centre stop of the coupling. Mark the spigots using a wax pencil.
4. Unpack your Polypipe Terrain FUZE electrofusion welding machine and ensure you have the correct leads attached.
5. Ensuring that the pipe work is supported correctly, attach the leads to the coupling and push the start/stop button. This will begin the electrofusion welding process.
6. There will be two visual indications showing that the weld has been completed successfully. The first will be on the screen showing that the welding is 100% complete. The second will be a visual indication on the coupling, as shown below.



8 Jointing Methods

Electrofusion Welding

The before and after.

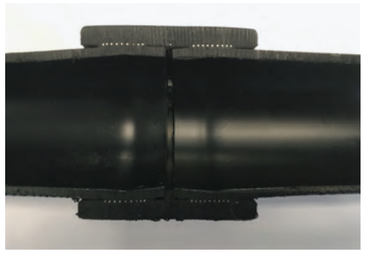
Before

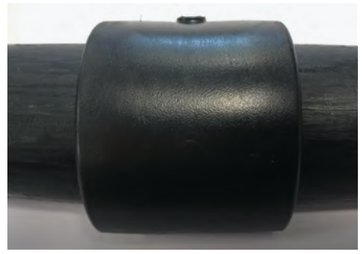
After

Examples of electrofusion welded joints which have been made correctly and incorrectly:

EXAMPLE OF A GOOD ELECTROFUSION WELD JOINT

You can see that the pipe surface has been scraped and the fitting has been welded once. The pipe and coupling surfaces have welded together to make a good joint.

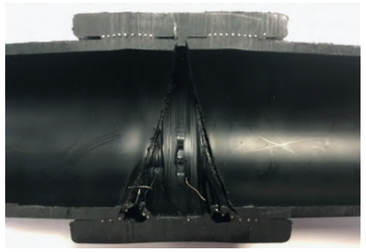




EXAMPLES OF INCORRECTLY PREPARED ELECTROFUSION WELD JOINTS

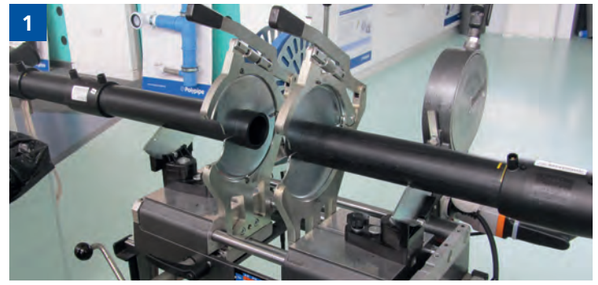
This shows where the coupling was welded twice without the coupling being left to cool down after the first weld. This has resulted in the pipe becoming distorted due to the excess heat.

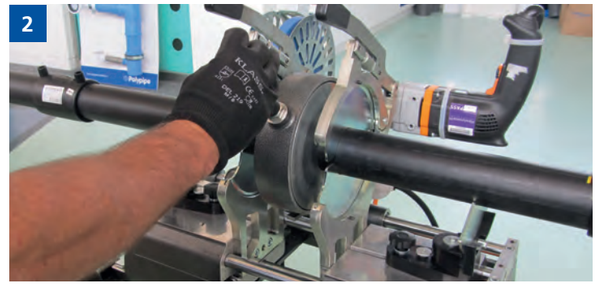
In the joint to the right the pipe has not been cut square and you can also see that the pipe surface has not been scraped. This joint is likely to leak.

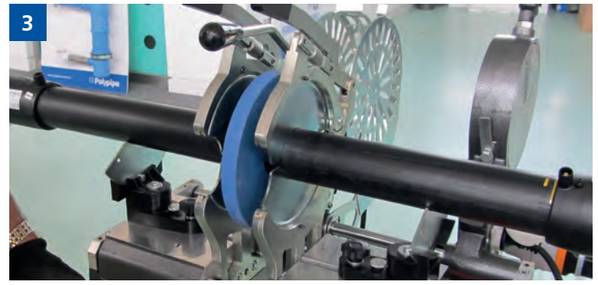


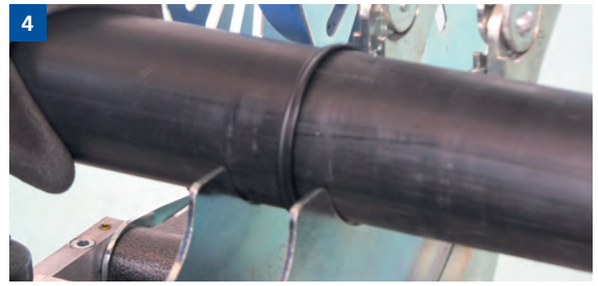
Butt Welding

1. Prepare pipe ends and insert into butt welding machine.
2. Use the planing tool to ensure that the pipe ends are square and free of any burr's.
3. Press the pipe/fitting ends lightly against the hot plate melting the pipe ends until a small bead is visible around both ends.
4. Remove hot plate and press the ends together with the necessary pressure (as advised by welding machine) and lock the clamps in place until the weld begins to cool.









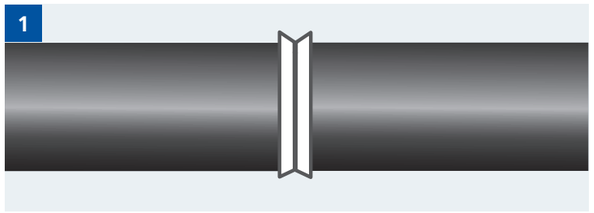
8 Jointing Methods

Butt Welding

Examples of butt welded joints which have been made correctly and incorrectly. These can be easily identified with a visual inspection:

EXAMPLE OF A GOOD BUTT WELD JOINT

1. Two equal size beads continuing all the way around the pipe on both sides of the joint.

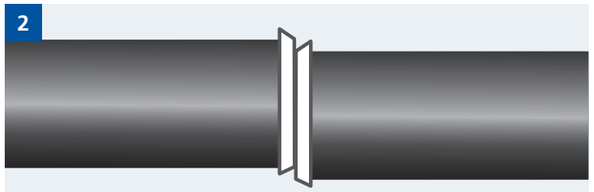


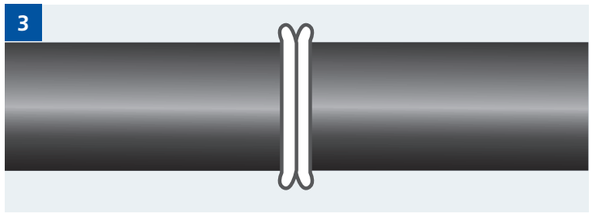
EXAMPLES OF INCORRECT BUTT WELD JOINTS

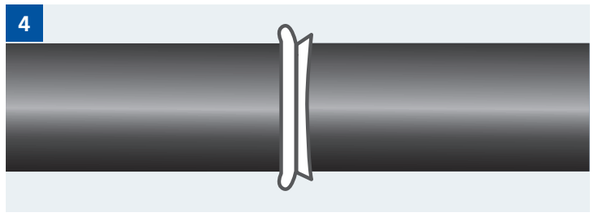
2. The pipes have been misaligned during the welding process.

3. Too much pressure has been exerted during the welding process when the pipe ends are on the hot plate. No pressure should be applied at this stage.

4. The two pipe ends have not heated evenly on the hotplate. Possibly one of the pipe ends was not cut/planed square.







Ring Seal

Available in sizes 40 – 315mm

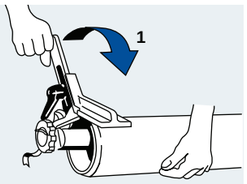
CONNECTION PROPERTIES:

a) Removable

a) Non-tension-resistant

Use

Ring-seal sockets facilitate the assembly of pre-fabricated sections.

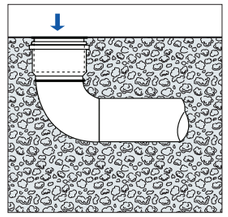


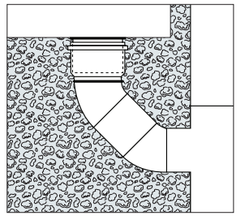
The pipe should be chamfered to approximately 15° and lubricated with suitable Polypipe product. Do not use oil or grease which can damage the rubber seal.

Assembly

The ring-seal socket is suitable for use on both horizontal and vertical applications with the small dimensions providing a space-saving advantage. Assembly instructions are also available for ring-seal sockets, with the insertion depth corresponding for the same diameters. Ring seal sockets are also provided with a cap to prevent dirt entering the pipe on-site. The pipe must be fully inserted into the socket as it is not intended to act as an expansion socket.

A flush fit is obtained by chamfering the pipe end to approximately 15° and lubricating it with silicone oil. To avoid damage to the rubber seal, do not use oil or grease.





Protection Cap.

Expansion

Available in sizes 40 – 315mm

CONNECTION PROPERTIES:

a) Removable

a) Non-tension-resistant

Use

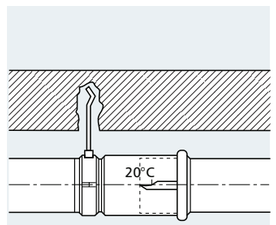
Expansion sockets must be provided on horizontal runs and vertical stacks running from floor to floor and for rainwater pipes both inside and outside the building.

Installation

Expansion sockets are suitable for use in both vertical and horizontal applications with the depth of the sleeve enabling the assembly of stacks and collector pipelines. The design of the seal allows for pipe movement during expansion and contraction, ensuring that the connection remains water tight even under substantial hydraulic load.

To ensure easy assembly of the sleeve, the following conditions must be observed:

- Chamfer the inserted pipe end to approximately 15°.
- Lubricate the pipe end with a suitable Terrain product.
  Note: do not use oil or grease which can compromise the rubber seal.
- Observe the indications on the outer surface of the expansion socket for insertion depth.



Horizontal assembly (e.g. at an ambient temperature of 20°C).

8 Jointing Methods

Flanged Joints

Available in sizes 50 – 315mm

CONNECTION PROPERTIES:

a) Removable

a) Tension-resistant

Use

The backing flanges are made of a special, painted aluminium alloy and have standard dimensions to suit EN1092-1/04 PN10/16 manufacturing standard/PN rating. These are most commonly used to create a removable connection in industrial plants. By using a blank flange, it is possible to create an inspection access opening for large diameter pipes (200, 250 and 315mm).

Mechanical

Available in sizes 90 – 160mm

CONNECTION PROPERTIES:

a) Removable

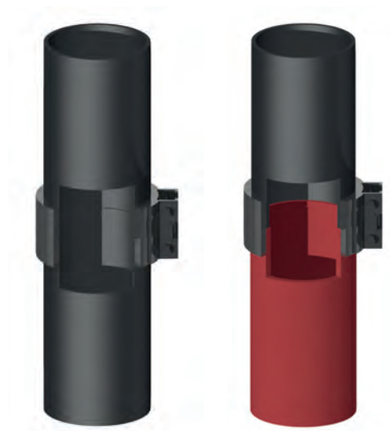
a) Non-tension-resistant

Use

Mechanical couplings are used in retrofit and live stack scenarios. They can be used when removing or replacing products in wet sections.

Available in two types:

- For connecting HDPE to HDPE stacks
- For connecting HDPE to existing Cast Iron stacks



Rigid Fixing

Available in size 110mm

CONNECTION PROPERTIES:

a) Removable

a) Tension-resistant

Use

Allows for the provision of thermal expansion of HDPE whilst retaining a rigid fixing.

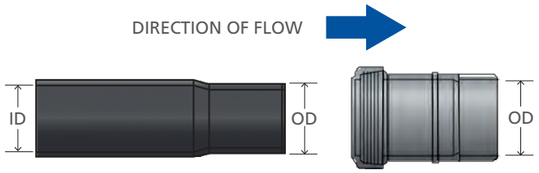
Available in two types:

- For connecting HDPE to HDPE
- For adapting PVC to HDPE

Patented design, patent no. 1703849.8

9 Adapting to other materials

Adapting from one material to another can sometimes require a number of different fittings. Terrain FUZE offers a wide range of solutions that can adapt our system with other materials, with specific products for adapting in direction of flow.



OD						
MATERIAL	SIZE					
	1¼"	1½"	2"	3"	4"	6"
PVC-c	36mm	43mm	56mm	82mm	110mm	160mm
PP	35mm	41mm	54mm			
HDPE	40mm	50mm	56mm	90mm	110mm	160mm
Terrain Q	40mm		50mm		110mm	160mm
Iron	42mm	47.8mm	60mm			
Copper	35mm	42mm	54mm		108mm	
Clay					100mm	
Vulcathene		48mm	60mm	89mm	114mm	
Cast Iron					112mm	
Ridgidrain					118mm	176mm
Chrome	32mm					

ID						
MATERIAL	SIZE					
	1¼"	1½"	2"	3"	4"	6"
PVC-c	32mm	39mm	52mm	76mm	104mm	154mm
PP	31mm	37mm	50mm			
HDPE	34mm	44mm	46mm	83mm	101mm	148mm
Terrain Q	36mm		50mm		104mm	153mm
Iron	32mm	38mm	51mm			
Copper	32mm	39mm	54mm		104mm	
Clay					76mm	
Vulcathene		38mm	51mm	76mm	102mm	
Cast Iron					98mm	
Ridgidrain					100mm	150mm
Chrome	28mm					

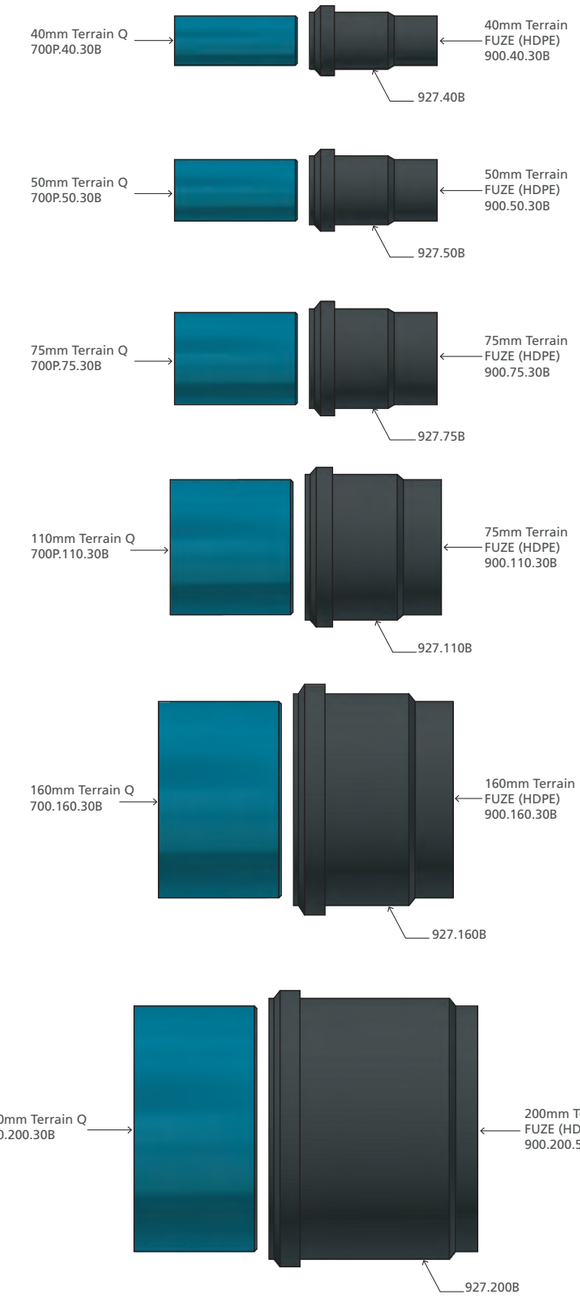
Note: Pipes to be chamfered and lubricated when being used with ring seal, use 9136250L Silicone grease.

References: 1. Terrain Soil and Waste Product Installation guide. 2. BSEN12056 Gravity drainage systems inside buildings. Sanitary pipework, layout and calculation. For more information please call our Technical Team on 01622 795200

The table below shows a range of five adaptors available and you can use this table to find the adaptor to suit your requirements.

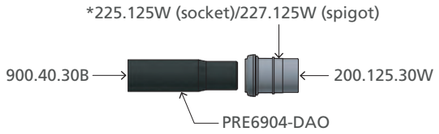
COMPATIBILITY TABLE					
PART NUMBER	TERRAIN FUZE SIZE	COMPATIBILITY			
		PVC (200 SERIES)	PP (300 SERIES)	ABS (600 SERIES)	COPPER
Clay	40mm	32mm	32mm	32mm	32mm
Vulcathene	50mm	32mm	32mm	32mm	32mm
Cast Iron	50mm	32mm	32mm	32mm	32mm
Ridgidrain	56mm	32mm	32mm	32mm	32mm
Chrome	56mm	32mm	32mm	32mm	32mm

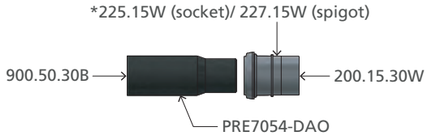
Terrain Q – Terrain FUZE (HDPE)

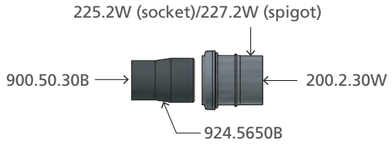


9 Adapting to other materials

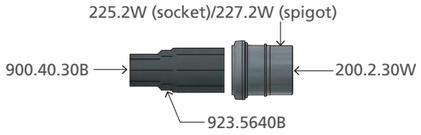
FUZE (HDPE) – PVC-c

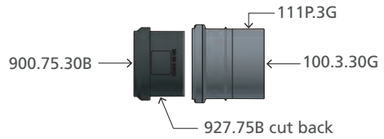


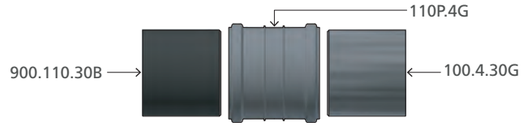


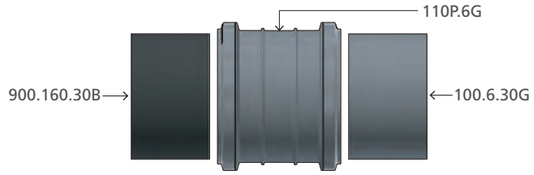


*This will cause a reduction in bore in the direction of flow.

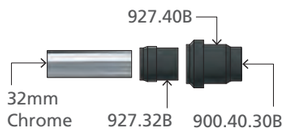




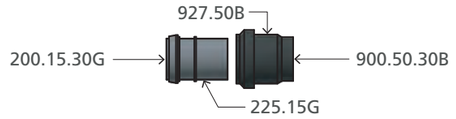


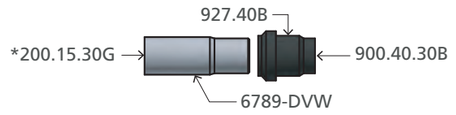


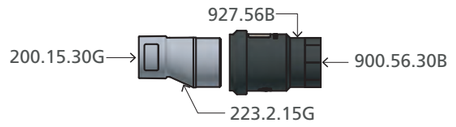
Chrome - FUZE (HDPE)

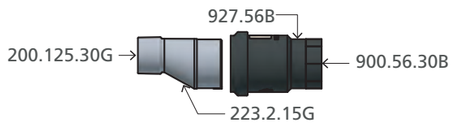


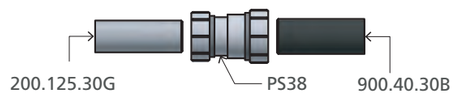
PVC-c - FUZE (HDPE)

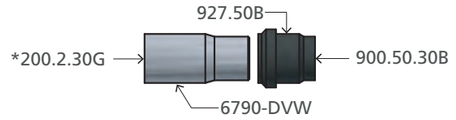












*Note: This will cause a reduction in bore in the direction of flow.

10 Installation

HDPE Thermal Expansion

Terrain FUZE HDPE pipe work systems expand and contract with changes in temperature, both ambient temperature and from the temperature of the waste discharge through the pipework. This guide describes the principles of thermal movement allowance and provides advice covering assembly and jointing techniques.

The advice and guidance is based on typical situations only. For further information contact the Terrain Technical Services Department. Terrain FUZE HDPE offers substantial durability against the flow of hot water. A waste pipe with no mechanical load will tolerate temperatures of up to 80°C and up to 95°C is permissible for a maximum of two minutes.

Thermal movement MUST always be accounted for in both locked and expansion systems (explained in the following pages).

CALCULATING THERMAL MOVEMENT

Terrain FUZE HDPE has a coefficient of expansion of 0.2 (mm/m/°C), the design and installation of above ground drainage systems must be able to accommodate for this. Calculate the thermal movement on straight lengths between anchors using:

$$\Delta L = L\Delta T$$

Where

ΔL = expansion (mm) OR contraction (-mm)

= co-efficient of linear expansion (mm/m/°C) Terrain FUZE HDPE, 0.2

L = Total length of the pipe between anchor points (m)

ΔT = Temperature difference (°C)

NB. For waste discharges ΔT should always be calculated from 0°C, so if the temperature of the water in the pipe is to be 60°C, then ΔT is 60°C.

Example 1 - Typical vertical stack

Example 1 - Typical vertical stack A 10 storey foul drainage stack will collect and convey domestic waste (assumed temperature 60°C) and connect directly to drain. Each storey is 3m high.

$\Delta L = L\Delta T$

$\Delta L = 0.2 \times 3.0 \times 60$ = 36mm thermal movement per floor

Example 2 - Typical suspended pipe run

A 20 metre, high-level lateral run has been designed in an open car park area. The maximum length between anchor points should be 5m. The assumed temperature of the waste fluid is 50°C.

$\Delta L = L\Delta T$

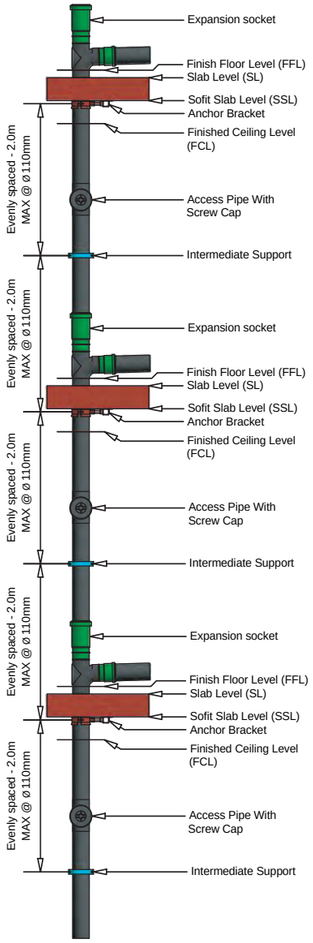
$\Delta L = 0.2 \times 5.0 \times 50$ = 50mm thermal movement between anchor points

10 Installation

Vertical Expansion System

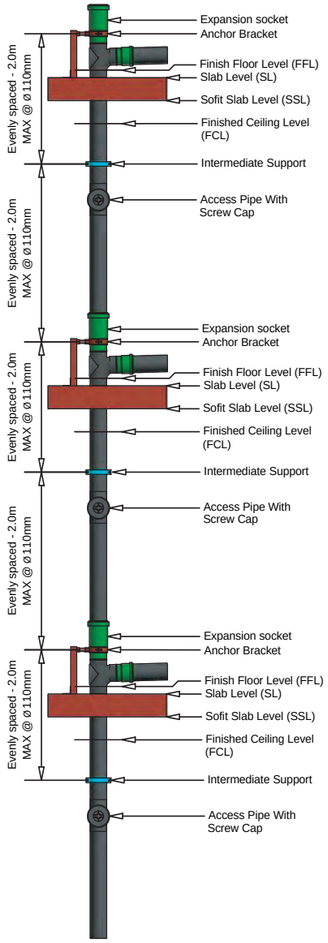
Expansion system anchored below slab

Rail system rules apply as per page 84.

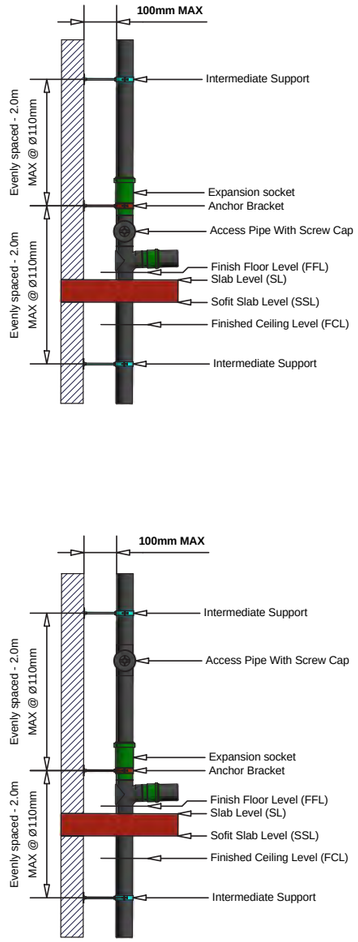


Expansion system anchored above slab

Rail system rules apply as per page 89.



Examples of expansion system anchored to a structural wall



Horizontal Expansion System

SUPPORT AND EXPANSION SOCKET DISTANCES

Unless there is an alternative provision for thermal movement, pipework should be fitted with expansion sockets in the following locations:

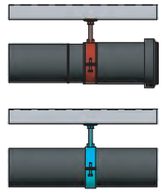
- At spacing's no greater than 5m for pipework OD Ø75mm and above
- At spacing's no greater than 2m for pipework OD Ø63mm and below
- Where the maximum distance between fixed points exceeds 2m
- At changes of direction or branch runs greater than 1m in length
- Any point where pipework passes through a floor or wall and is made good or fire-stopped must be treated as an anchor point when determining positions of expansion sockets
- Low Level WC Manifolds incorporate ring seal adaptors at each branch connection to compensate for thermal movement and also allow the branch to be 'turned' to the correct angle to allow connection to the WC

HORIZONTAL EXPANSION SYSTEM		
Pipe size diameter (OD mm)	Maximum distance between expansion sockets (m)	Intermediate support at any change of direction and at below maximum centres (mm)
40	2.0	400
50	2.0	500
56	2.0	560
75	5.0	750
110	5.0	1100
160	5.0	1600
200	5.0	2000
250	5.0	2500
315	5.0	3000

* See table on page 89 for pipe weights (empty and full).

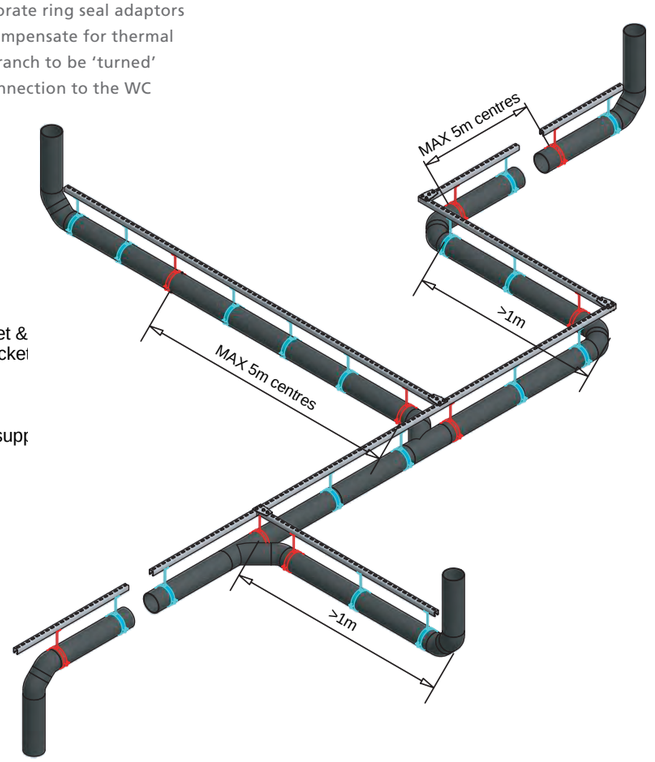
Example - Ø160mm Pipe

Key



Anchor bracket & Expansion socket

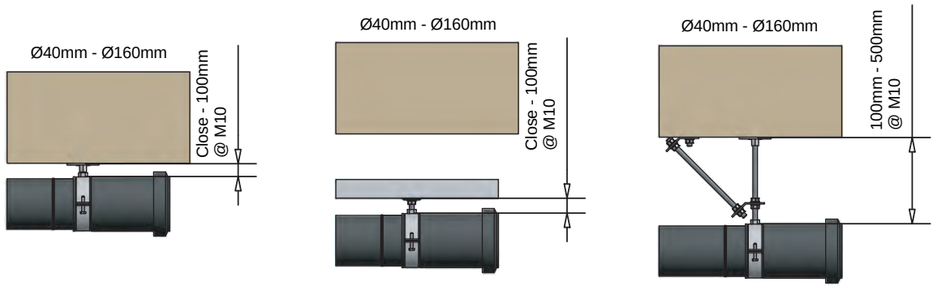
Intermediate supp

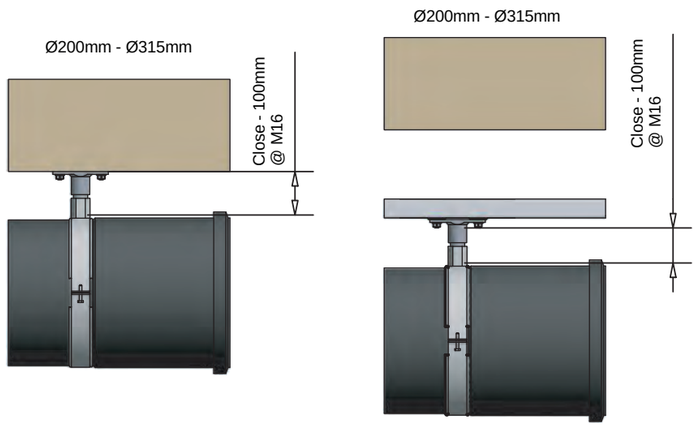


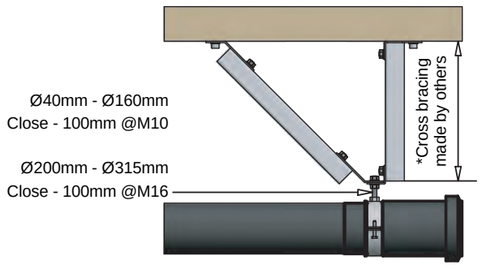
10 Installation

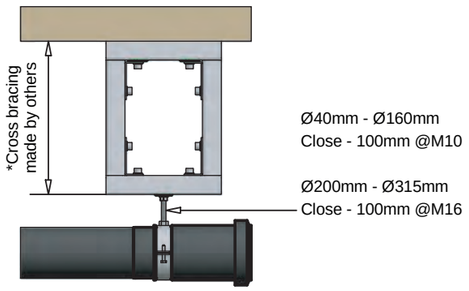
Bracketing an Expansion System

- Terrain FUZE HDPE can be anchored from the slab or off a rail system
- Cross bracing must be used for drop rods longer than figures shown below
- Rails are not supplied by Polypipe Building Services





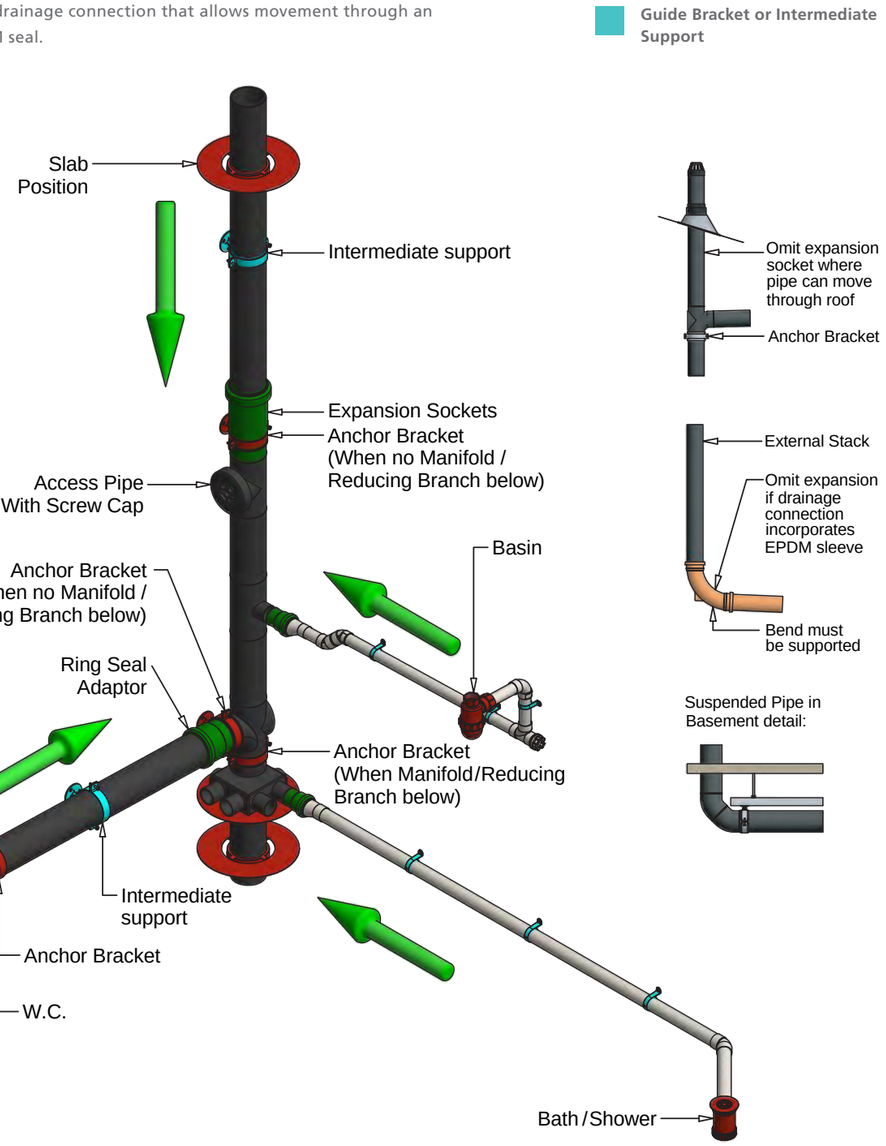




Example of an Expansion System

Expansion sockets may be omitted if alternative provision is created in one of the following ways.

- Above the highest branch connection to a foul and/or waste stack is free to move through a weatherproof sleeve
- At the base of an external drainage stack that is connected to a drainage connection that allows movement through an EPDM seal.

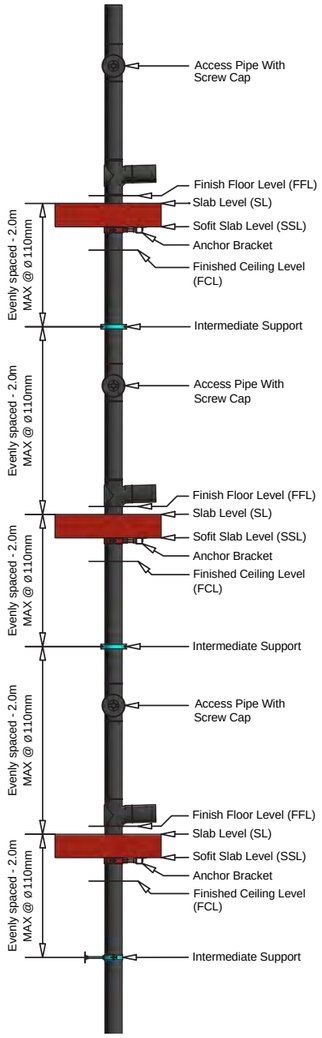


10 Installation

Vertical Locked System

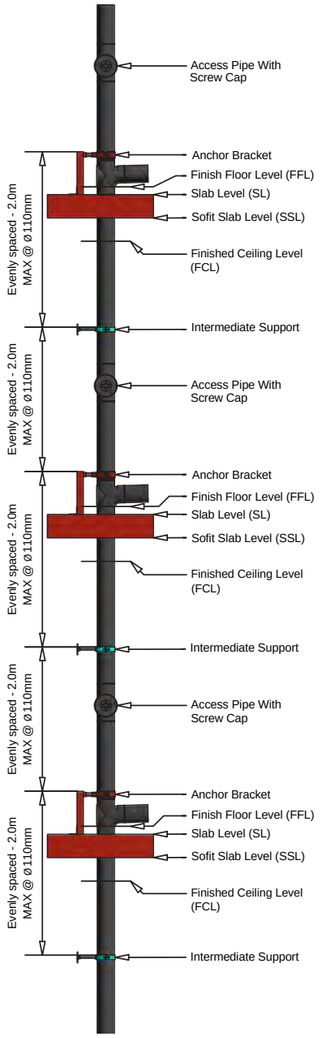
Locked system anchored below slab

Rail system rules apply as per page 88..

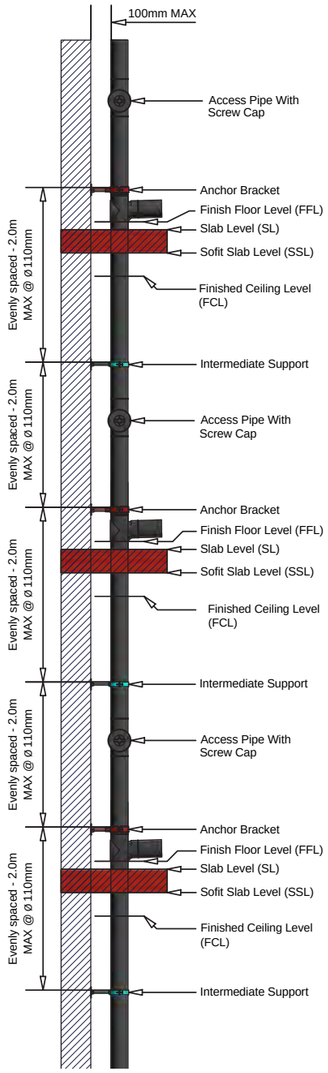


Locked system anchored above slab

Rail system rules apply as per page 88.



Locked system anchored to a structural wall



Horizontal Locked System

SUPPORT AND ANCHOR BRACKETS

Unless there is an alternative provision for thermal movement, pipework should be fitted with anchor brackets in the following locations:

- At spacing's no greater than 5m for pipework OD Ø75mm and above
- At spacing's no greater than 2m for pipework OD 63mm and below
- Where the maximum distance between fixed points exceeds 2m
- At changes of direction or branch runs greater than 1m in length
- Any point where pipework passes through a floor or wall and is made good or fire-stopped must be treated as a fixed point when determining positions of anchor brackets

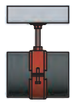
Pipe will still expand and contract into itself in a locked system. Even in a locked system, thermal movement needs to be accounted for.

HORIZONTAL LOCKED SYSTEM		
Pipe size diameter (OD mm)	Maximum distance between anchor brackets on straight pipe run (m)	Maximum distance between intermediate supports (mm)
40	2.0	400
50	2.0	500
56	2.0	560
75	5.0	750
110	5.0	1100
160	5.0	1600
200	5.0	2000
250	5.0	2500
315	5.0	3000

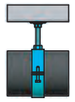
* See table on page 89 for pipe weights (empty and full).

Example - Ø160mm Pipe

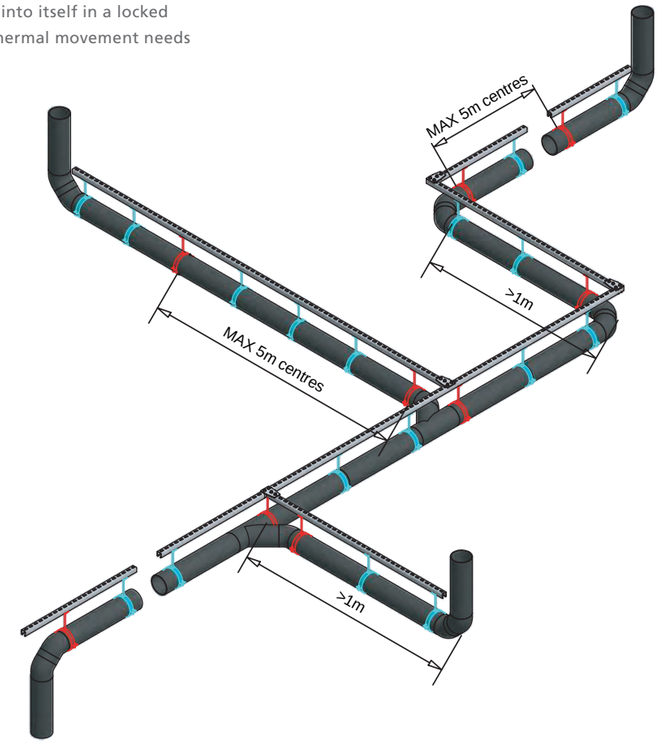
Key



Anchor bracket

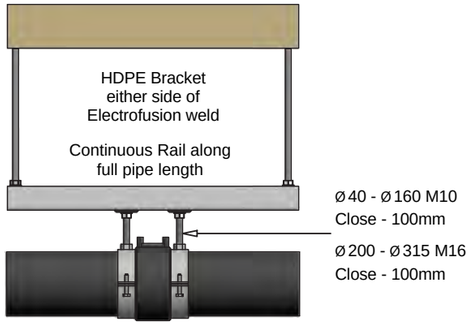


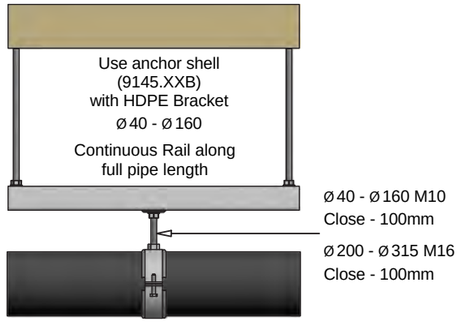
Intermediate support

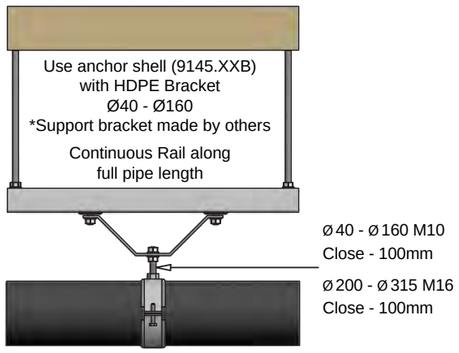


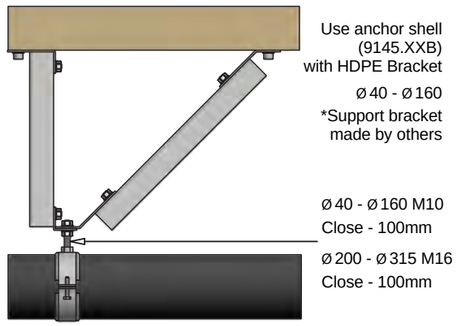
Bracketing a Locked System

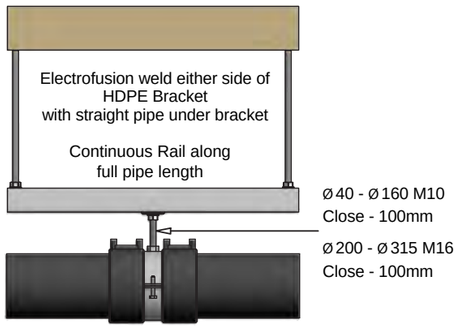
Types of Anchor Brackets on locked rail system

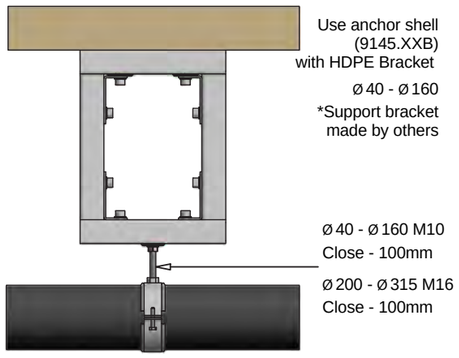












Summary of Expansion & Locked Systems

EXPANSION SYSTEMS

Rulings for anchor brackets in an expansion system:

- Pipe diameters up to 160mm - M10 drop rods up to 100mm below slab or rail
- Pipe diameters up to 160mm - M10 drop rods with M10 cross brace up to 500mm below slab or rail
- Pipe diameters up to 160mm where the vertical drop is greater than listed above use either the rail system or use Unistrut as a drop rod with a cross brace and an M10 connection to the bracket
- Pipe diameters 200-315mm - M16 drop rods up to 100mm below slab or rail
- Pipe diameters 200-315mm where the vertical drop is greater than listed above use either the rail system or use Unistrut as a drop rod with a cross brace and an M16 connection to the bracket

LOCKED SYSTEMS

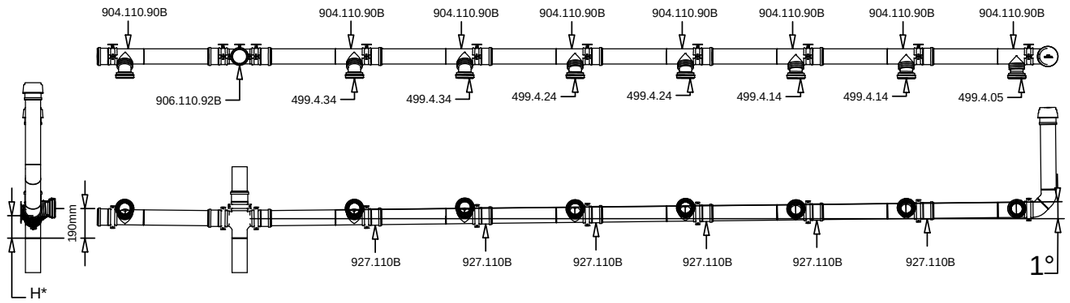
Rulings for anchor brackets in a locked system:

- In no circumstances should drop rods alone be used to support a locked anchor point
- Close coupled rail system up to 160mm diameter - M10 connection between bracket and rail
- Close coupled rail system 200-315mm diameter - M16 connection between bracket and rail
- Pipe diameters 200-315mm - M16 drop rods up to 100mm below slab or rail
- If the rail is not being used a suitable drop support needs to be created using Unistrut and a cross brace with the same size connections to brackets as listed above for a rail system

HORIZONTAL EXPANSION SYSTEM		
FUZE HDPE pipe diameter (OD mm)	Pipe weight full of water (Kg/m)	Pipe weight empty (Kg/m)
40	1.278	0.370
50	1.986	0.460
56	2.493	0.530
75	4.479	0.740
110	9.525	1.450
160	20.190	3.080
200	31.741	4.100
250	49.252	6.100
315	78.045	9.510

10 Installation

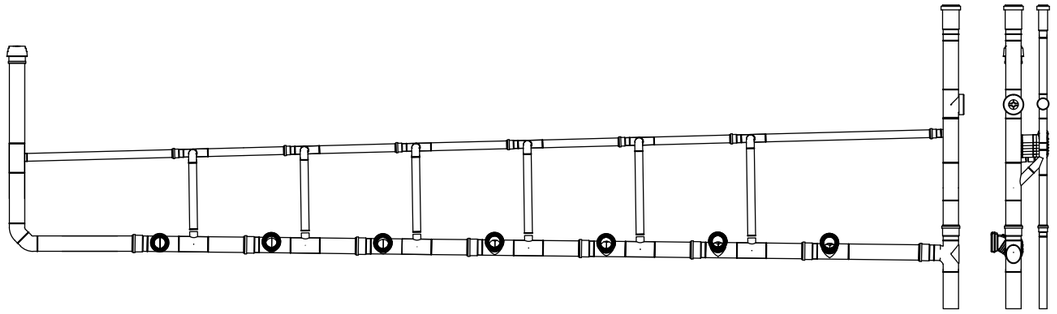
WC Connections



Float laid to a fall of 1° (17mm drop/1 metre run)

Note: If a secondary ventilation system is being installed then expansion must be provided to both the soil and waste stack and the secondary ventilation stack. Note: It is important to lubricate the ring seal adaptor with silicone grease.(9136.250L).

WC POSITION (HEIGHT H* FROM FFL)							
H*	1	2	3	4	5	6	7
mm	170	156	142	128	114	100	86



RISERS AND BRANCHES

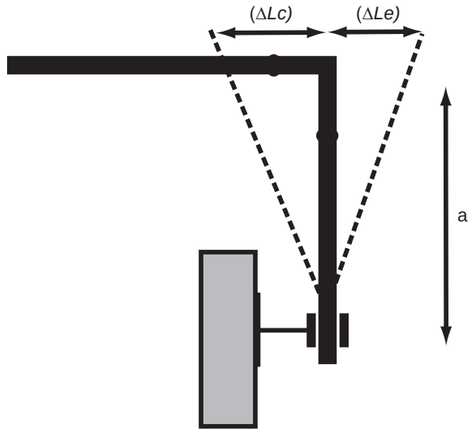
It is recommended that an expansion socket is incorporated at each floor level when designing and installing FUZE HDPE stacks in multi-storey buildings. Where a branch is taken off a main run, the thermal movement of the main run is going to affect the branch

- Establish the distance between the branch and the nearest anchor
- Calculate the movement at the point where the branch joins the run
- Establish the hole size through the wall and ensure that there is enough space for the branch to naturally flex, taking into account that the movement of the branch will be limited where it passes through a wall
- Pipe diameters 200-315mm - M16 drop rods up to 100mm below slab or rail
- If there is not enough room for the required offset, think about adding expansion sockets and anchor points to the main run to reduce the amount of movement experienced by the branch

Deflection Leg

The flexibility of Terrain FUZE permits expansion or contraction to be compensated for by means of directional change within a pipe system (deflection leg) as shown below.

To allow the pipe to deflect at a change in direction it is essential to calculate the distance to the first bracket (a) so that the pipe is free to expand and contract.



Step 1: Calculate the change in length

$\Delta L =$ x L x ΔT

Where:

ΔL = Expansion (mm) or contraction (-mm)

= Co-efficient of linear expansion (mm/m/°C). For Terrain FUZE = 0.2

L = Total length of the pipe between anchor points (m)

ΔT = Temperature difference (°C)

NB. For waste discharges ΔT should always be calculated from 0°C, so if the temperature of the water in the pipe is to be 60°C, then ΔT is 60°C.

Step 2: Determine the length of the deflection leg

$a = 10 \times \sqrt{(\Delta L \times Ø)}$

Where:

a = Deflection leg length (distance to first bracket)

ΔL = Expansion (mm) or contraction (-mm) from Step 1 above

Ø = Total length of the pipe between anchor points (m)

ΔT = Pipe outside diameter (mm)

10 Installation

Non-pressure Underground Installation

Terrain FUZE HDPE pipes and fittings marked (BD) are also suitable for underground applications.

Strict attention must be given to the trench where the pipe is to be laid. This must be completely flat and should be void of any sharp objects or stones which could cause localised deformation of the pipeline. A minimum bedding of 10cm of sand should be used to provide continual support along the whole length of the pipe and minimise the risk of point-loading within the trench. Following this, the first 15-20cm of cover should be of sand again and this must be compressed to avoid pipe movement. Compacting of the cover material should take place immediately after the pipe has been covered to restrict the initial stages of movement. The depth of the trench is dependent upon whether the application is trafficked or non-trafficked and the possibility of freezing temperatures. Official guidelines, standards and regulations should be observed to calculate this requirement.
(See illustrations on the right)

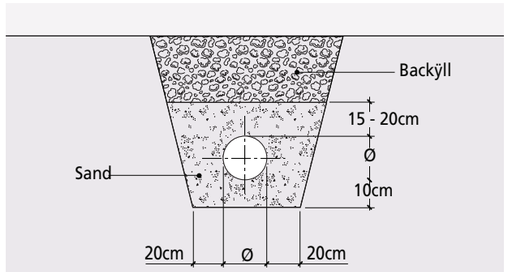
A minimum depth of 80cm must cover the pipe. To evenly distribute ground pressure on trafficked applications it is recommended to cover the layer of sand with a light concrete casting.

Two or more pipes laid in the same trench should not come into contact. A recommended distance of 10-15cm should remain between each pipeline to facilitate future maintenance. As with a standard pipe installation, this void should be filled with sand and compacted.

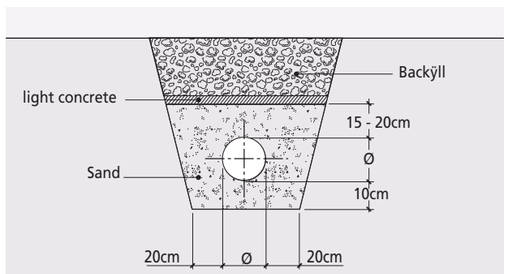
Rigid installations, where the pipeline is covered with concrete, do not undergo the same stresses as normal laying conditions and therefore the pipe is at no risk of deformation.

In underground installations, the ambient temperature is fairly stable and the fluid temperatures from the varying inlets have mixed and stabilised within the above ground pipe system. Expansion sockets are not required every six metres.

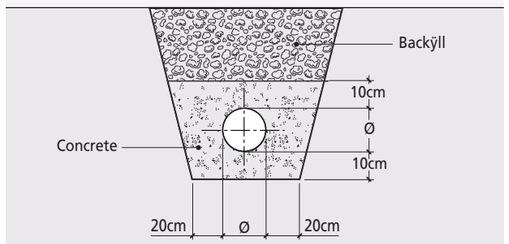
Light traffic

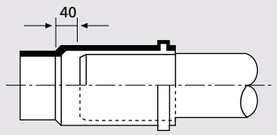


Heavy traffic



Rigid installation





N.B.: The spigot should be pushed fully into the expansion socket, marked at the socket edge and withdrawn by 40mm.

Seal areas should be protected from ingress of materials when being buried.

Special Consideration for Buried Drain Application

The Terrain FUZE HDPE system is suitable for buried drain applications under the envelope of the building at reasonable shallow depths and normal conditions.

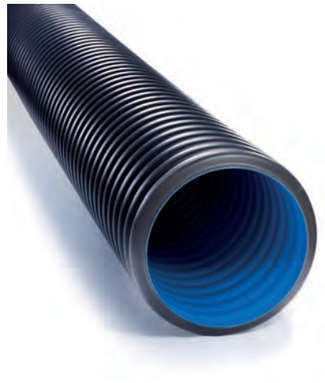
When any of the following conditions exist please contact Polypipe Terrain for confirmation on its suitability:

- Pipes at depths greater than 4 metres below ground level
- Pipes subjected to external water pressures exceeding 2 metres head (high water table)
- Contaminated ground conditions
- Pipes subjected to internal negative pressures
- If during the construction stage high point loads will be experienced due to heavy plant etc.
- If other manufacturers components are to be incorporated into the system
- Non domestic type discharges are expected, for example:
  - High volume discharges that could subject the pipe to more than 1.5 bar pressure
  - Combined high temperature and high volume discharges
  - Chemical waste
  - Radioactive waste

When leaving the footprint of the building we would recommend adapting onto a system designed for this purpose. Ridgidrain, for surface water drainage, or Polysewer, for foul sewers from Polypipe Civils are suitable systems for these applications.

Ridgidrain

- Surface water applications
- 100-900mm diameter HDPE pipes and fittings
- BBA approved

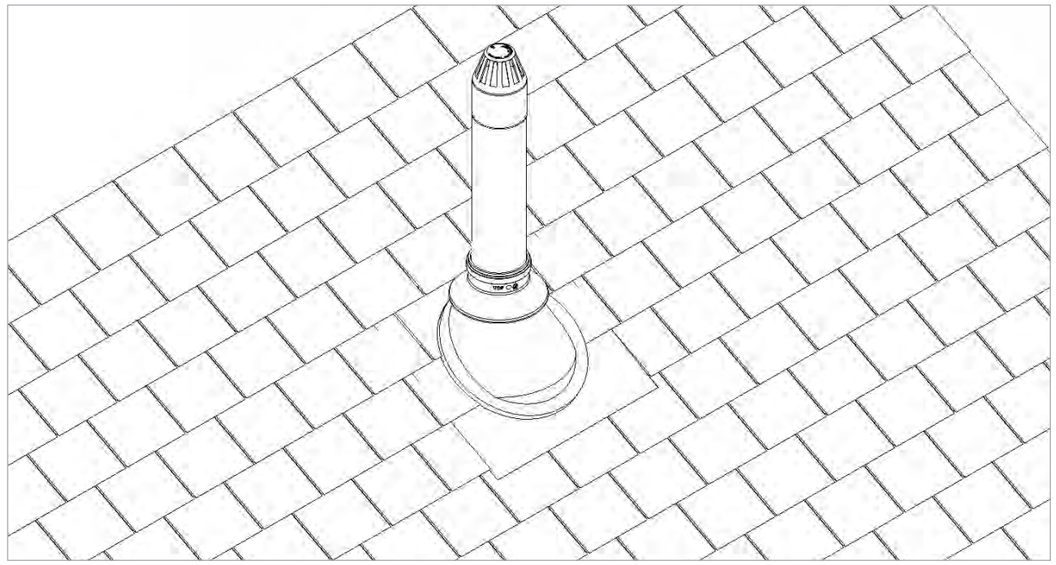


Polysewer

- Foul and combined applications
- 150 – 300mm diameter PVCu pipes and fittings
- BSi Kitemarked and BBA approved

For further information please contact Polypipe Civils on **01509 615100** or **civils@polypipe.com**

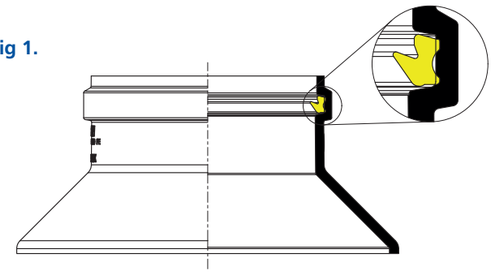
Weathering Apron and Vent Cowl



WEATHERING SLATES FOR PITCHED ROOFS

- Slide the 149 weathering slate over the stack using Terrain 9136 silicone lubricant.
- Dressing the weathering slate over the lower tiles first,then lay the side and upper tiles over the remaining portion of the weathering slate.
- Slide the weathering apron (931.110.200B) down to the rubber cone on the weathering slate into position ensuring the seal is facing in a downwards orientation as per fig 1.
- Affix the vent cowl (950.110B) onto the top of the stack by either an electrofusion or butt weld joint.

Fig 1.



NOTE: On low pitched roofs, optimum weathering may be achieved by making a single weld to the lower edge of the base plate.

WEATHERING SLATES FOR FLAT ROOFS (three layers felt)

- Dress the first layer of felt up to the pipe
- Slide the 149 weathering slate over the stack, ensuring the aluminium plate is dressed flush with a good contact onto the first layer of felt.
- Prime the aluminium baseplate with a good quality bitumen primer.

CAUTION: Keep hot material away from rubber cone

- Place a second layer of felt over the baseplate up to the cone and trim accordingly. Repeat for a third layer of felt.
- Slide the weathering apron (931.110.200B) down the stack to the rubber cone into position using Terrain 9136 silicone lubricant ensuring the seal is facing in a downwards orientation as per fig 1.
- Affix the vent cowl (950.110B) onto the top of the stack by either an electrofusion or butt weld joint.

WEATHERING SLATES FOR FLAT ROOF (three layers felt)

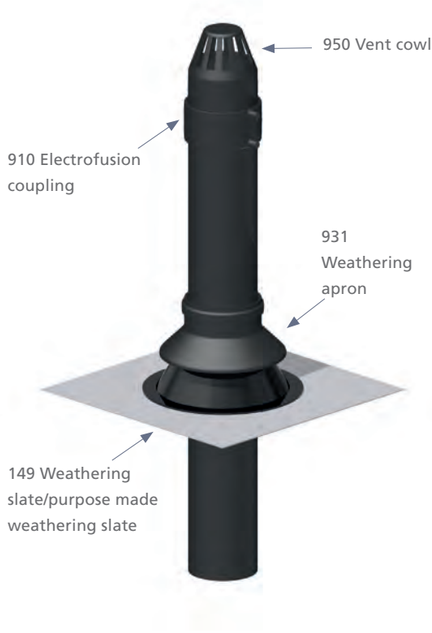
- Dress the first layer of felt up to the pipe
- Slide the 149 weathering slate over the stack, ensuring the aluminium plate is dressed flush with a good contact onto the first layer of felt.
- Prime the aluminium baseplate with a good quality bitumen primer.

CAUTION: Keep hot material away from rubber cone

- Place a second layer of felt over the baseplate up to the cone and trim accordingly. Repeat for a third layer of felt.
- Slide the weathering apron (931.110.200B) down the stack to the rubber cone into position using Terrain 9136 silicone lubricant ensuring the seal is facing in a downwards orientation as per fig 1.
- Affix the vent cowl (950.110B) onto the top of the stack by either an electrofusion or butt weld joint.

WEATHERING TO PITCHED ROOFS USING PURPOSE MADE SLATE (e.g. Lead)

- Position the weathering slate onto the open end of the soil stack.
- Slide the weathering apron (931.110.200B) down the stack to the weathering slate using Terrain 9136 silicone lubricant, ensuring the seal is facing in a downwards orientation as per fig 1.
- Affix the vent cowl (950.110B) onto the top of the stack by either an electrofusion or butt weld joint.



WEATHERING TO ASPHALT ROOFS USING PURPOSE MADE SLATE (e.g. Lead)

- Position the weathering slate onto the open end of the soil stack.
- Lay the asphalt as normal over the weathering slate up to the lead upstand around the stack. Feather this edge off with the asphalt.
- Slide the weathering apron (931.110.200B) down the stack to the weathering slate using Terrain 9136 silicone lubricant, ensuring the seal is facing in a downwards orientation as per fig 1.
- Affix the vent cowl (950.110B) onto the top of the stack by either an electrofusion or butt weld joint.

11 Firetrap Sleeves and Collars

Firetrap Sleeves

The Terrain Firetrap Sleeve is a cost-effective product for the fire stopping of pipe penetrations whilst maintaining similar thermal and acoustic properties as standard mineral fibre insulation. The Terrain Firetrap Sleeve was developed with ease of installation in mind.

The sleeve can be quickly and simply fitted onto the pipe and slid into the penetration ensuring that there are no air gaps around the sleeves by filling with mortar or mastic. In a fire situation, the sleeve expands to fill the available space (15mm max) between the pipe and the penetration and will crush and close off plastic drainage pipes. The pipe forms a solid char preventing the passage of fire and smoke to the adjacent compartment.

APPLICATIONS

For Terrain PVC, Terrain FUZE above ground drainage through:

- Concrete, masonry or plasterboard partitions
- Concrete floor constructions

Terrain Firetrap Sleeve was developed with ease of installation in mind.

UP TO 4HR RATING*

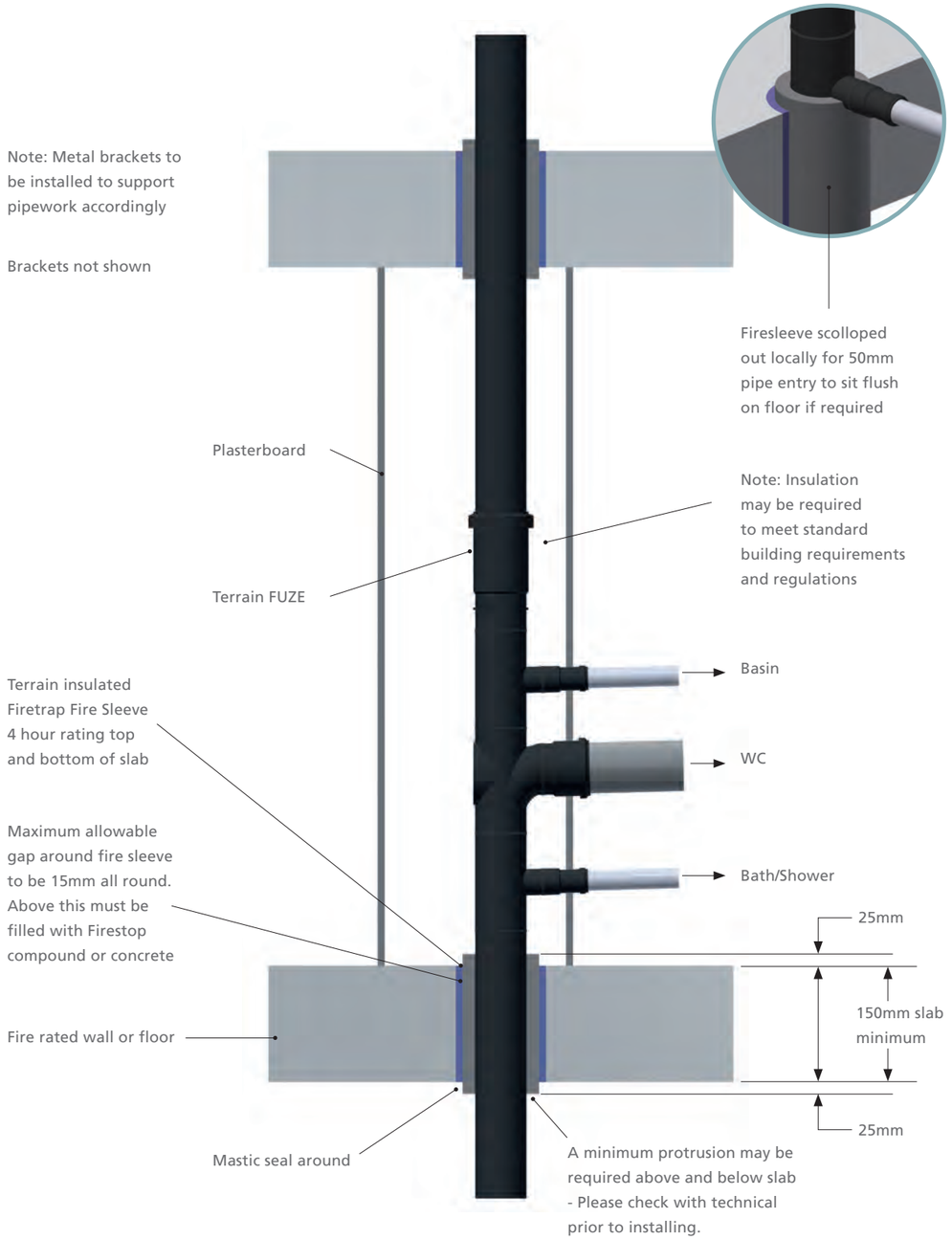
FEATURES

- Up to 4 Hour Fire Rating to BS 476 Part 20, BS EN 1366-3
- Protects pipe above and below the slab
- Cost effective
- One sleeve can replace two collars on a horizontal installation
- Easy installation
- Don’t have to drill slab
- No need for mechanical fixings
- No mastic is required, providing close fit
- Easily cut to size to minimise wastage
- Simple to install without special tools or skills
- Can be retro-fitted
- Offers excellent acoustic insulation
- Maintains the thermal insulation of the pipe through the slab or wall penetration
- Maintains vapour seal of existing insulation
- Allows for thermal movement of pipe

*Depending on pipe composition and application.
See datasheet FF109 for further information.

PRODUCT CODE	PIPE DIAMETER SUITABLE FOR (mm)	SLEEVE HOLE DIAMETER (mm)	SLEEVE HOLE OUTSIDE DIAMETER (mm)	LENGTH (mm)
1925.42	40	42	92 - 104	300
1925.54	50	54	104 - 116	300
1925.60	56	60	110 - 122	300
1925.76	75	76	126 - 138	300
1925.114	110	114	164 - 176	300
1925.169	160	169	219 - 231	300

Fire protection for vertical Terrain drainage pipework in a NON fire rated duct



11 Firetrap Sleeves and Collars

Firetrap Collars

Terrain Firetrap Collars have been specifically designed to re-instate the fire resistance of a wall or floor which has been penetrated by services such as Terrain PVC, Terrain FUZE or Terrain Q.

Manufactured in steel, each fire collar contains an internal lining of intumescent graphite impregnated organic polymer. Anchoring hooks are also supplied. The collars will seal pipes from 40mm to 315mm diameter and can be face fixed or set-in to a wall or ceiling structure. They are suitable for use on concrete, masonry and plasterboard partitions.

They have a up to 2 hour fire rating and feature mounting tabs for quick and easy installation.

APPLICATIONS

For Terrain PVC, Terrain FUZE above ground drainage through:

- Concrete, aerated concrete, masonry or plasterboard partition walls
- Concrete, aerated concrete or masonry floor construction

FEATURES

For Terrain PVC, Terrain FUZE above ground drainage through:

- Up to 4 Hour fire rating
- Powder coated steel sleeve
- Can be surface mounted or built in
- Mounting tabs for quick and easy installation
- Seals against smoke, toxic gases, flames and heat
- Can be installed in a recessed area to minimise overall dimensions
- Maintains vapour seal of existing insulation
- Allows for thermal movement of pipe

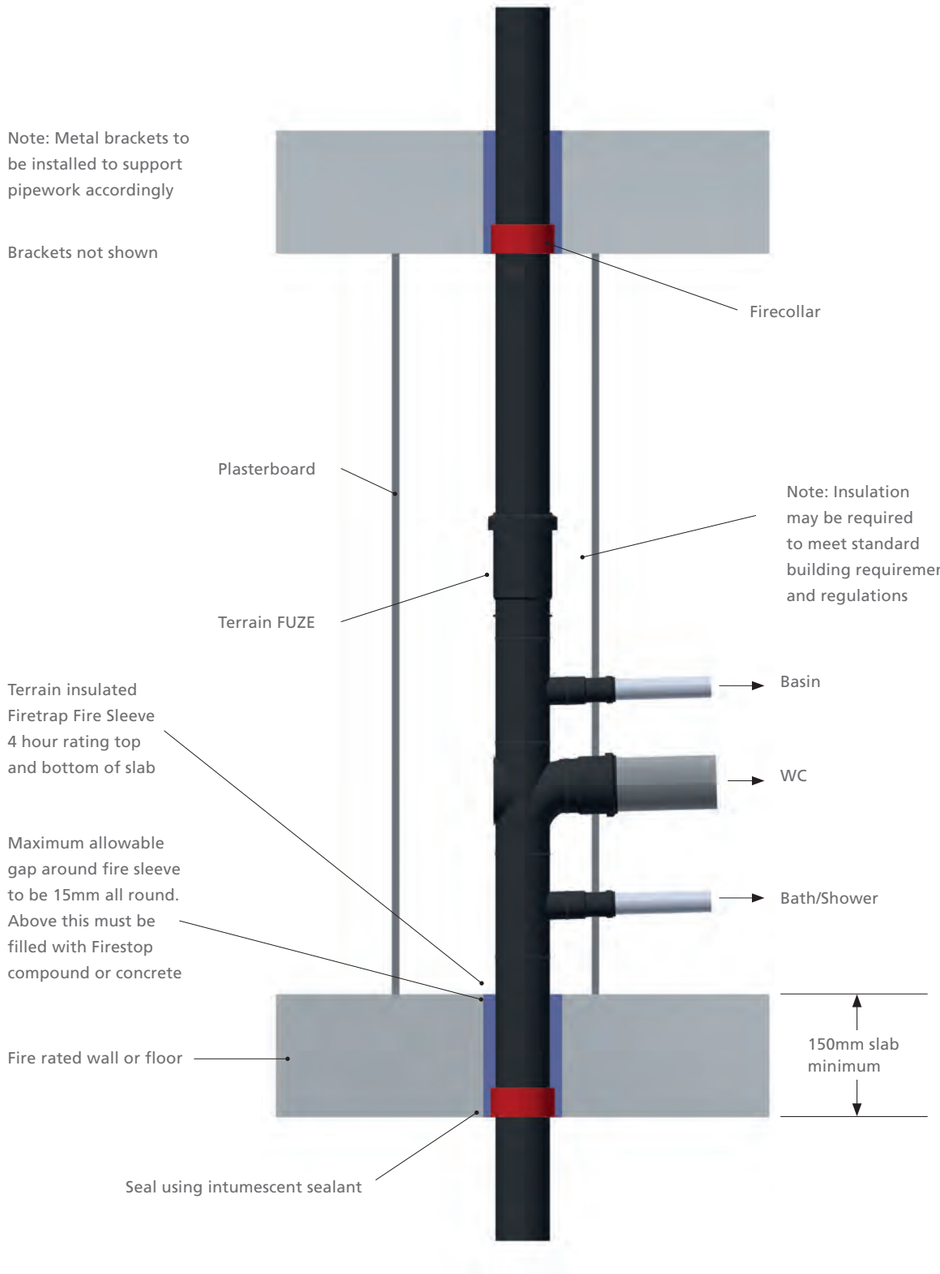
*Depending on pipe composition and application.
See datasheet TDSCIPC for further information.

PRODUCT CODE	Ø
1625.40R	40mm
1625.55R	55mm
1625.75R	75mm
1625.82R	82mm
1625.110R	110mm
1625.160R	160mm
1625.200R	200mm
1625.250R	250mm
1625.315R	315mm

Collars will seal pipes from 40mm to 315mm diameter and can be face fixed or set-in to a wall or ceiling structure.

UP TO 2HR RATING*

Fire protection for vertical Terrain drainage pipework in a NON fire rated duct



12 System Testing and Maintenance

NG.3 Testing

Terrain FUZE should be tested in accordance with guidelines stated within BS EN 12056-2 (Annex NG.3.1) which lays out the following:

NG.3.1 AIR TEST

NOTE Normally this test is carried out to confirm that all pipes and fittings are airtight. It should be completed in one operation but for large multi-storey systems testing in sections may be necessary.

NG.3.1.1 PREPARATION

The water seals of sanitary appliances should be fully charged and test plugs or bags inserted into the open ends of the pipework to be tested. To ensure that there is a satisfactory air seal at the base of the stack, or at the lowest plug or bag in the stack if only a section of the pipework is to be tested, a small quantity of water sufficient to cover the plug or bag can be allowed to enter the system.

One of the remaining test plugs should be fitted with a tee piece, with a cock on each branch, and one branch being connected by means of a flexible tube to a manometer. Alternatively, a flexible tube from a tee piece fitted with cocks on its other two branches can be passed through the water seal of a sanitary appliance. Any water trapped in this tube should be removed and then a manometer can be connected to one of the branches.

NG.3.1.2 APPLICATION

Air is pumped into the system through the other branch of the tee piece until a pressure equal to 38 mm water gauge is obtained. The air inlet cock is then closed and pressure in the system should remain constant for a period of not less than 3 min.

NG.3.1.3 LEAK LOCATION

NOTE Defects revealed by an air test may be located by the methods given in NG.3.1.3.1, NG.3.1.3.2 and NG.3.1.3.3.

NG.3.1.3.1 SMOKE

A smoke producing machine may be used which will introduce smoke under any pressure into the defective pipework. Leakage may be observed as the smoke escapes. Smoke cartridges containing special chemicals should be used with caution, taking care that the ignited cartridge is not in direct contact with the pipework and that the products of combustion do not have a harmful effect upon the materials used for the discharge pipe system. Smoke testing of plastics pipework should be avoided due to naphtha having a detrimental effect, particularly on ABS, PVC-U and MUPVC. Rubber jointing components can also be adversely affected.

NG.3.1.3.2 SOAP SOLUTION

With the pipework subject to an internal pressure using the smoke machine method as described in NG.3.1.3.1, a soap solution can be applied to the pipes and joints. Leakage can be detected by the formation of bubbles.

NG.3.1.3.3 WATER TEST

There is no justification for a water test to be applied to the whole of the plumbing system. The part of the system mainly at risk is that below the lowest sanitary appliance, and this may be tested by inserting a test plug in the lower end of the pipe and filling the pipe with water up to the flood level of the lowest sanitary appliance, provided that the static head does not exceed 6m.

*For accurate readings, please ensure equipment is regularly checked.

Permission to reproduce extracts from BS EN 12056-2:2000 is granted by BSI. British Standards can be obtained in PDF or hard copy formats from the BSI online shop: www.bsigroup.com/Shop or by contacting BSI Customer Services for hardcopies only: Tel: +44 (0)20 8996 9001, Email: cservices@bsigroup.com.

Air pressure test to comply with BS EN 12056-2 for testing a stack with connections

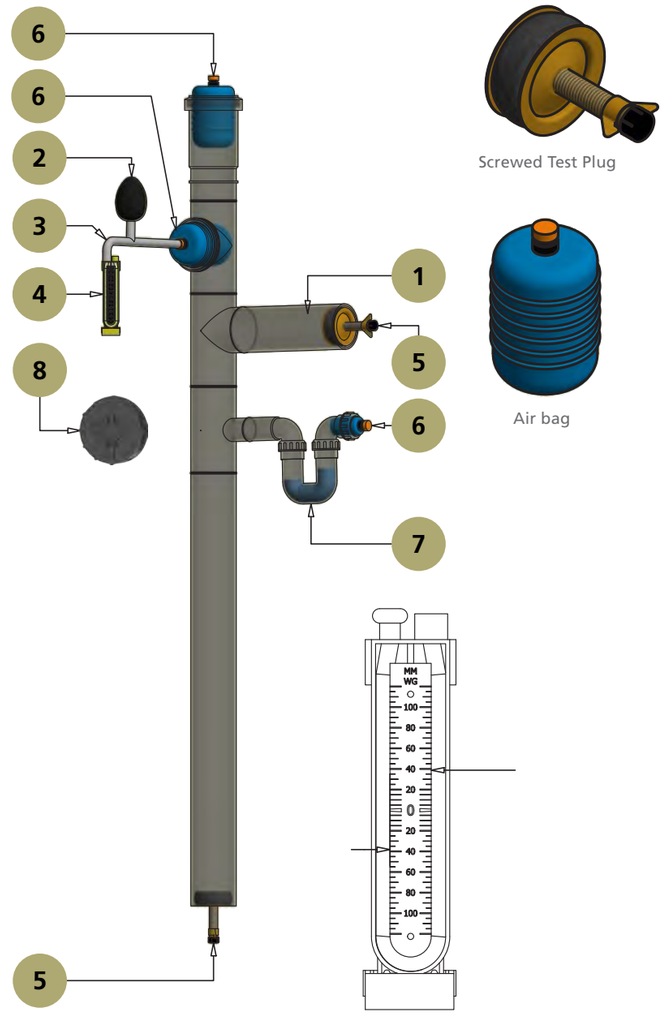
SCREWED TEST PLUG

- Blank or open
- For use in pipe ends
- Manufactured and supplied by others

AIR BAG

- Blank
- For use in access pipe/ expansion socket/pipe ends
- Manufactured and supplied by others

Traps must be filled with water to ensure there is positive pressure within the system to seal the waste inlet.



Screwed Test Plug

Air bag

KEY	
NO.	PART
1	Pipework to test
2	Bellow
3	Hose
4	U-Gauge (should read 38mm)
5	Screwed Test Plug
6	Air Bag
7	Trap (must be filled with water)
8	Screwed Cap (for access door)

Note: Blue temporary caps are not to be used for air pressure testing, only black threaded caps are to be used.
Further information is available on technical bulletin:2016 - PT06 - Air pressure test to comply with BS EN 12056-2 - Version 6

12 System Testing and Maintenance

System Maintenance

NG.4.1 GENERAL

Discharge pipe systems should be kept in a clean and sound condition in order to maintain maximum efficiency. This is facilitated by designing in accordance with the recommendations in this national annex. The following points should be noted:

- When access covers, caps and clearing eyes are removed, damaged packing, ring seals, washers and loose fittings should be renewed before replacement.
- Care should be taken in the use of chemical descaling agents, which are often of a corrosive nature and materials employed in the pipe system should be clearly identified before treatment to ensure that the internal surfaces are not subject to damaging chemical attack.
- Caution is necessary when employing the methods of clearing obstructions which involve the use of air or water at high pressures.
- Hand operated rods for removing blockages in discharge pipes should be capable of passing through the system without damaging the internal surfaces of pipes and fittings.
- Mechanised rodding equipment should only be used by properly trained operators and the pipework to be cleared should be thoroughly examined in advance to enable selection of the appropriate cleaning attachments.
- In renewing paintwork care should be taken to preserve any distinguishing colours which may have been used for identification purposes. Reference should be made to BS 1710.

NG.4.2.DEPOSITS DUE TO MISUSE OF THE DISCHARGE SYSTEM

Completely or partial blockages due to large objects or compacted masses, such as toilet paper and sanitary towels, can usually be loosened by rodding. All such material should be removed from the system at the nearest access point.

NG.4.3 PERIODIC INSPECTION

In addition to general maintenance work, periodic inspections and tests may be advisable to ascertain if there is any misuse or negligence. All defects should be fixed.

13 Support

As the industry moves forward, we're here right by its side. Terrain FUZE is proof of our commitment to making things simple for our customers, an innovative plastic drainage system that's designed for the future.

Our website also provides useful information to keep you up to date with news and innovations as they happen, including how Terrain FUZE can further enhance your project.

To find out more visit:
polypipe.com/this-is-our-terrain/terrain-fuze

Polypipe Building Services

Investing in our business and our people enables us to bring more expertise, more support and more innovation to our customers, helping them to create safe and sustainable commercial buildings, whether newbuild or refurbishment projects.

BUILDING SERVICES SPECIALISM

Having made significant investment in expanding our portfolio to include not only our trusted and well-established Terrain drainage systems, but also MecFlow, our new water supply system, we're committed to working with our customers to provide the best building services solutions for their project. From schools, hospitals and tall buildings to shopping centres, local authorities and commercial and industrial developments, we provide drainage and water supply solutions that help our customers create safe and sustainable services within buildings.

SERVICE AND SUPPORT

Recognising the challenges the construction industry faces, we continuously research and develop products and services that enable us to support our customers more – from working with Engineers to design the best solutions for complex projects to helping Contractors overcome labour shortage issues, a lack of on-site storage and on-site waste management. We develop services to support our customers so that together, we can achieve more.

POLYPIPE ADVANTAGE SERVICE

The Polypipe Advantage service has been specially developed to complement our products and services offering. The Polypipe Advantage team is with you every step of your project, from initial design and project planning, through to manufacture and delivery. By creating fabricated Terrain drainage stacks and MecFlow Kits off-site, we're able to provide our customers quick and more efficient installations on-site. For more information on how the Polypipe Advantage service could benefit your next project, email:
buildingservice.technical@polypipe.com

SUPPORTING PRODUCTS AND LITERATURE

With both drainage and water supply systems in its portfolio, Polypipe Building Services has a number of solutions for your next project. More information on these systems can be found at:
polypipe.com/commercial-building-services

TAKING YOUR PROJECT FURTHER

As part of the Genuit Group, we have a number of complementary water and climate management systems available to maximise the comfort and efficiency of your commercial building:

Nuaire Ventilation Systems
Our Nuaire brand has been at the forefront of packaged Air Handling Units (AHUs) for over 20 years, designing and manufacturing market leading ranges. Explore the full range of Nuaire ventilation systems at **www.nuaire.co.uk**.

Polypipe Underfloor Heating
Underfloor heating systems are increasingly popular and are rapidly becoming the heat source of choice for commercial and multi-occupancy residential developments. For more information on our range of Underfloor Heating Systems, controls and manifolds visit: **www.polypipeUFH.com**.

Polypipe: Inspiring Green Urbanisation
To help address the pressures that urbanisation and climate change place on our built environment, we've developed a new generation of technologies that sustain and optimise urban green assets through extended and fully integrated water management solutions. Systems that make space for water, alleviate flooding and capture, store and reuse rainwater, whilst enabling and inspiring Green Urbanisation.
www.polypipe.com/civils/gi

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+44 (0)1622 795200

MecFlow
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Polypipe Building Services
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Polypipe Advantage
+44 (0)1622 795200

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14 Approval

Terrain FUZE, HDPE Soil and Waste

Terrain FUZE is made to the manufacturing standards stated below. These standards set out the dimensional, physical and mechanical characteristics that each individual product shall conform to.

PIPES AND ELECTROFUSION COUPLINGS

Pipes and Electrofusion Couplings are manufactured in accordance with BS EN 1519 Standard, Kitemark certificate KM 729217, and is covered by the British Board of Agrément (BBA), certificate 07/4479.

FITTINGS

Fittings are also covered by the British Board of Agreement (BBA), certificate 07/4479.

FIRETRAP COLLARS AND FIRETRAP SLEEVES

Firetrap Collars hold a European Technical Assessment (ETA-12/0332).

Fire collars comply to standards BS EN 13501-1 & 13501-2.

Fire sleeves comply to standards BS EN 1363-1 & 1366-3.

For copies of certificates please visit: **www.polypipe.com/commercial-building-services**

P.A.P.A. AND AAV

Terrain P.A.P.A. - BBA - Certificate No. 18/5551

Terrain Air Admittance Valves - BS EN 12380/BBA - Certificate No. 09/4650

Polypipe Quality Assurance

Our Terrain products are accredited to the following Quality Management Systems:

BS EN ISO 9001 - Quality Management System

BS EN ISO 14001 - Environmental Management System

BS ISO 45001 - Occupational Health & Safety Management System

PAS 99 - Integrated Management Registration

BS ISO 56002 - Innovation Management System

FURTHER INFORMATION AND ASSISTANCE

Terrain products are backed by a comprehensive technical advisory service, available to provide advice and design guidance on all aspects of above and below ground drainage.

Technical services include:

- On-site advice and problem solving.
- Terrain Drainage Stacks are designed and fabricated through our Polypipe Advantage Service. Any items ordered through this service have a 21-day lead time.

For more information, please see page 62.

For prompt assistance, please contact the Polypipe Advantage team: **Tel: 01622 795200**

Email: **buildingservices.technical@polypipe.com**

www.polypipe.com/commercial-building-services

14 Approval

Terms and Conditions

1. GENERAL

1.1 In these conditions

1.1.1 "the Company" means Polypipe Limited, a company registered in England and Wales with registered number 1099323. Registered office: Broomhouse Lane, Edlington, Doncaster, DN12 1ES, United Kingdom.

1.1.2 "Customer" means the person with whom the Company contracts for the supply of Product pursuant to these conditions;

1.1.3 "Order" means any order submitted to the Company by a Customer;

1.1.4 "Order Confirmation" means any order confirmation submitted to the Customer by the Company;

1.1.5 "Product(s)" means the goods and/or services to be supplied by the Company as referred to and described in an Order which is accepted by the Company;

1.1.6 "Quotation" means the quotation submitted to the Customer by the Company prior to submission of an Order which details the prices at which the Customer may make an offer to purchase the Products;

1.1.7 "Writing" includes telex, cable, facsimile transmission, electronic data transfer and comparable means of communication.

1.2 A contract shall come into force between the Parties each time an Order is accepted by the Company, whether by issuing an Order Confirmation, by delivery, or otherwise, but not before. Subject to clause 1.3, (i) the terms of each contract shall be as set out in these conditions and the terms of any Order accepted by the Company, and (ii) in the event of any conflict between these conditions and any such Order, the terms of the Order shall prevail.

1.3 Save to the extent contemplated at clause 2.1, the parties agree that any terms and conditions submitted at any time by the Customer which have not been written specifically for the purposes of the Product requirement to which a specific Order relates (including, without limitation, any standard terms and conditions of purchase which are printed on any order documentation submitted by the Customer), shall not apply to any contractual dealings between the parties and shall not be deemed to constitute a counter-offer to purchase Products in accordance with those terms unless a specific intention is expressed for such terms and conditions to apply in respect of a specific Order notwithstanding this clause 1.3, and any failure by the Company to challenge or respond to any such terms and conditions does not imply and shall not constitute acceptance of those terms and conditions.

1.4 Unless otherwise stated therein Quotations shall be valid for a maximum period of 30 days from issue and may be withdrawn at any time by written or oral notice.

1.5 Any statement or representation (other than in the Company's Quotation or these terms and conditions) by the Company its servants or agents upon which the Customer wishes to rely must be set out in Writing and attached to or endorsed on the Customer's Order and in any such case the Company may confirm, reject or clarify the point and submit a new Quotation. Any statement or representation which is not so confirmed in Writing is followed or acted upon entirely at the Customer's own risk, and shall not form any part of the contract between the parties, and shall be deemed not to have influenced the Customer in deciding whether to enter into the contract.

1.6 The contract is between the Company and the Customer as principals; neither the benefit nor the burden is assignable by the Customer without the Company's written consent; the contract may be assigned or subcontracted by the Company.

1.7 Unless specifically agreed to the contrary all trade terms shall be interpreted in accordance with current INCOTERMS.

1.8 If, subsequent to any contract of sale which is subject to these conditions, a contract of sale is made with the same Customer without reference to any conditions of sale or purchase, such contract howsoever made shall be deemed to be subject to these conditions or (if different) the standard Conditions of Sale of the Company current at the time when such contract of sale is made.

2. ELECTRONIC TRADING

2.1 If the Company and Customer agree that electronic trading between them shall be a basis for order processing and invoicing then these terms and conditions shall apply subject to any special terms and conditions terms which are specific to electronic trading and which have been agreed by the parties in writing.

2.2 Electronic orders shall be valid if all the information agreed between the Customer and the Company as being required is properly set out in the agreed format and the order is transmitted by the Customer to the Company by reference to the correct identification code and is received by the Company when collecting its electronic mail from the relevant system.

3. DELIVERY

3.1 Unless otherwise agreed in Writing by the Company delivery shall be deemed to take place in the case of ex-works sales when the Products are made available by the Company for collection by the Customer or its carrier and in all other cases upon delivery by the Company to the agreed mainland UK delivery point airport or port but before the Products are unloaded, which shall be the responsibility of the Customer.

3.2 The Company shall not be obliged to make delivery unless and until the Company has received all necessary information, drawings, final instructions and approvals from the Customer and the Customer acknowledges that any delays or alterations by the Customer may result in delayed delivery for which the Company shall not be responsible.

3.3 All dates and periods for delivery are estimated and do not constitute fixed times for delivery by the Company. Unless such a right or rights are expressly agreed in Writing by the Company, the Customer shall have no right to damages or to cancel the contract for failure arising from any cause to meet any delivery times given in the contract or subsequently set.

3.4 Notwithstanding clause 3.3 the Customer shall be obliged to accept delivery on the date or within the period stated in the Quotation or (if none is so stated) no later than one month after the issue or notice in Writing by the Company requiring the Customer to accept delivery. Failure by the Customer either to take delivery or to make payment in respect of any one or more installments of Products shall entitle the Company to terminate the Contract (such right is without prejudice to any other rights and remedies available to the Company whether expressly provided for in these Conditions or implied by any rule of law).

3.5 Where the Customer requests and the Company agrees to postpone delivery or where delivery is otherwise postponed or delayed without default by the Company, the Customer shall pay upon receipt of written demand from the Company all costs and expenses including a reasonable charge for storage and transportation occasioned thereby and the Customer shall pay for the Products in accordance with these conditions as if the same had been delivered in the ordinary course without reference to the postponement or delay. In addition, the Company shall be entitled to claim interest pursuant to Clause 7.3.2 of these Conditions from the date on which payment would have fallen due, had the Products been delivered in the ordinary course but for the postponement or delay.

3.6 Unless otherwise expressly agreed in Writing the Company may effect delivery in one or more installments. Where delivery is effected by installments each installment shall be treated as a separate contract governed by these conditions. No delay in the delivery of any installment of Products or any defect therein shall entitle the Customer to terminate the remainder of the contract.

4. RISK AND TITLE

4.1 Risk of damage to or loss of the Products shall pass to the Customer upon delivery and the Customer is then solely responsible for all loss damage or deterioration to the Products.

4.2 Title to the Products shall not pass to the Customer until either:-

4.2.1 The Company has received in cash or cleared funds all monies payable (whether or not due) to the Company under this and any other contracts whenever made between the Company and the Customer including contracts made after this contract; or

4.2.2 When the Company serves on the Customer notice in Writing specifying that title in the Products or any part thereof has passed.

4.3 Until title has passed to the Customer the Company may require the Customer to deliver up to the Company all products in respect of which the Company has title and if the Customer fails to do so forthwith the Company's officers, employees, representatives or agents shall be entitled to enter upon any premises where such Products are kept for the purposes of recovering the same.

4.4 Until title to the Products has passed to the Customer pursuant to these conditions it shall possess the Products as fiduciary agent and bailee of the Company and shall store the Products separately from other goods not owned by the Company and shall ensure that they are fully insured on an all risks basis and clearly identifiable as belonging to the Company and the Company shall be entitled to enter upon any premises where such Products are kept for the purpose of satisfying itself that this condition is being complied with by the Customer.

4.5 In the event that the Customer has any contract with any other company under the ultimate control of the parent company that has ultimate control of the Company under which any monies are outstanding (whether or not due) then the Customer shall not (notwithstanding that title would otherwise pass pursuant to Clause 4.2 above) obtain title to the Products or other goods supplied by the Company under this or any other contracts between them until such other company has received in cash or cleared funds all such monies.

5. CANCELLATION AND AMENDMENT

5.1 No contract can be amended or cancelled except with the Company's approval in Writing and should such approval be given the Customer shall indemnify the Company against any costs, losses or expenses resulting from any cancellation or amendment.

6. PRICES

6.1 Unless otherwise agreed in Writing all prices shall be as stated in the valid Quotation or, if no valid Quotation is in place, the Company's prevailing standard price at the time of receipt of an Order, and are for delivery ex works and are exclusive of VAT and any other applicable taxes, which are payable in addition. Unless otherwise stipulated by the Company in Writing prices are payable in Sterling or if the Sterling currency has ceased to exist when the contract is made, shall be payable in such currency as replaces the Sterling currency.

6.2 The Company will endeavour to ensure that all prices on display/provided to Customers are correct and up to date. However, should a Customer place an Order using an incorrect price then the Customer agrees that the Company may substitute the incorrect price set out in the Order for the correct price (whether the price specified on a valid Quotation or the Company's prevailing standard price, as appropriate) and charge accordingly.

6.3 The Company shall be entitled at any time by giving notice in Writing, before or after final invoicing to make a reasonable adjustment to the price in the event of any alteration in quantity, design or specification requested by the Customer.

6.4 The Company reserves the right at any time prior to delivery by giving notice in Writing to increase the price if there is any increase in the cost of materials, labour, transport, or utilities or if the costs of the Company are increased by any other factor beyond the reasonable control of the Company.

6.5 Charges made on the Company's invoice for cases will be credited on their return to the Company's premises carriage paid and in good reusable condition. Cases shown as returnable but not charged on the Company's invoice must be returned to the Company's premises carriage paid and in good re-usable condition otherwise an additional charge will be made in respect of their cost.

6.6 The Customer shall be liable to the Company for any demurrage costs incurred in the event of vehicles being unduly delayed at the point of delivery.

7. TERMS OF PAYMENT

7.1 Unless otherwise agreed by the Company in Writing, the Customer shall make payment by the last day of the month following the month of invoice and the Company shall be entitled to issue invoices in the month in which the Products are delivered or would have been delivered, save for postponement or delay otherwise than due to default on the part of the Company. Time for payment of the price is of the essence of the contract.

7.2 No disputes arising under this contract shall serve to permit payment by the Customer of sums due to the Company to be delayed nor shall disputes interfere with prompt payment in full. The Buyer shall not be entitled to make any deduction from or set off against any sums owing to the Company by reason of any such dispute or at all.

7.3 In the event of default in payment by the Customer the Company shall be entitled, without prejudice to any other right or remedy:

7.3.1 to suspend without notice all further deliveries on this or any other contract between the Company and the Customer;

7.3.2 to charge interest on a daily basis (after as well as before judgement) on any amount outstanding at the rate of 4% above the Base Rate of Lloyds Bank plc from time to time: and/or

7.3.3 to serve notice on the Customer requiring immediate payment for all goods supplied by the company under this and all other contracts between them whether or not payment is otherwise due or invoiced.

8. SPECIFICATIONS

8.1 Subject to Clause 8.2 the Products shall in all material respects be of such specification agreed between the Company and the Customer under the contract, or (if not so agreed) shall be generally in all materials respects in accordance with any published specification issued by the Company.

8.2 The Company reserves the right to make changes in dimensions or other specifications of the Products as are required to conform to applicable standards or laws or are otherwise within reasonable limits having regard to the nature of the Products. Dimensions specified by the Company are to be treated as approximate only unless it is specifically agreed in Writing that exact measurements are required.

8.3 The Customer acknowledges that it has not specified any particular use for the Products and that it is entirely its own responsibility to satisfy itself that the Product is suitable for the use which it intends.

9. LOSS SHORTAGES AND DAMAGE APPARENT ON DELIVERY INSPECTIONS

9.1 The Customer shall have no claim for loss, shortages or damage on delivery which are or would be apparent on inspection unless the Customer:

9.1.1 unpacks and inspects the Products as soon as reasonably practicable following receipt:

9.1.2 notifies the Company of any loss, shortages or damage (otherwise than by a qualified signature on the delivery note) within ten working days of receipt: and

9.1.3 demonstrates to the satisfaction of the Company that such loss, shortages or damage occurred prior to delivery.

9.2 The Customer shall have no rights in respect of loss, shortages or damage unless the Company is given a reasonable opportunity to inspect the Products and investigate any complaint before any use of or alteration to or interference with the Products.

9.3 On a valid complaint made in accordance with this Clause the Customer shall be entitled (in the case of notified shortages) to receive within a reasonable time a delivery of Products equivalent to the shortfall and (in the case of defects) to repairs to or replacements for the affected Products or at the Company's option a credit for the price thereof but the Company shall have no further liability whatsoever. If a complaint of loss, shortages or damage on delivery is not made to the Company in accordance with this Clause 9 within 5 working days of the date of delivery, then the Products shall be deemed to be delivered complete and undamaged in accordance with the contract and the Customer shall be bound to pay for the same accordingly.

9.4 Loss, shortages or damage in a delivery or any installment delivery shall not be a ground for termination of the contract or the remainder of the contract (as the case may be).

10. WARRANTY

10.1 The Company warrants that Products which do not comply with either Clause 8.1 or Sections 13 to 15 of the Sale of Goods Act 1979 (as amended) are shown to have been defective at delivery as a result of faulty design workmanship or materials (other than free-issue materials), shall either be repaired or replaced or that, at the Company's option, a credit or refund for the price thereof shall be given provided always that:

10.1.1 the Company receives written notice of the defect within 12 months of delivery;

10.1.2 no alteration to or interference with the Products takes place before the Company is given access to the Products to inspect and test the same;

10.1.3 the defect does not consist of a loss shortage or damage to which Clause 9 is expressed to apply;

10.1.4 the defect does not arise by reason of a design specification or instruction given by the Customer;

10.1.5 the Customer has not defaulted in its obligation to make payment of the contract price for the Products;

10.1.6 the defect shall not be attributable to incorrect storage or use of the Products by the Customer.

10.2 The benefit of Clause 10.1 shall only extend to Products or parts not manufactured by the Company to the extent that the Company has equivalent recourse against the manufacturer or supplier thereof.

10.3 The Customer shall indemnify the Company in respect of loss or damage arising from any use made of Products after the Customer became or ought reasonably to have been aware of a defect.

10.4 In the event of a valid claim being made in accordance with Clause 10.1:

10.4.1 the Customer shall be bound to accept repaired or replacement Products or at the Company's option credit or repayment and shall not be entitled to terminate the contract;

10.4.2 if the Company does not repair or replace Products within 60 days or such longer time as may be reasonable then the Customer's sole remedy shall be an entitlement to full credit or repayment in respect of the defective Products; and the Company shall be under no further liability in respect of any loss or damage arising from the defect or from any delay before repair replacement credit or refund is effected.

11. LIABILITY

11.1 The Company does not exclude liability arising under Section 12 of the Sale of Goods Act 1979 (good title) (as amended) or for death or personal injury caused by its negligence as defined in the Unfair Contract Terms Act 1977, fraudulent misrepresentation or any other type of liability which cannot by law be excluded or limited

11.2 Save as provided under Clauses 9, 10 and 11.1 the Company shall have no liability to the Customer in connection with or arising from any defect or failure in the Products or otherwise due to the quality, condition, suitability, durability, safety or any other aspect or feature of the Products. The Company's liability, whether in respect of one claim or in the aggregate, shall not exceed the contract price payable under this contract for the supply of Products to be provided under it. The price of the Products is predicated on the basis of the limitations and exclusions set out in these conditions. The Customer acknowledges that without those exclusions and limitations, the price of the Products would be higher and that the limitation of the Company's liability is therefore reasonable in all the circumstances. The Customer agrees that it is its own responsibility to insure adequately to cover any loss or damage in excess of the aforesaid limit of the Company's liability. Subject to reaching agreement on terms, the Company and the Customer may determine an increased level of liability which is to be accepted in Writing by the Company to cover, in particular specific types of loss or damage which both parties reasonably foresee and anticipate.

11.3 In Clause 11.2 the term "liability" means any form of liability whatsoever including but not limited to liability in misrepresentation and under contract, common law, equity and any statutory provision whether or not based on negligence or breach of any express or implied duty to act with care or skill.

11.4 Notwithstanding any other provisions of these conditions the Customer shall have no claim against the Company in respect of any loss other than strictly direct losses (meaning for these purposes the increased costs of purchasing products from a third party or the cost of remedial repair work) and specifically consequential, financial economic loss whether direct or indirect including but not limited to any incidental costs of dismantling fitting or other ancillary work required in connection with the provision of a repair or replacement, any loss or production profits contracts loss of use or anticipated savings and any claims made against the Customer by any third party are excluded even if reasonably foreseeable.

11.5 To the extent that any liability of the Company is expressed to be limited or excluded by these conditions the Customer shall indemnify the Company in respect thereof.

12. CONFIDENTIAL INFORMATION ETC.

12.1 All drawings, documents, records, computer software and other information supplied by the Company are supplied on the express understanding that all intellectual property rights therein is reserved to the Company and that the Customer will not without written consent of the Company either give away, loan, exhibit, or sell the same or extracts therefrom or copies thereof or use the same in any way except in connection with the Products in respect of which they are issued.

13. PATENT INDEMNITIES

13.1 If the Customer is subject to a claim or threatened with any action alleging that the Products in the form supplied infringe any patent, copyright, design right or other intellectual property right then provided that the Customer promptly informs and fully co-operates with the Company and if requested allows the Company the conduct and defence thereof on the Customer's behalf, the Company will indemnify the Customer against any award or damages for infringement made in any such action by a court or other competent body against the Customer. Further, if the Products are infringing the Customer agrees that the company shall have the option at its own expense either to modify the Products so that they do not infringe: to replace the Products with a non-infringing substitute: to procure for the Customer the right for the Customer to continue its use of the Products: or to repurchase the Products from the Customer at the price paid by the Customer less an allowance for the use made thereof.

14 Approval

13.2 The Company shall have no liability in respect of claims for infringement or alleged infringement of third parties patent or other intellectual property rights arising from the manufacture or supply of the Products to the Customer's instructions or in accordance with designs plans or specifications given by the Customer and the Customer shall indemnify the Company against all losses damages expenses costs or other liability arising from such claims.

14. CUSTOMER'S DRAWINGS

14.1 The Customer shall be solely responsible for ensuring that all drawings information advice and recommendations specified or given to the Company by the Customer or its agents, servants, consultants or advisers are accurate correct and suitable. Examination or consideration by the Company of such drawings information advice or recommendations shall not result in any liability on the part of the Company.

15. COMPANY LITERATURE

15.1 The information contained in the advertising, sales, technical, and other literature issued by the Company may be relied upon to be accurate in the exact circumstances in which it is expressed otherwise any illustrations performance details examples of installations and methods of assembly and all other information and data in such literature are based on experience and upon trials under test conditions and are provided for general guidance only. No such information or data shall form part of the contract unless it is specifically referred to in the Quotation.

16. TERMINATION

16.1 Without prejudice to any other rights or remedies of the Company it shall be entitled in any of the following circumstances to terminate (in whole or in part) this and any other contract whenever made between the Company and the Customer and/or to suspend deliveries and/or to receive upon demand payment of all monies payable under any such contracts whether or not otherwise due:

16.1.1 the Customer made or proposes any voluntary arrangement with its creditors or becomes subject to an administration order or becomes bankrupt or goes into liquidation;

16.1.2 an encumbrancer takes possession or a receiver is appointed of any of the property or assets of the Customer;

16.1.3 the Customer becomes unable to satisfy its debts as they fall due or cease, or threatens to cease to carry on business;

16.1.4 the Company reasonably believes that any of the events mentioned above or any equivalent or similar event under any relevant laws to which the Customer or any connected person is subject has or may occur;

16.1.5 the Customer or any connected person commits any breach of this or any either contract whenever made between the Customer and the Company.

17. FORCE MAJEURE

17.1 The Company shall be excused performance of its obligations whilst and if affected by act of God governmental restriction condition or control, any act done or not done pursuant to a trade dispute whether such dispute involves its employees or not, default by suppliers of the Company, shortage of materials or by any other act matter or thing beyond its reasonable control including failure by the other party to carry out anything required for performance of the contract.

17.2 In the event that the Company does not perform its obligations by reason of any of the causes referred to in Clause 17.1 within six months after the time for performance then the Company or the Customer may by written notice terminate the contract without liability save that the Customer shall pay for any Products delivered or completed at the time of termination.

18. TOOLS

18.1 Any tools (such as jigs, dies, etc) which the Company may construct or acquire specifically in connection with the Products shall, notwithstanding any charges the Company may make for them, be and remain the Company's sole and unencumbered property and in the Company's possession and control without restriction.

19. FREE-ISSUE MATERIAL

19.1 Free-issue material shall be insured by and remain at the risk of the Customer at all times and the Company shall be indemnified by the Customer against any loss, damage, injury or expense whatsoever arising directly or indirectly therefrom and the company shall not be liable for loss of or damage to any such materials during fabrication by the Company or sub-contractor employed by Company or whilst on the premises of the Company or of any such sub-contractor or in transit to or from the premises of the Company or of any such sub-contractor provided that the Company may at its sole discretion make a contribution towards the replacement costs of such materials.

19.2 An allowance for material lost as process scrap is (where applicable) included in the contract price and no such losses shall be the subject of any claim by the Customer or contribution by the Company.

19.3 Where materials are supplied by or on behalf of the Company the Customer shall be responsible to ensure that the material is of satisfactory quality and is fit for its purpose and shall indemnify be Company against any loss damage, injury or expenses whatsoever arising directly or indirectly from any fault in or incorrect specification of the said materials.

20. CONSUMER PROTECTION ACT 1987

20.1 Where the Customer purchases the Products for use or incorporation with any other products to be assembled, produced, processed packed or supplied by the Customer or for resale or supply ancillary to any such other products or other products supplied by the Customer then:

20.1.1 the Customer shall forthwith on demand produce for inspection by the Company copies of all written instructions information and warnings to be supplied by the Customer in relation thereto provided nevertheless that such inspection or right to inspect shall not give rise to any responsibility or liability on the part of the Company; and

20.1.2 the Customer shall indemnify the Company against any losses, costs and damages that the Company may suffer or incur in the event any claim is made against the Company in relation thereto if the Products did not comprise the detective element thereof or were rendered defective by reason of actions or omissions of the Customer (including without limitation the supply of defective free-issue materials) or were rendered defective by reason of instructions or warnings given or omitted by the Customer or other reseller.

20.2 For the purpose of Clause 20.1 the term "defective" shall be interpreted in accordance with the definition contained in Part 1 of the Consumer Protection Act 1987.

21. HEALTH & SAFETY

21.1 The Customer agrees to pay due regard to any information supplied by the Company relating to the use for which the Products are designed or have been tested or concerning conditions necessary to ensure that they will be safe and without risk to health at all times when they are being set, used, cleaned, serviced or maintained by any person and the Customer undertakes to take such steps as may be specified by such information or otherwise necessary to ensure that as far as is reasonably practicable the Products will be safe and without risk to health at all times as mentioned above.

22. LAW AND JURISDICTION ETC.

22.1 The Contract shall be governed and interpreted exclusively according to the Laws of England. The parties hereby agree to submit to the exclusive jurisdiction of the English courts provided that the Company may at its option take proceedings in the courts of the state in which the Customer is domiciled including action to obtain any remedy (including injunctive relief). In the case of any order for the export of Products, the Schedule to the Uniform Law on International Sales Act 1967 shall not in any circumstances apply to the Contract and neither shall the limits imposed by the Unfair Contract Terms Act 1977 on the extent to which liability can be excluded or limited.

22.2 No waiver of or delay or failure by the Company to exercise any rights or remedies shall prejudice or preclude any future or further exercise thereof.

22.3 If any provision of these conditions shall be held invalid or unenforceable in whole or in part then the unaffected provisions shall remain in full force and effect. Headings appear for convenience only and shall not affect the Construction of these conditions.

22.4 If the Contract provides for the supply of services and no general conditions of the Company relating specifically to the supply of services are made applicable to such services then these conditions shall mutatis mutandis apply to such services as they would apply to Products and in such event Clause 10.1 will be deemed to include a reference to Sections 3 to 5 of the Supply of Goods and Services Act 1982 (as amended), either in addition to or in place of the reference to Sections 13 to 15 of the Sale of Goods Act 1979 (as amended) as may be appropriate. For the avoidance of doubt the following provisions apply where the Company supplies services to the Customer in accordance with clause 22.4:-

22.4.1 the Company's obligation to provide the services is in any event conditional upon payment of the agreed price for the services. Any default or delay in payment according to the terms agreed between the Company and the Customer shall entitle the Company at its option to decline to perform or decline to continue to perform its obligations hereunder but without thereby incurring any liability to the Customer.

22.4.2 Save to the extent that by reason of negligence on the part of the Company in the performance of the services which results in death or personal injury (which the Company does not limit or exclude), the Company's liability under the contract shall be limited to the amount of charges paid to the Company in return for the services and in particular the Company accepts responsibility only for direct and unavoidable loss or damage arising from any negligence in the provision of services and in particular all other types of loss whether economic, financial, indirect or consequential and whether reasonably foreseeable or not are excluded to the fullest extent permitted by law.

22.4.3 The Customer shall lend all such reasonable assistance to the Company in the performance of the services as the Company shall reasonably require.

22.4.4 The Customer shall indemnify and keep the Company, its employees, agents and contractors indemnified at all times from and against any loss or damage and injury caused to persons or property in the course of the provision of the services where such loss or damage arises by reason of the Customer's negligence or negligence of persons under the control of the Customer.

22.4.5 The Customer acknowledges and agrees that if due to the act or omission of the Customer, the Company is not able, having attended at the Customer's premises to perform the services, the Company shall be entitled to claim reasonable additional costs and expenses from the Customer occasioned by any resulting delay in the provisions of the services.

22.5 In cases for the sale or supply of Products overseas, the following additional provisions shall apply unless otherwise stipulated in writing by the Company:

22.5.1 the Customer shall be solely responsible for obtaining all necessary import authorisations, the payment of any applicable import taxes, duties or imposts and the Company shall be under no obligation to give the Customer the notice specified in Section 32(3) of the Sale of Goods Act 1979 (or any re-enactment thereof);

22.5.2 Quotations issued in a currency other than Sterling may at the Company's option, unless otherwise agreed in writing, be subject to amendment in the event of fluctuations in the applicable exchange rate prior to the date of invoice;

22.5.3 payment in respect of Products for export is due on the date specified by the Company at the date when the Contract is made, in the currency stated in the invoice and in accordance with the method of payment stipulated by the Company. All costs incurred by the Company in connection with the designated particular method of payment shall be met by the customer.

22.5.4 If you are a consumer within the meaning of the Distance Selling Regulations 2000 and you have bought the products detailed overleaf over telephone, internet or via mail order then within seven days of receipt of you products you have the right to cancel your order and return the Products for a full refund. Trading terms were accurate at point of publication, to check for updates, please go to Trading Terms & Conditions at www.Polypipe.com/trading-terms-conditions.

Notes

14 Approval

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Terrain FUZE

Design, specification
and installation guide

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