



HOTELS



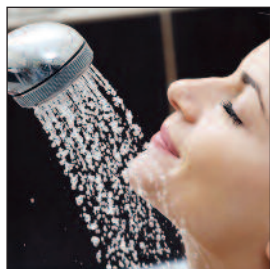
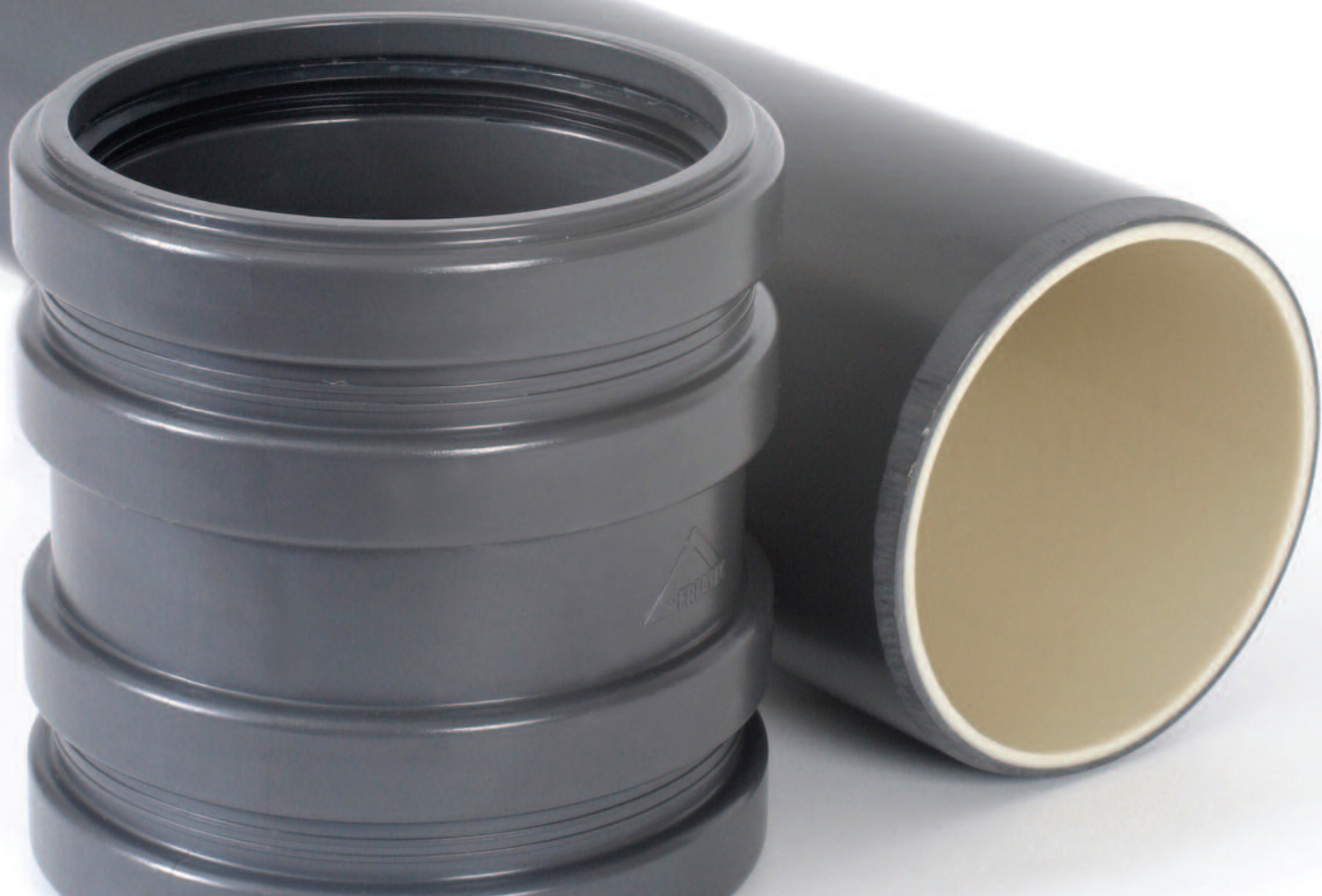
APARTMENTS



THEATRES



LIBRARIES



**friaphon**

Sound attenuated drainage

Technical Data and Dimensions

## SOUND ATTENUATED DRAINAGE

**A purpose-designed sound reducing drainage system that offers outstanding sound insulation properties compared with traditional cast iron or lagged single wall plastic drainage systems.**

Friaphon is constructed with dual layer technology and offers exceptional sound reduction properties from noises emitted by sanitary installations in buildings.

Lower material costs coupled with speed of installation and no need for lagging, means Friaphon offers significant cost savings over cast iron and single wall plastic drainage systems.

### Key Product Information

- Size Range: 110mm and 160mm
- Temperature Rating: 95°C (Short term)

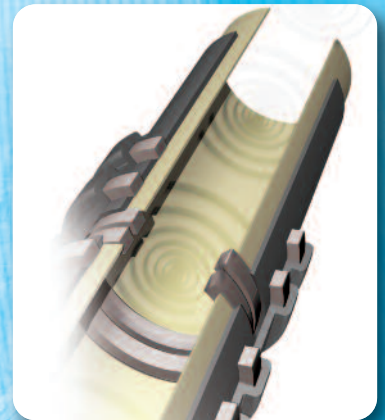
### Key Product Features

- Superb sound insulation
- Lower cost alternative to cast iron
- No lagging required
- Lower cost alternative to lagged plastic
- Push fit assembly
- High impact and temperature resistant

### Typical Applications

Sound attenuated drainage systems in:

- Luxury apartments
- Hotels
- Libraries
- Hospitals
- Public buildings
- Restaurants

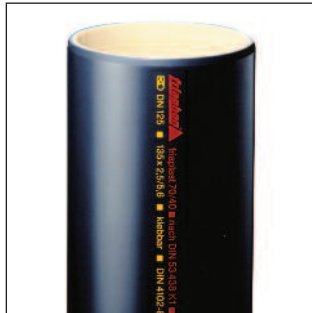


# FRIAPHON

# Friaphon



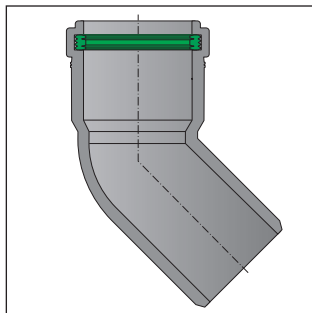
## System Overview



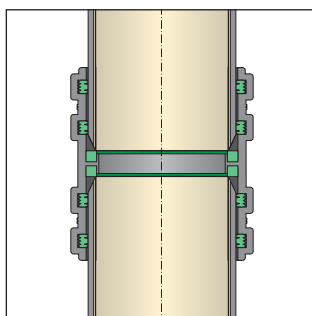
Friaphon pipe is manufactured by dual forming two materials of different density. Friaphon Dual Technology guarantees the excellent sound insulation and airborne sound reduction properties of the system.



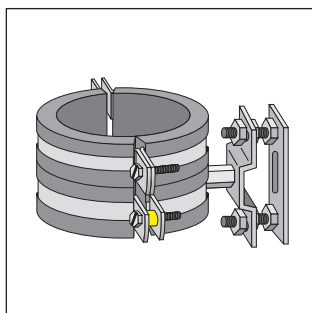
Sound waves are partially reflected along the boundary layers to be absorbed by the pipe's mass.



Fittings in the Friaphon range achieve a high sound insulation level due to increased wall thickness and rubber ring joints.



When using Friaphon double couplers as standard connectors, pipes can be connected to each other free of any structure-borne noises by way of a floating bearing of the pipe ends. At the same time this enables expansion to be accommodated.



Installation is by means of rubber lined support and sliding clips. The support clip acts as the normal method of anchoring at individual floor level.

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## System Overview

Friaphon is a purpose-designed, sound attenuated drainage system for installation in accordance with BS EN 12056.

Friaphon pipe and fittings are subject to quality monitoring by the Plastic Pipe Quality Association (GKR) in Bonn and are officially accredited by a Certificate/Approval: General Building Inspectorate Approval Z-42.1-220 from the German Institute of Building Technology (DIBt) in Berlin.

Boss branches and pipes are manufactured in accordance with the dimensional requirements of BS EN 1329/BS4514 and are compatible with MUPVC or ABS waste systems to BS 5255 and polypropylene to BS 5254.

The system allows for a simple installation fully complying with the sound protection requirements laid down in standard DIN 4109/VDI 4100.

The sound insulation properties are proven by IBP Test Certificate P-BA 354/1998 from the Fraunhofer Institute for Building Physics.

Friaphon consists of dual formed plastic pipes and moulded fittings in sizes 110mm and 160mm.

The sound-insulating effects of the system result from both its pipes, the production of which is based on the dual forming process, as well as fittings which are connected to each other by way of double couplers and rubber ring joints.

The use of high-quality plastics throughout the Friaphon product range ensures corrosion- and encrustation-free components and parts.

## Specifications

Material:	ABS/ASA/PVC-U styrene copolymer (fittings and inside pipe layer) PVC-U mineral-reinforced (outside pipe layer)
Density:	Fittings and inside pipe layer 1.3 g/cm <sup>3</sup> Outside pipe layer 1.5 g/cm <sup>3</sup>
Temperature resistance:	95°C (short term) 90°C (long term)
Thermal expansion coefficient:	0.08 (mm/m x K)
Acidity/alkalinity:	pH2 to pH12
Pressure loading capacity:	0.5 bar ring seal (jointed)
Fire characterisation:	As per DIN 4102, B2, self-extinguishing, no dropping

## Application areas

The Friaphon domestic drainage system is intended for use and installation in accordance with BS EN 12056 and the corresponding national standards.

It is generally intended for the removal of waste water in accordance with national standards.

The Friaphon domestic drainage system can be used for:

1. Above ground drainage pipework
2. Internal rainwater services.

### Friaphon must not be used for:

- piping which carries water containing petrol or benzene
- sanitation piping for dry cleaners.

## Temperature resistance

Friaphon will withstand hot water:

For short periods	up to 95°C
Continuously	up to 90°C

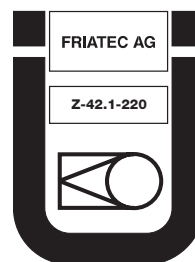
Introducing steam into the Friaphon domestic drainage system is not recommended.

## Pressure resistance

The Friaphon domestic drainage system is able to withstand pressures of 0.5 bar. Connectors and moulded fittings are tested to 0.5 bar.

## Quality assurance

The quality of Friaphon system components is monitored in accordance with recognised quality assurance regulations and standards and in line with the stipulations of the Plastic Pipe Quality Association by means of self-monitoring and third-party monitoring.



Building Inspectorate Approval with Quality Monitoring by Plastic Pipe Quality Association.

## Sound Insulation

### Overview of the structural requirements for sound insulation

#### DIN 4109/A1: 2001-01 for residential buildings

A maximum sound pressure level of  $L_{in} \leq 30\text{dB (A)}$  or noises emitted by sanitary installations is permissible in rooms requiring protection, e.g. living rooms and bedrooms.

#### DIN 4109

Other building installations (non-residential buildings), sound pressure level  $L_{in} \leq 35\text{dB (A)}$ .

#### DIN 4109 – 10 (E)

Additional sound insulation in residential buildings.

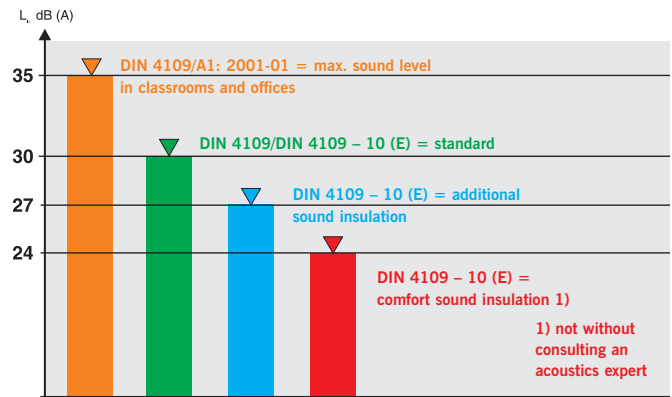
#### DIN 4109 – 10

Specifies the new requirements of additional sound insulation for residential buildings. Accordingly, the sound insulation levels to follow are mandatory:

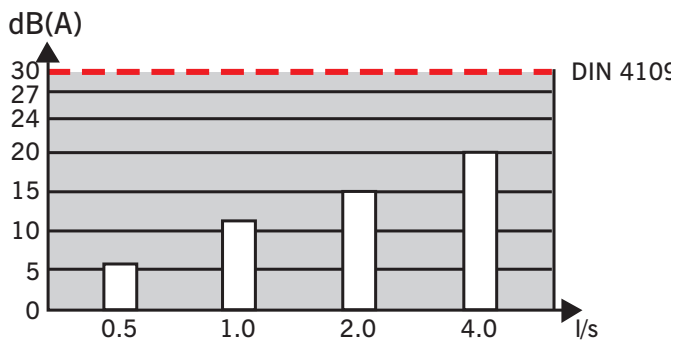
- standard sound insulation  $L_{in} \leq 30\text{dB (A)}$
- additional sound insulation  $L_{in} \leq 27\text{dB (A)}$
- comfort sound insulation  $L_{in} \leq 24\text{dB (A)}$

Although standard DIN 4109 – 10 has not yet been published, the required sound insulation values should be laid down on a binding basis in current construction contracts now to avoid any subsequent legal disputes as to the observance of sound insulation values.

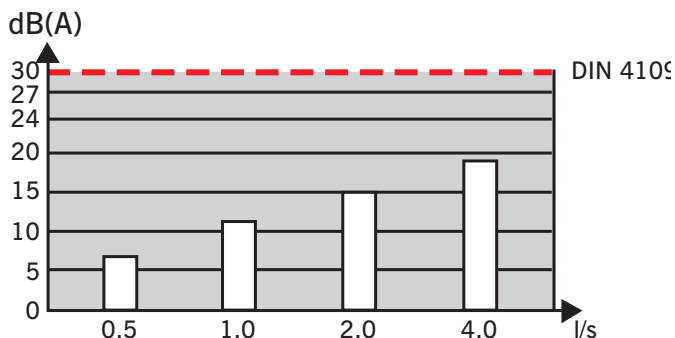
**NB:** There is no UK equivalent for acoustic performance standard.



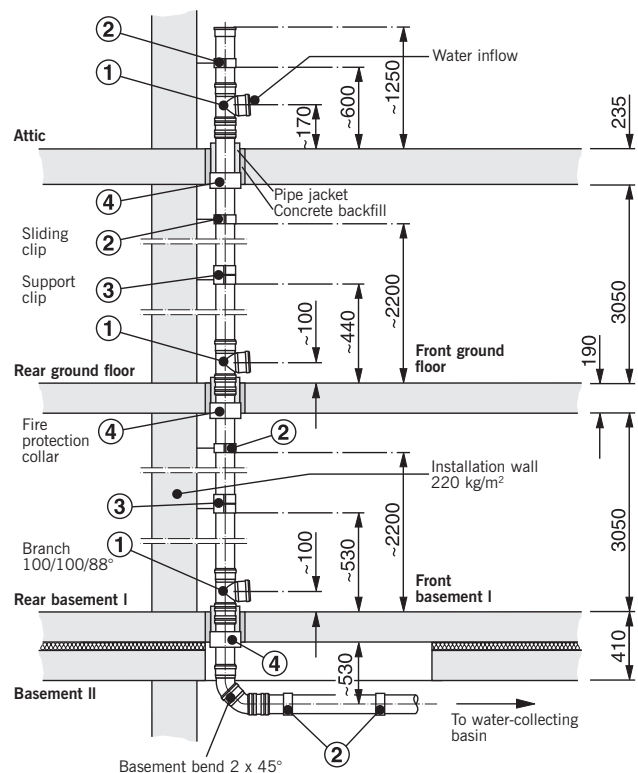
### Extracts from the Test Certificate of the Fraunhofer Institute for Construction Physics No. P-BA 354/1998



Friaphon wastewater system: place of measurement: rear section of ground floor



Friaphon wastewater system: place of measurement: rear section of basement I

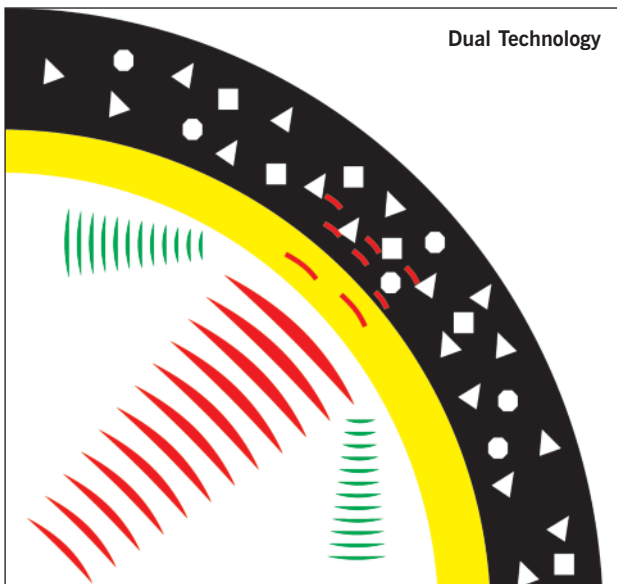
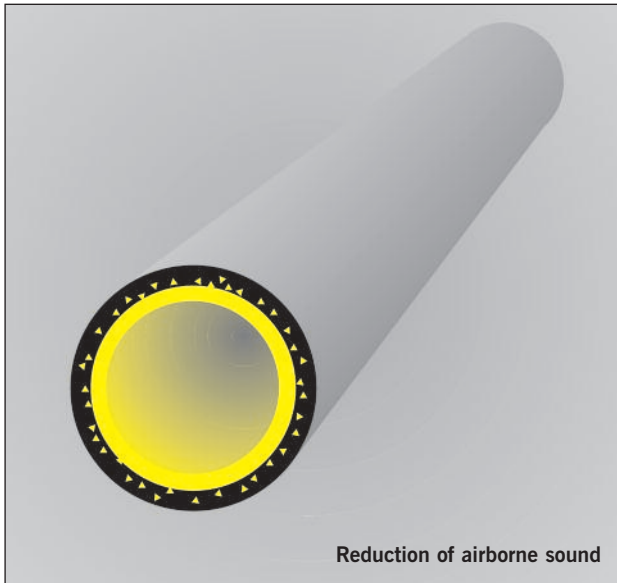


## System Description

### Properties

The push-fit Friaphon domestic drainage system is based on pipes made of two layers of plastic. The two layers are inseparably bonded together by a special manufacturing process.

The light-coloured inner skin guarantees high resistance to temperature. The dark-coloured outer skin combined with the inner skin provides the sound-deadening effect.



The Friaphon domestic drainage system meets the requirements of BS, DIN, Austrian Standards, SIA Standards, Belgian Standards and Dutch Standards.

Its excellent properties guarantee significant benefits in use such as:

- outstanding sound insulation properties
- low transportation weight
- resistance to hot water
- push-fit assembly
- resistance to corrosion
- excellent resistance to chemicals
- professional installation techniques
- reduced installation cost
- recyclability

Friaphon consists of:

- Two-layer bonded 'Dual Technology' pipes with smooth ends
- Friaphon double couplers
- Friaphon support clips with support rings
- Friaphon cushioning sections
- Friaphon fire protection collars
- Friaphon moulded fittings with socket sleeves according to BSEN 1455, DIN 19 561

**Friaphon Dual Technology guarantees the excellent sound insulation and airborne sound reduction properties of the entire system.**

**The sound insulation properties are proven by IBP Test Certificate P-BA 354/1998 from the Fraunhofer Institute for Building Physics. (Copies available on request.)**

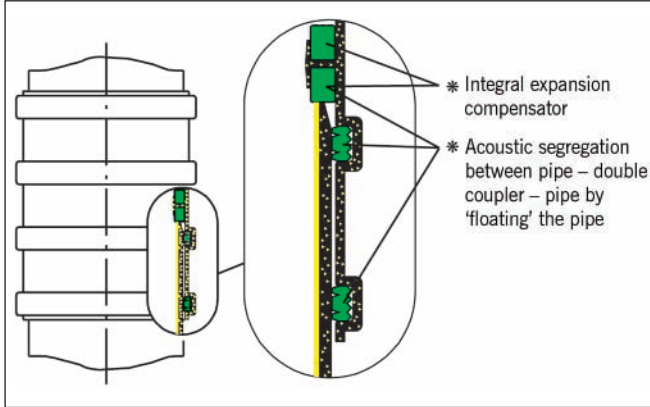
## System Description

### Friaphon double coupler

The Friaphon double coupler prevents the transmission of sound along pipes and compensates for thermal expansion. The Friaphon double coupler is used for connecting pipe to moulded fittings and pipe to pipe.



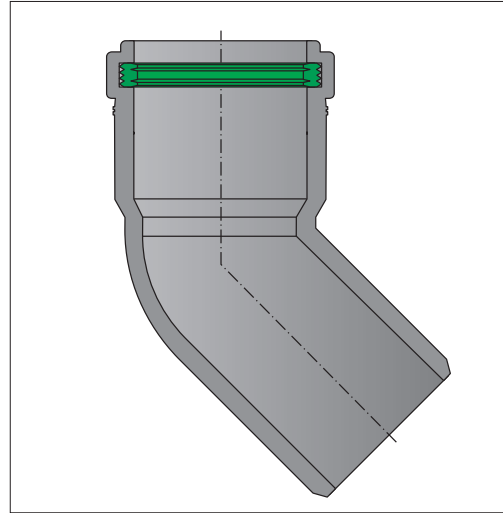
The integral compensation for expansion and the 'floating mounting' of the pipe ensure simple installation. The transmission of structure-borne sound (longitudinal transmission of sound) is prevented.



Sectional representation of Friaphon double coupler.

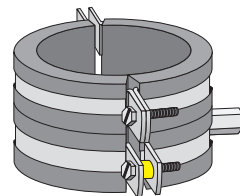
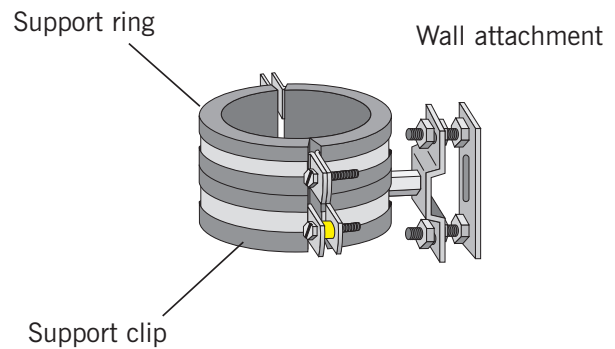
### Friaphon fittings

Fittings in the Friaphon range achieve a high sound insulation level resulting from minor sound vibrations.

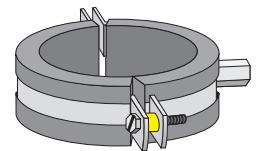


### Friaphon fixings

Installation is by means of sound proofing, rubber lined support and sliding clips. The support clip acts as the normal method of anchoring at individual floor levels.



Mounting with bolt screw



Sliding clip



## System Description

### Product range overview

Illustration	Description	Size d in mm	
		d = 110 ≅ DN 100	d = 160 ≅ DN 150
	Sound insulated pipe with smooth ends, Dual Technology, length in mm	110 x 5.3 <b>DN 100</b> 3000	160 x 6.3 <b>DN 150</b> 3000
	Double coupler (normal connection)	110	160
	Bend 15°	110	160
	Bend 30°	110	160
	Bend 45°	110	160
	Bend 67°	110	160
	Bend 87°	110	160
	Short cushioning section for fall up to 10m	110	160
	Long cushioning section for fall exceeding 10m, L = 250mm	110	160
	Branch 45°	110/110	160/160
	Single branch 92 <sup>1</sup> / <sub>2</sub> °	110/110 160/160 160/110	
	Double branch 45°	110/110	

## System Description

### Product range overview

Illustration	Description	Size d in mm	
		d = 110 ≅ DN 100	d = 160 ≅ DN 150
	Double branch 92 <sup>1</sup> / <sub>2</sub> °	110/110	
	Corner branch 92 <sup>1</sup> / <sub>2</sub> °	110/110	
	Access pipes	110	160
	Access boss pipe	110	
	Boss pipe	110	160
	Strap-on boss	110/32 110/40 110/50 160/50	
	Waste manifold	110	
	Reducers		160/110   110/50

## System Description

### Product range overview

Illustration	Description	Size d in mm	
		d = 110 ≅ DN 100	d = 160 ≅ DN 150
	Sleeve (for repair purposes)	110	160
	Bonding sleeve/ Double bonding sleeve	110	160
	Socket plug	110	
	Screwed access cap	110	
	Boss connector	32, 40, 50	
	Boss adaptor (Rubber)	32, 40	
	Boss adaptor (Solvent Weld)	50	
	Boss adaptor (Waste Manifold)	50	
	Unicollar fire protection	2250mm strip length	

## System Description

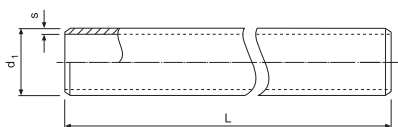
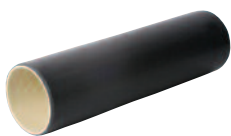
### Product range overview

Illustration	Description	Size d in mm	
		d = 110 ≅ DN 100	d = 160 ≅ DN 150
	Support clip with support ring and wall fixing	110	160
	Intermediate sliding clip	110	160
	Lubricant	125 gram	
	Adhesive	500 ml	
	Primer	500 ml	
	Pipe cutter	50/125	
	Chamfering tool		
	Reamer		



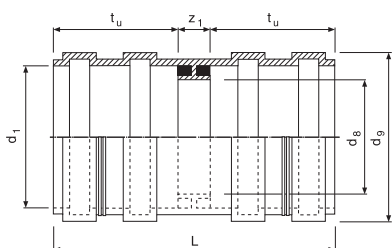
## Dimensional Data

### Sound insulated pipe with smooth ends



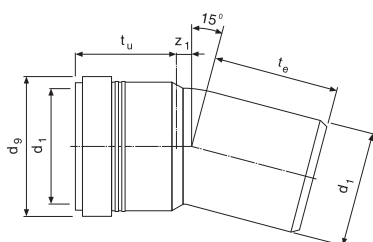
d <sub>1</sub> mm	s mm	L mm	kg/m	l/m	Ref. No.
110	5.3	3000	2.65	7.7	FP 12 12 71
160	6.3	3000	4.59	17.0	FP 12 12 73

### Double couplers (standard connector)



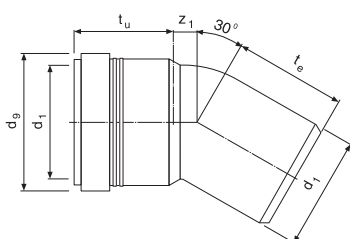
d <sub>1</sub> mm	d <sub>8</sub> mm	d <sub>9</sub> mm	z <sub>1</sub> mm	t <sub>u</sub> mm	L mm	Ref. No.
110	95.0	132	14	61.5	137	FP 12 22 70
160	142.0	187	14	78.0	170	FP 12 22 72

### Bends 15°



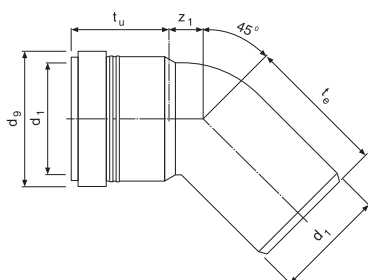
d <sub>1</sub> mm	d <sub>9</sub> mm	Z <sub>1</sub> mm	t <sub>u</sub> mm	t <sub>e</sub> mm	Ref. No.
110	132	14	60	72	FP 12 20 19
160	187	19	71	93	FP 12 20 31

### Bends 30°



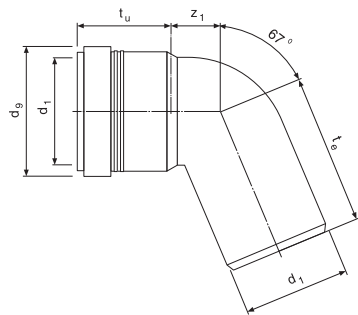
d <sub>1</sub> mm	d <sub>9</sub> mm	Z <sub>1</sub> mm	t <sub>u</sub> mm	t <sub>e</sub> mm	Ref. No.
110	132	21	60	80	FP 12 20 20
160	187	30	71	104	FP 12 20 32

### Bends 45°



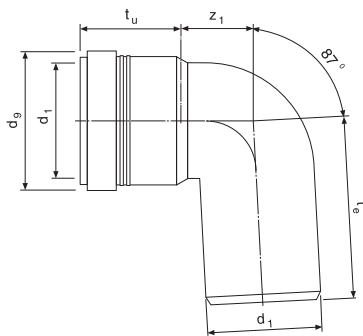
d <sub>1</sub> mm	d <sub>9</sub> mm	Z <sub>1</sub> mm	t <sub>u</sub> mm	t <sub>e</sub> mm	Ref. No.
110	132	29	60	88	FP 12 20 21
160	187	42	71	116	FP 12 20 33

## Bends 67°



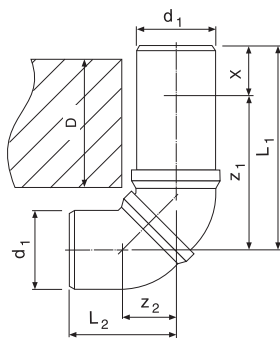
d <sub>1</sub> mm	d <sub>9</sub> mm	Z <sub>1</sub> mm	t <sub>u</sub> mm	t <sub>e</sub> mm	Ref. No.
110	132	49	60	107	FP 12 20 22

## Bends 87°



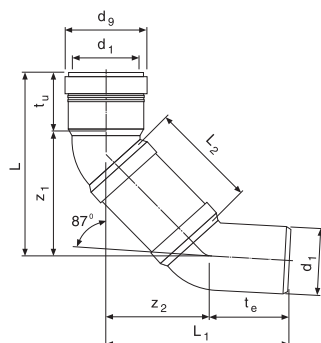
d <sub>1</sub> mm	d <sub>9</sub> mm	Z <sub>1</sub> mm	t <sub>u</sub> mm	t <sub>e</sub> mm	Ref. No.
110	132	61	60	120	FP 12 20 24
160	187	89	71	163	FP 12 20 36

## Short cushioning sections height of fall up to 10m



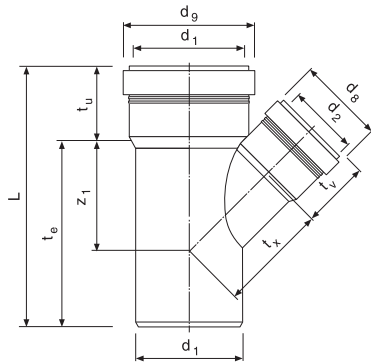
d <sub>1</sub> mm	Z <sub>1</sub> mm	Z <sub>2</sub> mm	X mm	L <sub>1</sub> mm	L <sub>2</sub> mm	D mm	Ref. No.
110	170	56	120	285	144	145-270	FP 12 23 07
160	237	73	60	296	189	220-270	FP 12 23 09

## Long cushioning sections height of fall exceeding 10m



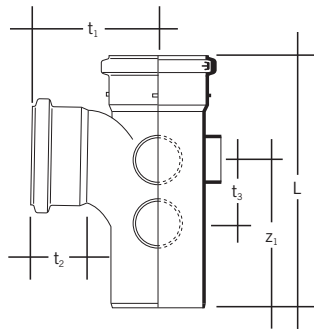
d <sub>1</sub> mm	d <sub>9</sub> mm	Z <sub>1</sub> mm	Z <sub>2</sub> mm	t <sub>u</sub> mm	t <sub>e</sub> mm	L mm	L <sub>1</sub> mm	L <sub>2</sub> mm	Ref. No.
110	132	266	213	60	88	320	301	250	FP 12 23 01
160	187	295	230	71	116	361	346	250	FP 12 23 03

## Branch 45°



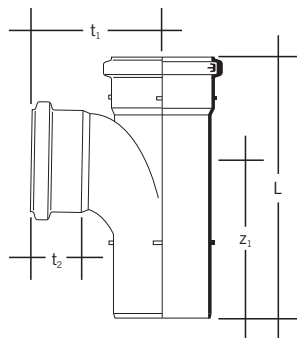
d <sub>1</sub> mm	d <sub>2</sub> mm	d <sub>8</sub> mm	d <sub>9</sub> mm	z <sub>1</sub> mm	t <sub>u</sub> mm	t <sub>e</sub> mm	t <sub>v</sub> mm	t <sub>x</sub> mm	L mm	Ref. No.
110	110	132	132	134	60	223	60	134	283	FP 12 22 24
160	110	132	187	159	71	240	60	168	311	FP 12 22 39
160	160	187	187	194	71	310	71	194	381	FP 12 22 45

## Single branch 92½° five boss



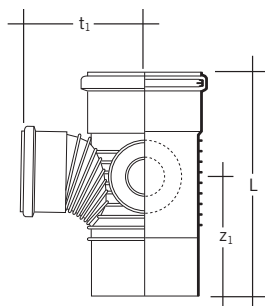
Size mm	L mm	t <sub>1</sub> mm	t <sub>2</sub> mm	z <sub>1</sub> mm	t <sub>3</sub> mm	Ref. No.
110	300	150	60	175	76	FP 12 26 01

## Single branch 92½°



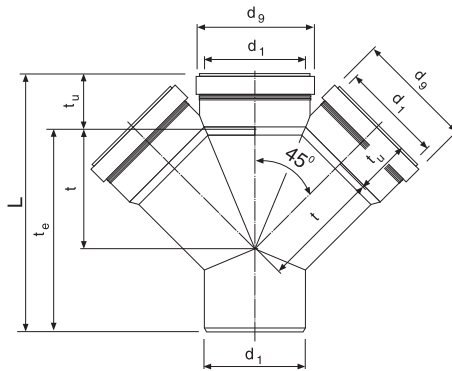
Size mm	L mm	t <sub>1</sub> mm	t <sub>2</sub> mm	z <sub>1</sub> mm	Ref. No.
160	438	245	96	260	FP 12 27 03

## Single branch 92½° two boss, unequal



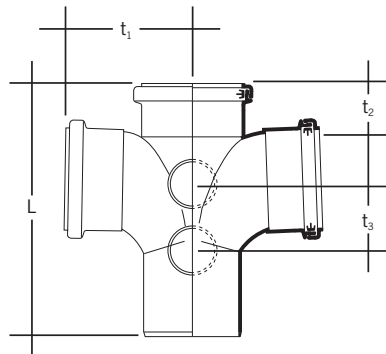
Size mm	L mm	t <sub>1</sub> mm	z <sub>2</sub> mm	Ref. No.
160 x 110	337	175	175	FP 12 28 03

## Double branch 45°



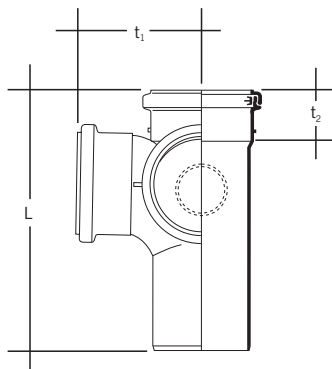
d <sub>1</sub> mm	d <sub>9</sub> mm	t mm	t <sub>e</sub> mm	t <sub>u</sub> mm	L mm	Ref. No.
110	132	130	223	60	283	FP 12 22 48

## Double branch 92½° four boss



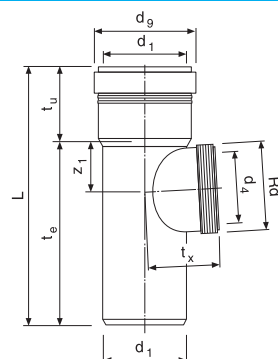
Size mm	L mm	t <sub>1</sub> mm	t <sub>2</sub> mm	t <sub>3</sub> mm	Ref. No.
110	288	141	54	76	FP 12 30 01

## Corner branch two boss/access upstands



Size mm	L mm	t <sub>1</sub> mm	t <sub>2</sub> mm	Ref. No.
110	384	242	190	FP 12 31 01

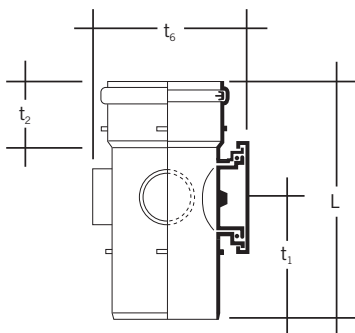
## Access pipes



d <sub>1</sub> mm	d <sub>4</sub> mm	d <sub>9</sub> mm	Rd mm	z <sub>1</sub> mm	t <sub>u</sub> mm	t <sub>e</sub> mm	t <sub>x</sub> mm	L mm	Ref. No.
110	93	132	110 x ½	62	60	182	80.0	242	FP 12 25 26
160	93	187	110 x ½	89	71	252	110.0	323	FP 12 25 28

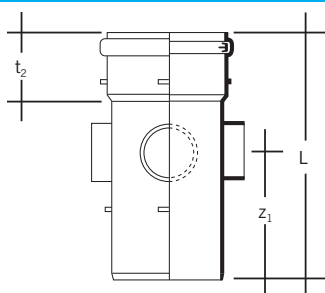


## Access boss pipe three boss upstands



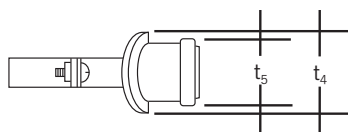
Size mm	L mm	t <sub>1</sub> mm	t <sub>2</sub> mm	t <sub>6</sub> mm	Ref. No.
110	244	123	70	152	FP 12 32 01

## Boss pipes four boss upstands, one open



Size mm	L mm	z <sub>1</sub> mm	t <sub>2</sub> mm	Ref. No.
110	244	123	70	FP 12 33 01
160	335	110	96	FP 12 33 03

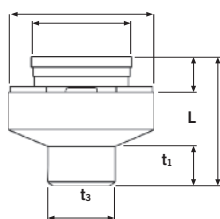
## Strap-on bosses



Size mm	t <sub>4</sub> mm	t <sub>5</sub> mm	Hole size	Ref. No.
110 x 32	70	55	50	FP 12 35 01
110 x 40	70	62	50	FP 12 36 01
110 x 50	86	75	63	FP 12 37 01
*160 x 50	-	-	63	FP 12 34 03

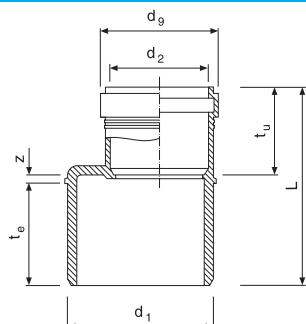
\*Use with 50mm straight boss adaptor on page 20.

## Waste manifold (32, 40, 50mm)



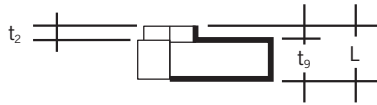
Size mm	L mm	t <sub>1</sub> mm	t <sub>2</sub> mm	t <sub>3</sub> mm	t <sub>4</sub> mm	t <sub>5</sub> mm	Ref. No.
110	208	68	51	110	132	183	FP 12 43 01

## Reducer



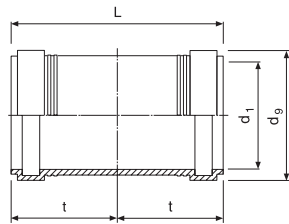
d <sub>1</sub> mm	d <sub>2</sub> mm	d <sub>9</sub> mm	t <sub>u</sub> mm	t <sub>e</sub> mm	z mm	L mm	Ref. No.
160	110	132	60	80	4.0	144.0	FP 12 25 10

## Reducer solvent socket, single boss upstand



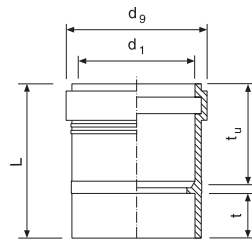
Size mm	L mm	t <sub>9</sub> mm	t <sub>2</sub> mm	Ref. No.
110 x 50	48	25	19	FP 12 38 01

## Sleeves



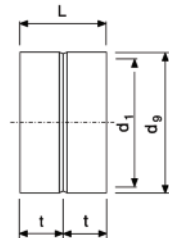
d <sub>1</sub> mm	d <sub>9</sub> mm	t mm	L mm	Ref. No.
110	132	62.5	125	FP 12 25 30
160	187	79.0	158	FP 12 25 32

## Bonding sleeves



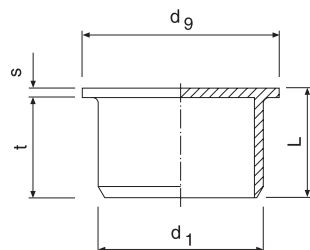
d <sub>1</sub> mm	d <sub>9</sub> mm	t <sub>u</sub> mm	t mm	L mm	Ref. No.
110	132	60	32	95	FP 12 25 44
160	187	71	42	117	FP 12 25 46

## Double bonding sleeves



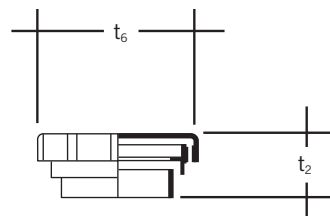
d <sub>1</sub> mm	d <sub>9</sub> mm	t mm	L mm	Ref. No.
110	115	35	73	FP 12 25 62
160	167	42	88	FP 12 25 64

## Socket plug



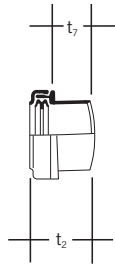
d <sub>1</sub> mm	d <sub>9</sub> mm	t mm	s mm	L mm	Ref. No.
110	120	32.0	5	41.5	FP 12 25 40

## Access cap solvent socket, screwed

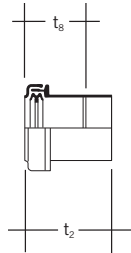


Size mm	t <sub>6</sub> mm	t <sub>2</sub> mm	Ref. No.
110	140	30	FP 12 42 01

## Boss connectors ring seal socket/spigot for solvent joint to all boss upstands



Size mm	Angle	t <sub>2</sub> mm	t <sub>7</sub> mm	Ref. No.
32	87½°	43	21	FP 12 39 01
40	87½°	43	21	FP 12 39 02



Size mm	Angle	t <sub>2</sub> mm	t <sub>8</sub> mm	Ref. No.
50	87½°	74	48	FP 12 39 03

## Boss Adaptors rubber push-fit



Size mm	Ref. No.
32	FP 12 40 01
40	FP 12 40 02

## Boss Adaptors (solvent weld)\*



Size mm	Ref. No.
50 (straight)	FP 12 41 02

\*Use with 160/50 strap boss.

## Boss Adaptors (solvent weld/waste manifold)\*



Size mm	Ref. No.
50 (90°)	FP 12 41 01

\*For 50mm waste pipe connection to waste manifold.

## Unicollar fire protection



Ref. No.
V 46 81 00

Unicollar is a unique method of protecting pipes which pass through fire rated walls and floors. The system is supplied in continuous strip form, which is cut to length and attached to the element using ready-made clips. These clips fit into the pre-punched slots on the strip.

Unicollar is packed in a box, which contains 2250mm length of collar or 150 segments. The box has installation details on one face. The collar is designed so that it can be cut and snapped in segments of 15mm. One box is the equivalent of 5 x 110mm collars.

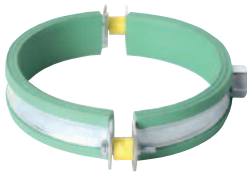
For details on fire ratings and installation see pages 37 and 38.

## Support clips with support ring and wall fixing



d mm	Ref. No.
110	FP 12 13 01
160	FP 12 13 03

## Intermediate sliding clips



d mm	Ref. No.
110	FTPC 1100
160	FTPC 1601

## Lubricant



Contents g	Ref. No.
125	FP 12 29 70

## Primer



Contents ml	Ref. No.
500	FP 12 29 90

## Adhesive



Contents ml	Ref. No.
500	FP 12 29 80



## Tools

### Pipe cutter\*



Size	Ref. No.
50-125 mm	FT 80 00 03

*\*To cut 160mm pipe we recommend Rothenberg's Rocut 160 pipe cutter.*

### Chamfering tool



Ref. No.
FT 55 05 10

### Reamer

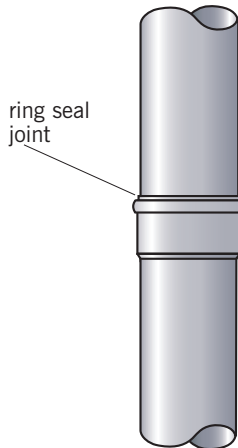


Ref. No.
FT 80 00 08

## Design

### Methods of jointing

The principal method of jointing 110 and 160mm Friaphon pipes and fittings is by ring seal. Some components in the range are solvent welded.



### Thermal movement

#### Friaphon double coupler

The coefficient of linear expansion for Friaphon is 0.08mm/m/°C. As a result a 3m length of pipe will increase in length by approximately 4.8mm when subjected to a 20°C temperature variation. Any movement is controlled by means of the Friaphon double coupler. No additional measures are necessary.

### Sanitary pipework design

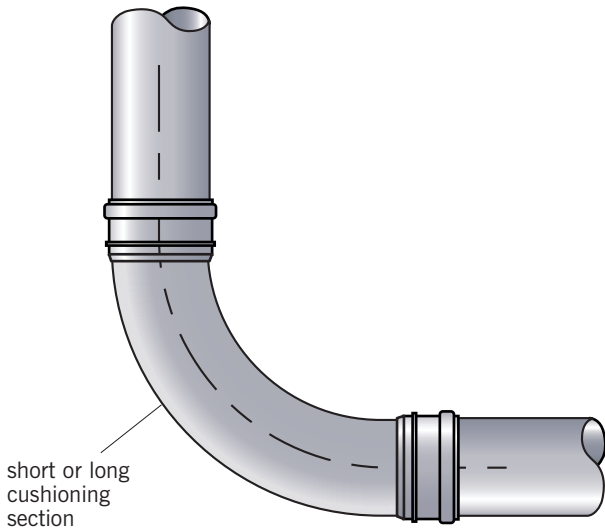
All sanitary pipework systems should be designed in accordance with BS EN 12056: 2000, Parts 1 to 5.

The above is a new European Standard which has British Standard status and supersedes BS 5572: 1994 Code of Practice for Sanitary Pipework which has been withdrawn. The new standard has five sections, parts 1, 2 and 5 deal specifically with sanitary pipework and parts 3 and 4 refer to roof drainage and the design of wastewater lifting plants.



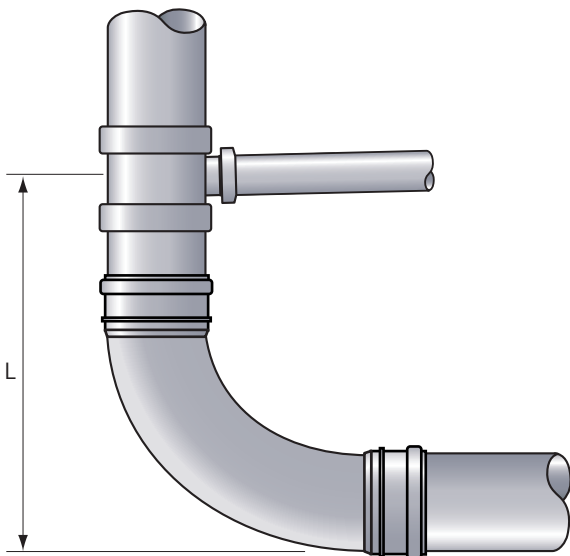
## Bends at the base of stacks

Bends at the base of vertical stacks should be of long radius and have a minimum centre line radius of 200mm on a 110mm nominal size stack. Two 45° radius bends may also be used as an alternative to provide the change of direction and connection to the building drain. The same design principle should also be adopted where offsets occur in stacks of one or more storey height.



## Branches at the base of stacks

For single dwellings up to three storeys high, the distance between the centre line of the lowest branch connection and the invert of the drain should be at least 450mm. For multi-storey systems up to five storeys high, the minimum distance should be 740mm and for systems higher than five floors no connections are permissible at ground floor level. Where this occurs a separate stub stack should be provided to serve the ground floor or individual appliances should have their own separate connection to the building drain.



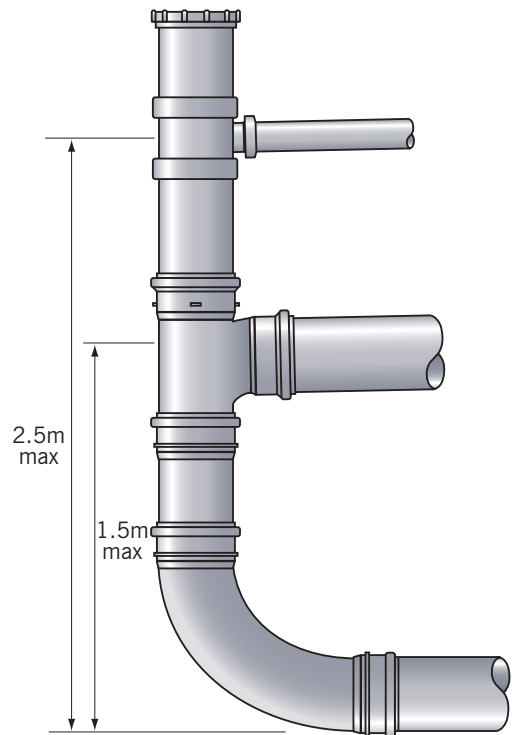
- L = 450mm up to three storeys high
- L = 740mm up to five storeys high
- L = one storey height, over five storeys

## Offsets in stacks

Offsets in the wet portion of a discharge stack should be avoided wherever possible but where they have to be fitted a large radius or two 45° bends should be used to create each change of direction. Offsets in lightly loaded stacks up to three storeys high do not require offset venting but on multi-storey buildings this may be necessary depending on the loading of the stack and the numbers of floors above the offset. The principles previously described for bends and branches at the base of a stack should also be applied.

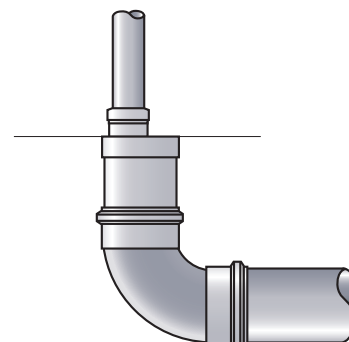
## Stub stacks

An unventilated stub stack terminated with an access fitting may be used to connect a group of ground floor appliances to the building drain provided the vertical drop to the invert level of the drain does not exceed 1.5m from a WC and 2.5m from a waste appliance. Where one or more stub stacks are connected to the same drain, the head of the run should be ventilated to atmosphere or air admittance valves fitted to each stub stack arrangement.



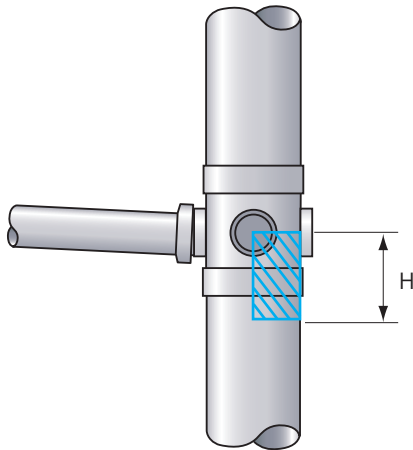
## Stub waste

This technique is often used to connect isolated ground floor waste appliances such as basins, baths, shower trays and sinks to eliminate exposed pipework or low level ducting. The 110mm unventilated drain is terminated at finished floor level with a reducer and boss adaptor to suit the size of waste from the appliance.



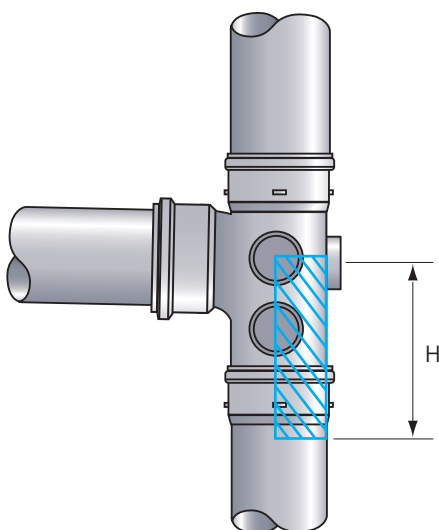
### Prevention of cross-flow

Where small diameter branch waste pipes connect to a discharge stack they must be arranged to eliminate the risk of cross-flow from one branch to the other. A branch creates a no entry zone for opposing waste connections, which varies depending on the stack diameter. No connections should be made within the restricted zone although entry is permissible on the centre line of the boundary directly opposite or at right angles.



Stack size	Height of zone 'H'
110mm	110mm
160mm	250mm

To prevent cross-flow from a large diameter branch to a smaller waste connection, the latter should be made to the stack at or above the centre line of the larger branch, at right angles or at least 200mm below the restricted zone. Entry is permissible on the boundary centre line directly opposite or at right angles.



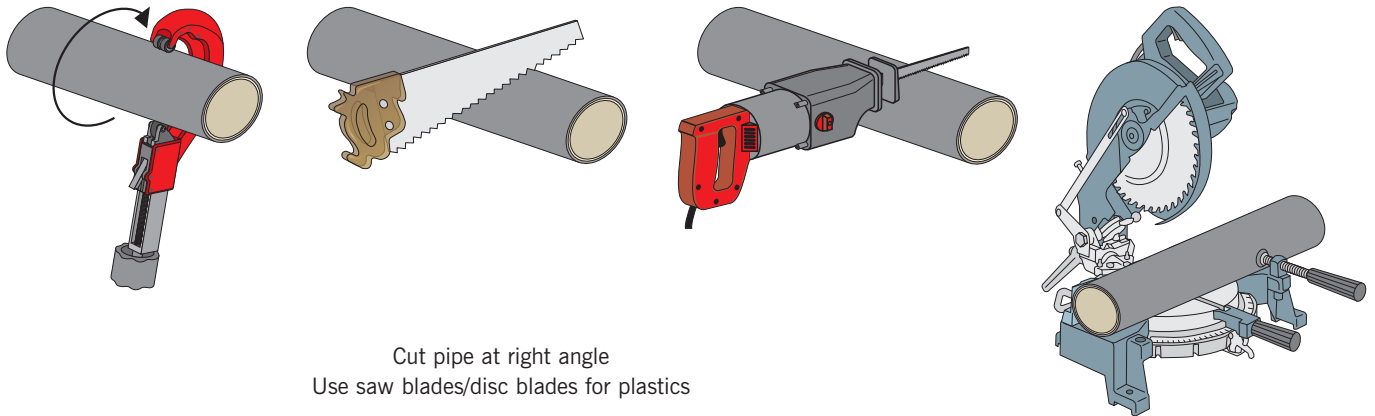
'H' = 200mm irrespective of stack diameter



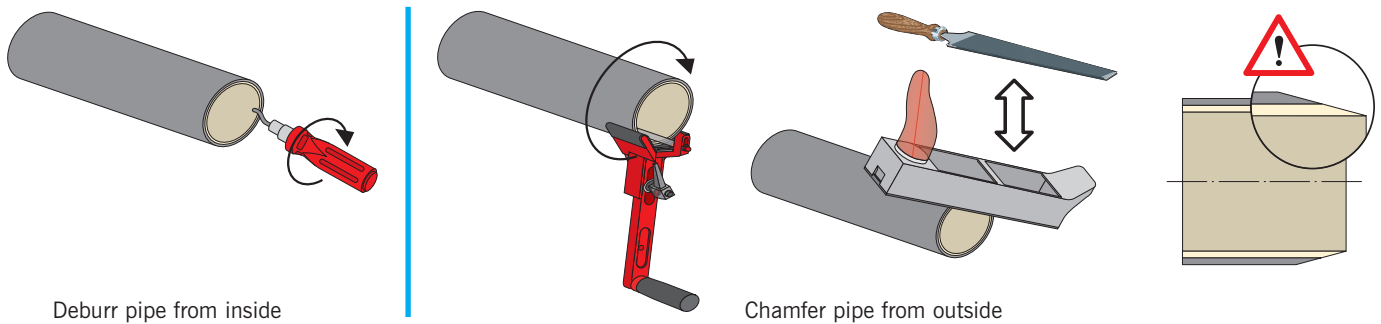
## Jointing

- Special tools are not required
- All tools are standard tools

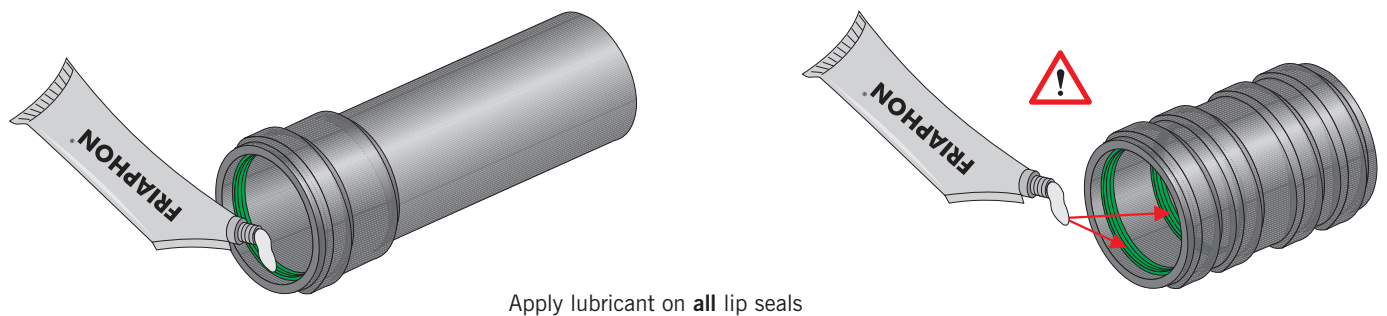
### Pipe cutting



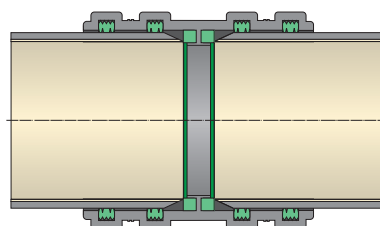
### Chamfering/deburring



### Push-fit jointing



Only use lubricants approved for Friaphon products. Any use of inappropriate lubricants may damage or disintegrate the sealing.



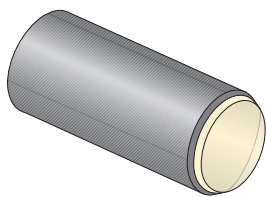
Push part as far as it goes

## Bonding

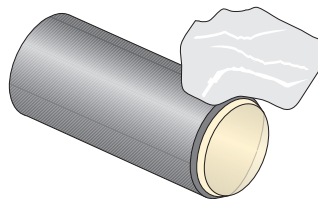


Only use primer and adhesive approved for Friaphon products. Any use of inappropriate primers and adhesives may damage the pipe material and cause leaky connections.

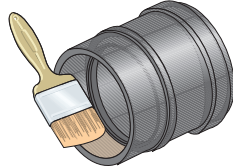
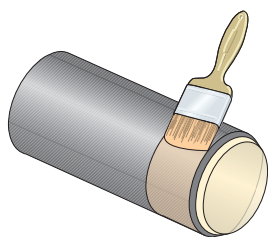
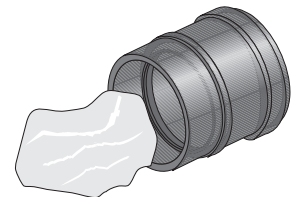
## Bonding



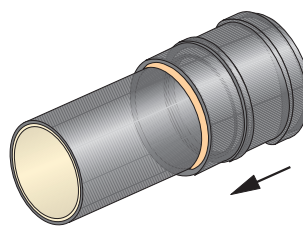
Chamfer pipe



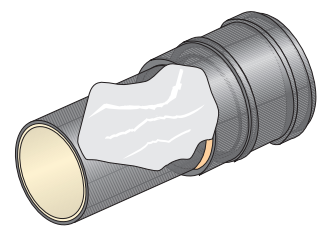
Clean faces to be bonded



Apply adhesive all over faces with brush

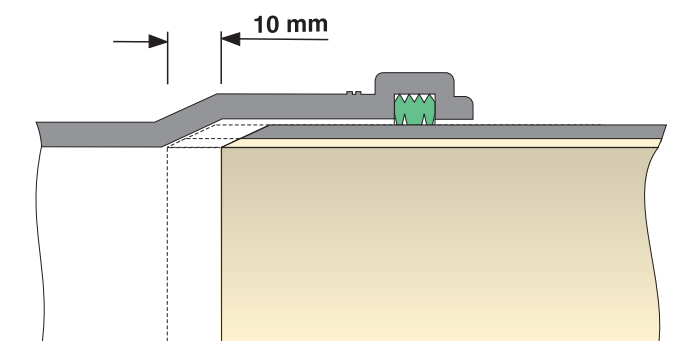


Insert pipe to maximum depth



Remove excess adhesive

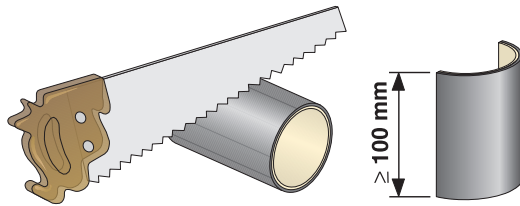
When using bonding sleeves, provide for compensation of expansion forces.



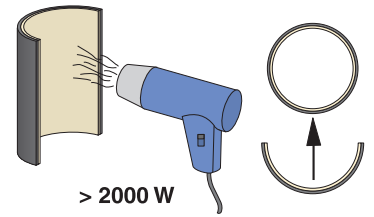
## Repairs



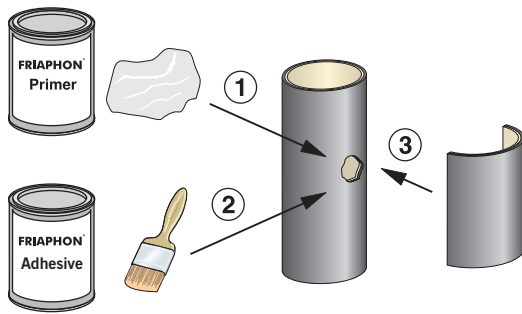
Damaged pipe



Cut repair part from remnant pipe



Adjust repair part

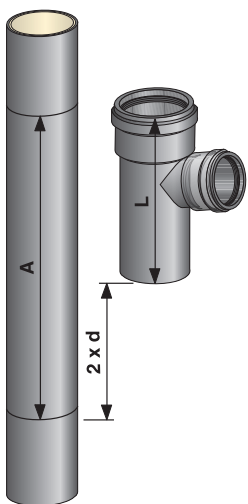


Clean faces to be bonded, apply adhesive, press on repair part

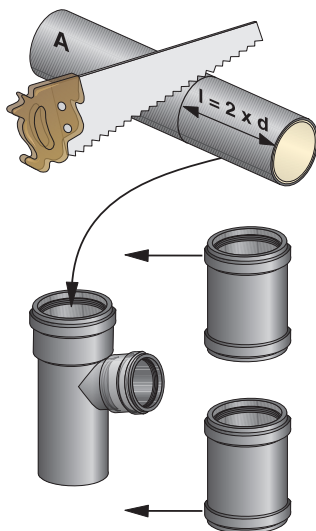


Fix hose clamp, remove after hardening

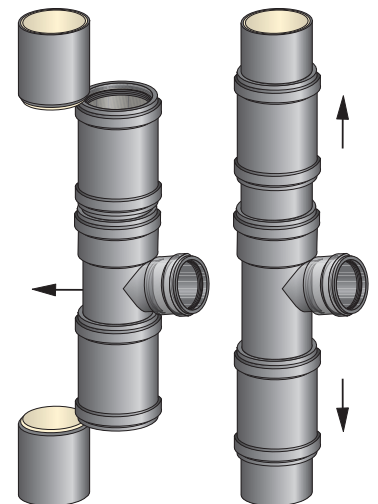
## Subsequent installation of branches



Cut off pipe length  $A = L + 2 \times d$ , chamfer remaining pipe ends



Insert pipe piece into branch at a length of  $l = 2 \times d$ , fit in sleeves



Insert branch, provide for connection by way of sleeves

## Installation

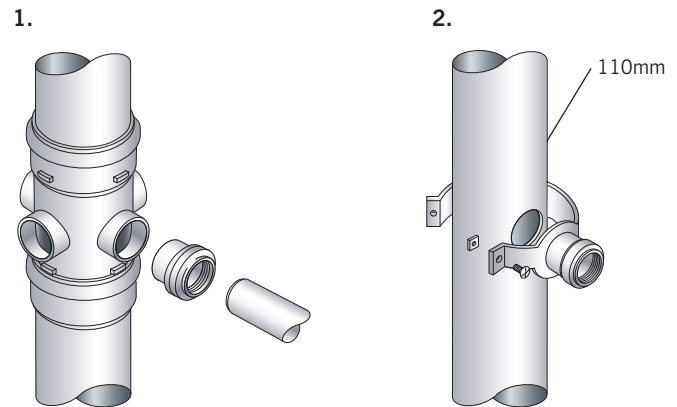
### Boss pipe connections

#### 1. Multiple entry boss pipes

All have 90° boss upstands moulded on each fitting with one inlet port open. Connection is made using the appropriate size boss connector to suit 32, 40 or 50mm waste pipes.

#### 2. Strap-on-bosses

Primarily designed to permit 32, 40 and 50mm waste pipe connections to be made to existing 110mm discharge stacks, strap-on-bosses can also be used on new systems to provide flexibility of installation during different stages of construction.



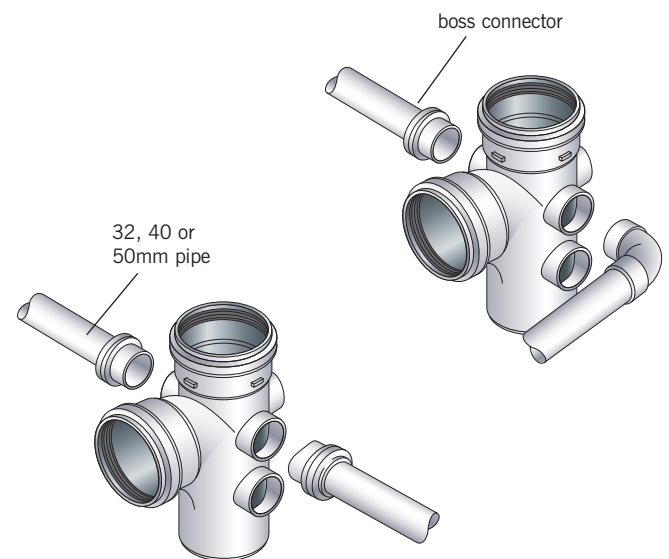
### Boss branches

The Friaphon range of five boss branches are designed to allow multiple waste pipe connections to be made to the discharge stack from different directions. Four different side entry combinations are possible together with a rear if required. Staggered waste pipe connections, directly opposite are not permitted as cross-flow could occur.

### Compatibility

Boss pipes, boss connectors and strap-on bosses fitted with multi-fit 'T' ring seals are suitable for use with MUPVC or abs waste systems to BS 5255, polypropylene to BS 5254 and metric size copper to BS 2871.

Un-perforated boss upstands on boss pipes, branches and reducers may be drilled to accept 32, 40 and 50mm boss connectors using a 51mm diameter hole saw.



### Horizontal connections

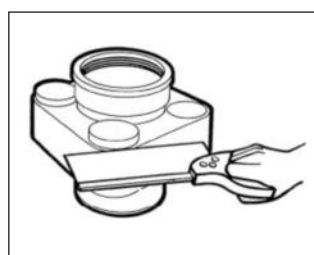
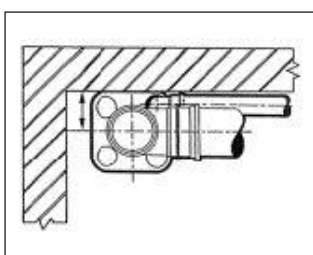
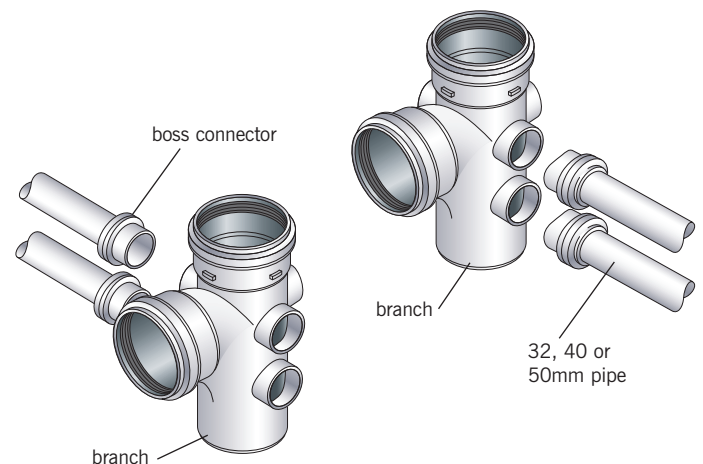
Boss pipes were developed for use in horizontal situations where it is recommended that connection to the larger diameter pipe is made at 45°. These have solvent weld sockets to receive 50mm diameter MUPVC or abs waste pipes to BS 5255.

### Waste manifold (4 port)

Plumbing in the bathroom or WC is made easier by using the waste manifold. Waste pipes may be connected to the manifold above floor level using any one of four inlets to suit site conditions. The four waste inlets will also permit connections of extra pipework at a later date.

The Friaphon waste manifold will accept waste pipes to BS EN 1451 and BS EN 1566, BS 5255.

For 50mm connections, solvent weld the boss adaptor (FP 12 41 01) directly into the socket; for 32mm and 40 mm connections use rubber boss adaptors.



## Installation

### Fixing techniques

Only pipe clips with sound-proofing insert strips, which match the external diameter of the pipe and fully enclose it, should be used for the Friaphon domestic drainage system (insert strips made of soft PVC are not acceptable).

Threaded rods or shanked bolts should be used to attach pipe clips.

d	DN	Minimum thread size
110-160	100-150	M10

Pipe with pipe clip.

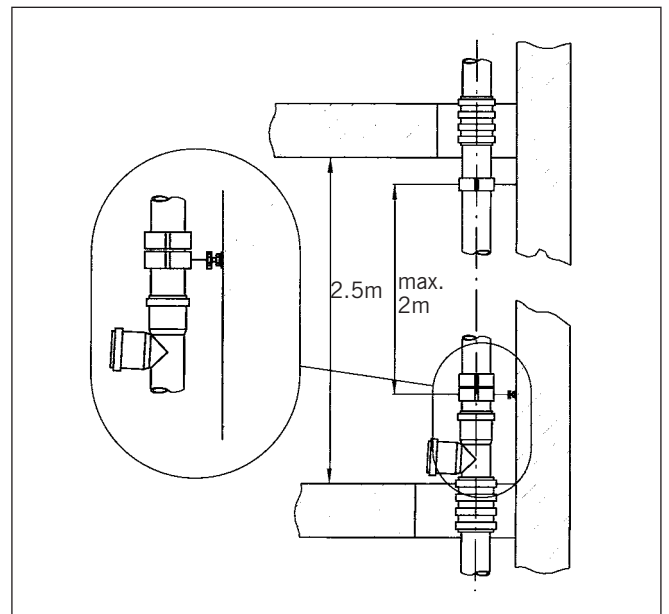


The spacing of the pipe clips must not exceed 2m for vertically installed pipes and 10 times the external diameter of the pipe (10 x d) for horizontally installed pipes. Care must be taken to ensure that pipe clips are fitted as close as possible to the floor and the ceiling.

Pipe attachment for vertical runs.

Top: with a sliding clip.

Bottom: with the Friaphon support clip and support ring.



### Pipe clip spacings

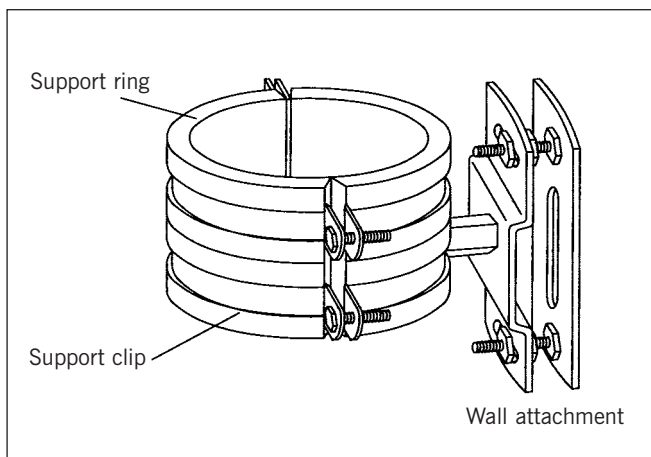
External diameter d	DN	Horizontal clip spacing 10 x d	Vertical clip spacing
110	100	1100	2000
160	150	1600	2000



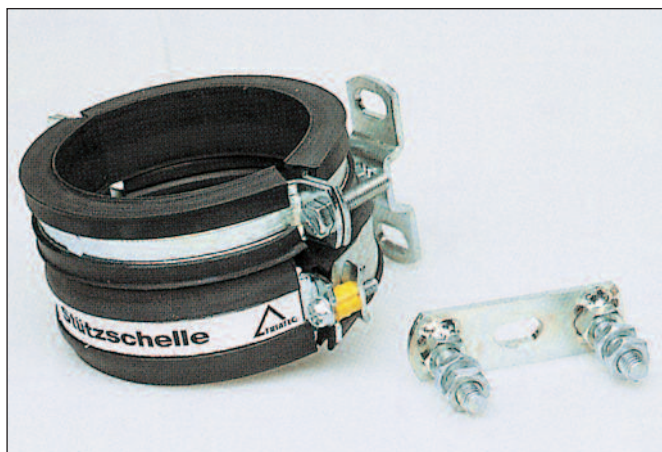
## Installation

### Friaphon support clip

Friaphon support clips with support ring and wall attachment allow the pipe to be fixed at any point along its axis. The support clip should preferably be fitted above the bottom branch. The attachment points are selected to suit the best place in the brickwork. The support ring bears the weight of the down pipe above it.



Friaphon support clip complete.



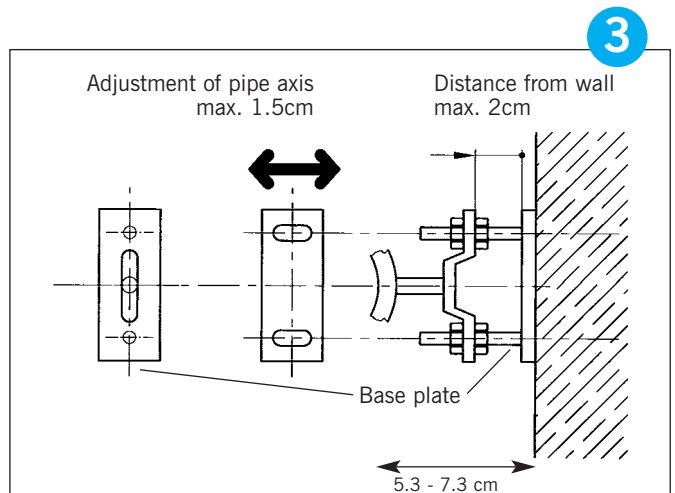
Friaphon support clip complete.



Mark, drill and fit the wall attachment.



Adjusting the distance from the wall.



Adjustment options on the wall fixing.



## Installation

### Fitting instructions

4



Fit the support clip to the wall attachment and tighten with a 17mm open ended spanner.

5



Open the snap lock of the support clip and insert the Friaphon pipe into the moulded fitting and clip fixer.

6



Assemble the support clip and secure the screws on the snap lock. A spacer prevents overtightening.

7



Fix the support ring onto the Friaphon pipe so that it rests on the support clip.

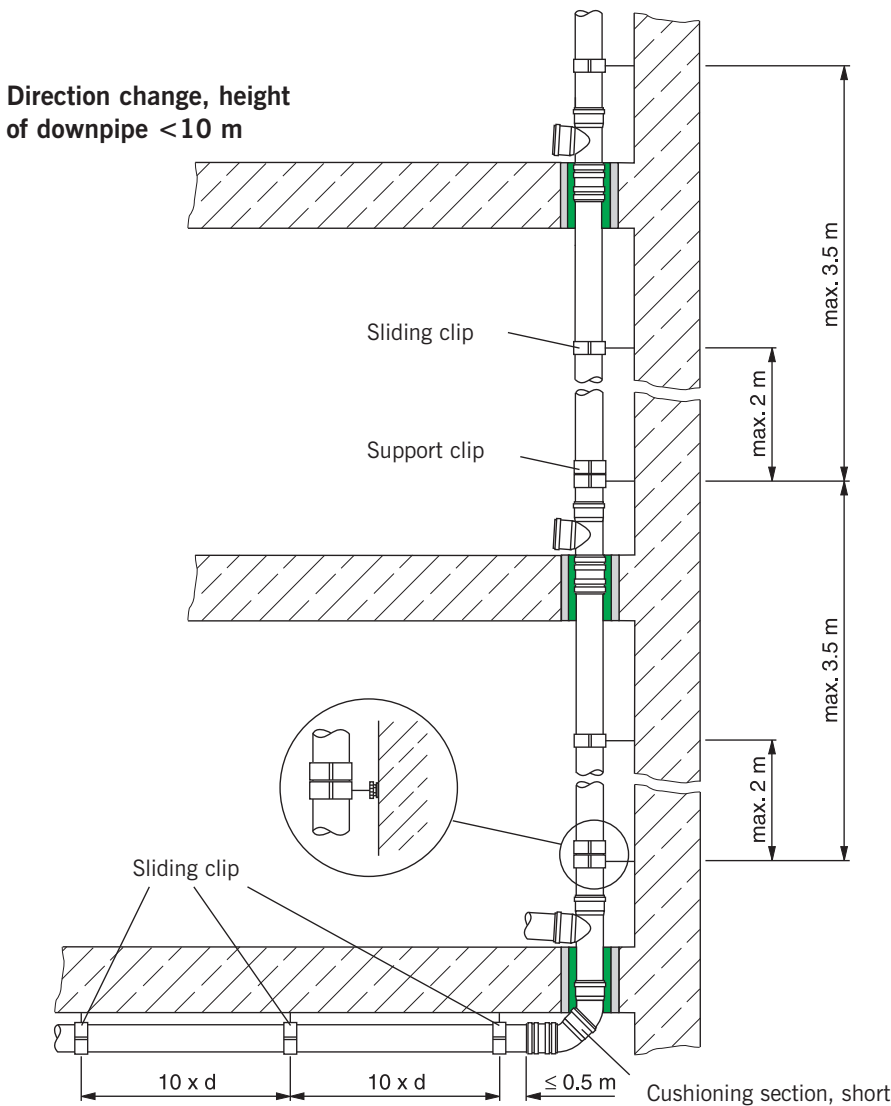
8



Finished assembly of the complete Friaphon support clip.

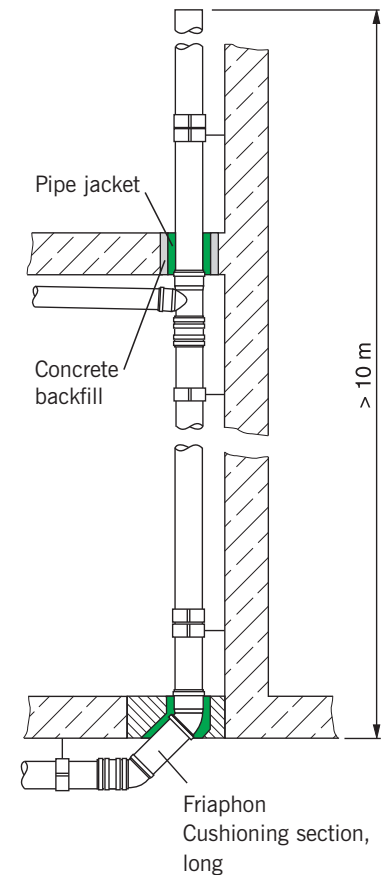
## Installation of pipes

### Distance between pipe clips



Dimensions and design of the wastewater system must be in keeping with BS EN 12056.

### Direction change, height of downpipe > 10m, in keeping with standard

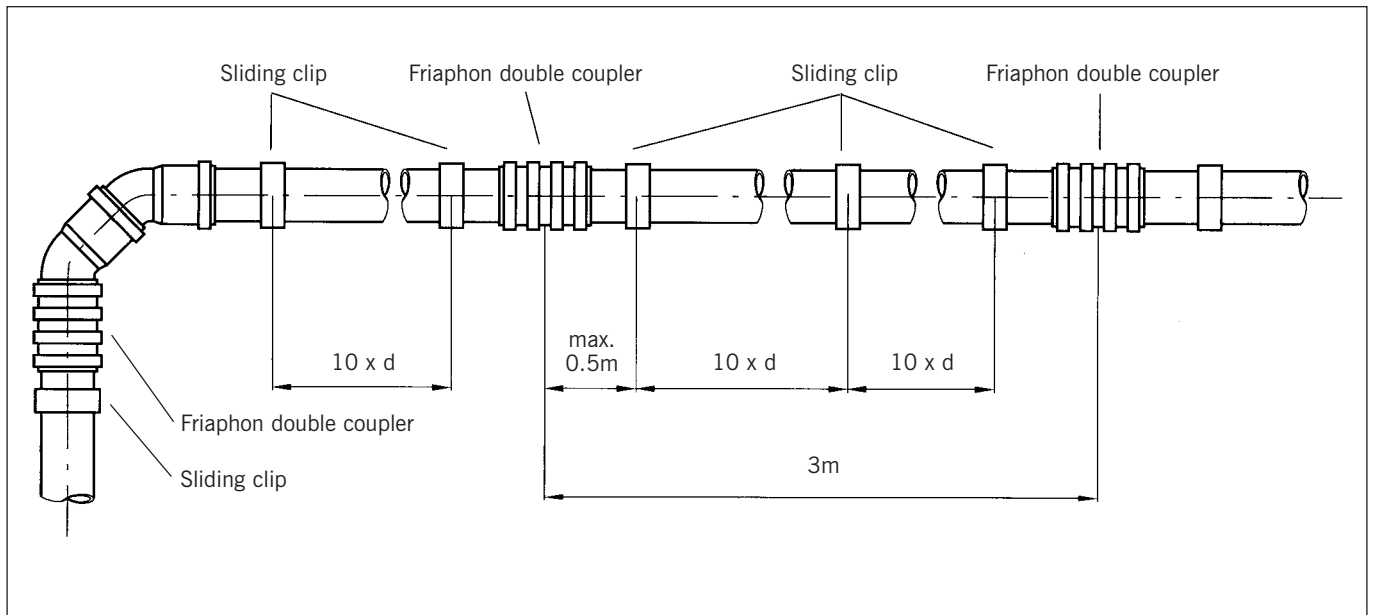


#### Pipe Jacket

To prevent sound vibrations travelling from the pipe to the concrete backfill, wrap 5mm PE foam insulator around the pipe before backfilling.

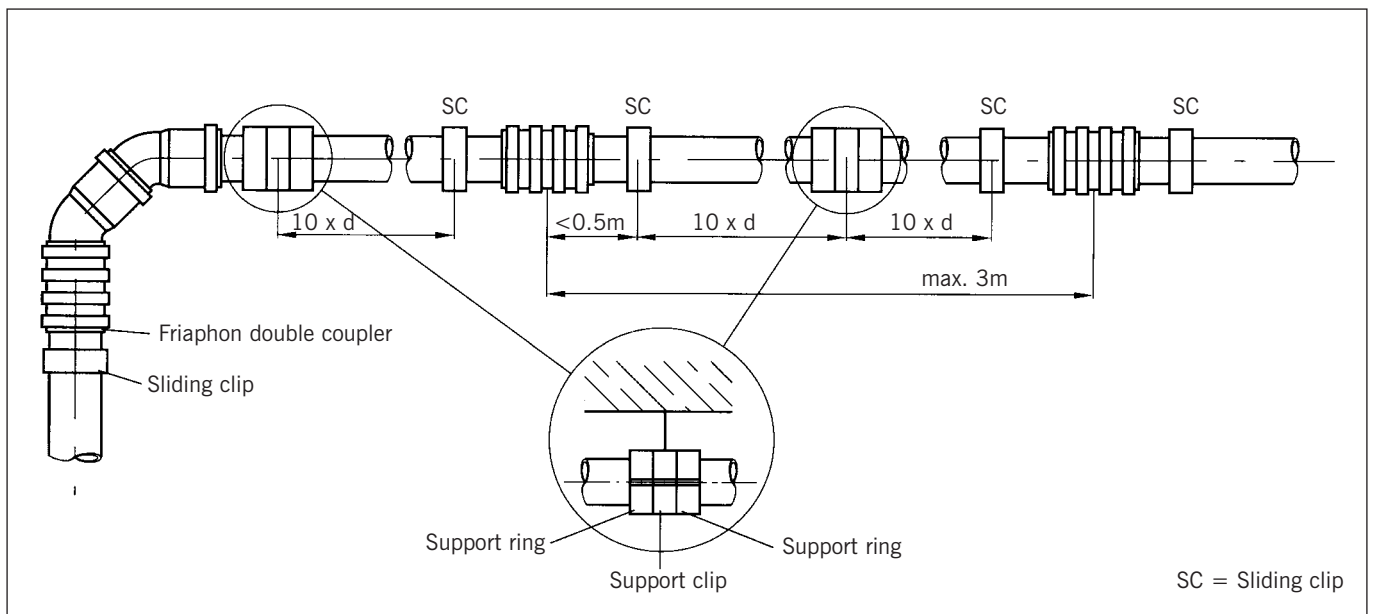
## Installation of pipes

### Assembly example of horizontal pipes with sliding clips



### Assembly example of horizontal pipes with support clips and sliding clips

If a horizontal pipe has to be secured against being forced apart it must be fitted with support clips.



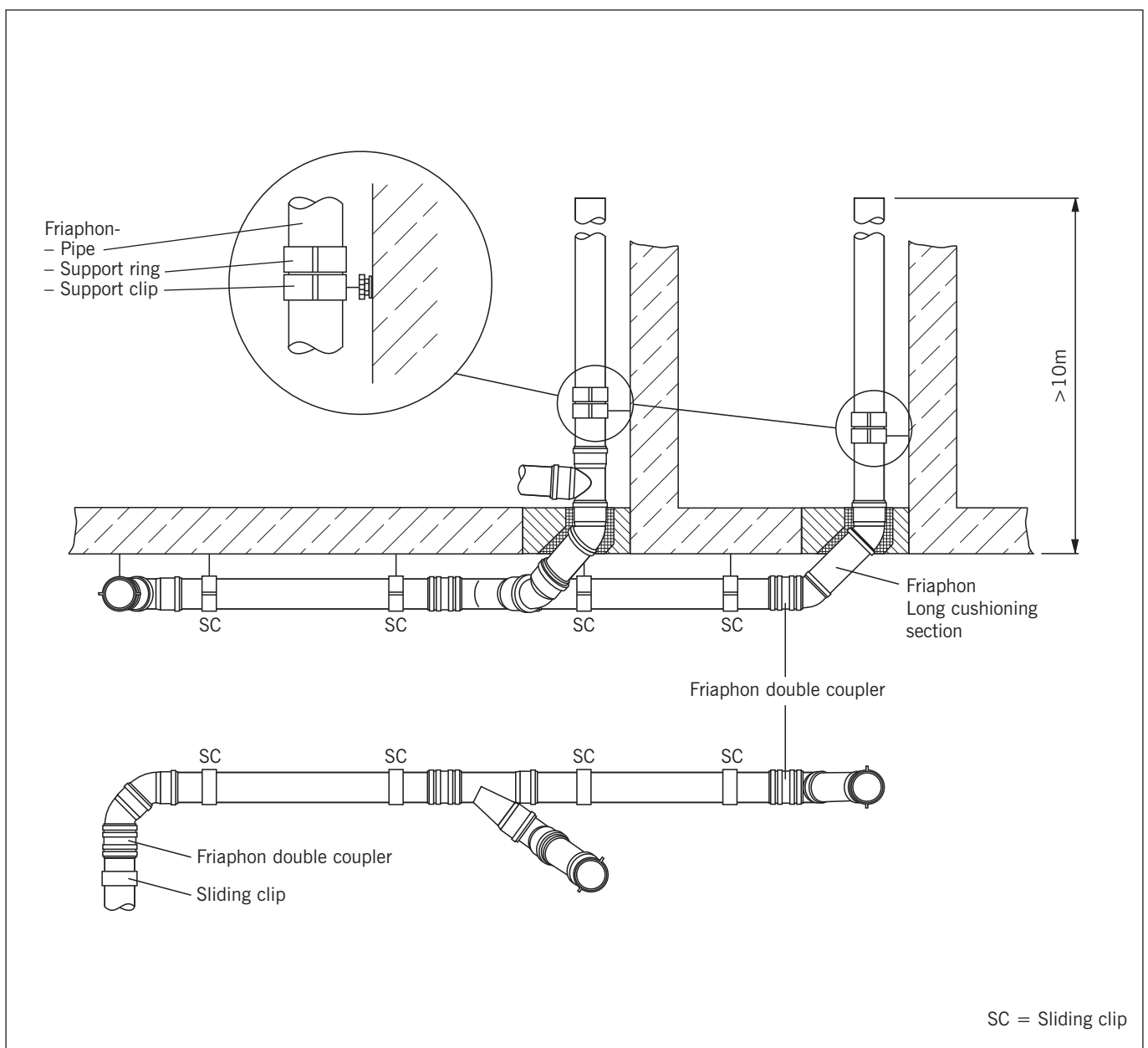
## Installation of pipes

### Assembly example with branch and two down pipes

Wherever there is a change of direction or a branch, the piping must be adequately secured. The distance between pipe clips for horizontal straight pipe runs is a maximum of **10 x d**.

The examples below show assemblies which use double couplers. Here the pipe clips fitted must always be of the sliding type.

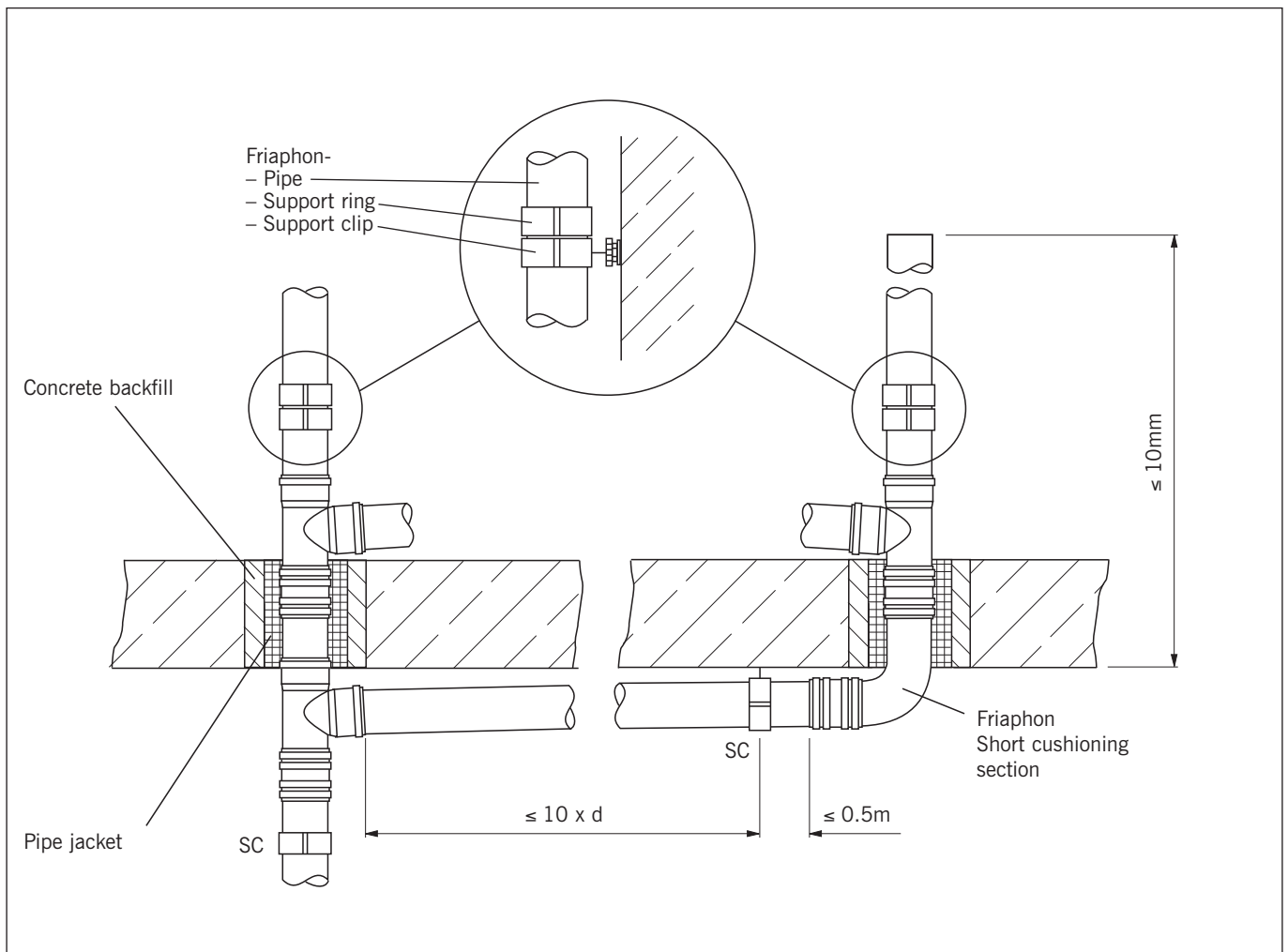
If a horizontal pipe is fixed to the ceiling as a collector pipe, every change of direction from vertical to horizontal must be made with two 45° bends and one 250mm cushioning section (i.e. a long cushioning bend).



## Installation of pipes

### Assembling short runs of pipes

Even when assembling short horizontal runs of pipe with a length  $\leq 10 \times d$ , as shown in the illustration, a sliding clip must be fitted as close as possible to the cushioning section in order to stabilise the position.





## Installation of Unicollar® Fire Protection Collar

### 1 Removing the Casing and Accessories from the Box

The box contains the fixings and accessories required to install the collar. Open the box at the position clearly marked with an arrow. Remove the box of accessories. The end of the collar can now be pulled and the strip will uncoil. Ensure the soft Graftitex faces up. The collar strip has snapping perforations at 15mm centres.

**Only pull out enough strip for the collar length required.**



### 2 Cutting and Snapping the Strip

Identify the outside diameter of the pipe that is to have the collar applied to. On the box is a table, which gives the number of segments for each size pipe and the length of strip required. Either count the number of (15mm) segments required or measure the strip. Cut through the Graftitex at the appropriate position.



Hold the strip with a finger and thumb on each side of the cut and as close to the cut as possible, and fold in a downward direction as far as possible. Repeat this folding until the steel snaps.



### 3 Fixing the Collar

The ends of the Graftitex, once cut, will be square. To make it easy to fix, cut these square ends away at a slight angle. Shape the strip to the approximate diameter of the pipe. If the pipe is small (e.g. under 75mm) pay extra attention to the ends of the strip to ensure they have been shaped correctly. Push one of the prongs of a bracket through the notch at one end of the strip. Fold the strip around the pipe and push the other prong through the notch on the other end of the strip. (The bracket can be gently hammered in to position if pushing is difficult). Attach the bracket to the wall or floor as described over and shown on the box drawings. Fix the other bracket(s) as required.

Ensure the correct number of brackets are always used and the two ends of the strip always have a connecting bracket.



**Note:** To prevent structure-borne sound bridges wrap 5mm PE foam insulator around the pipe before folding the strip around the pipe.





### 4 Floors

The concrete must be in a condition that will ensure the anchors hold securely. Larger steel fixings may be used if deemed appropriate. Back fill any gap between the pipe and concrete greater than 8mm with mortar or commercial grade mortar mix. Acrylic, intumescent or silicone sealant may be applied around the pipe on the topside of the floor slab if a water seal is required. If there is a possibility of pipe movement occurring that will cause cracks in the seal between the pipe and mortar mix (if used), it may be advisable to seal the pipe with acrylic, intumescent or silicone sealant to prevent cold smoke egress. This however is not required for the fire rating to be achieved. If the gap between the pipe and slab is less than 8mm, apply a bead of acrylic, intumescent or silicone sealant approx. 8mm deep in to the gap at the soffit.

#### Fire Resistance (BS 476: Part 20)

Pipe Size	Integrity
110mm	2 hours
160mm	2 hours

### 5 Walls

For framed walls, use the 40mm x 10 laminating screws provided. For masonry walls, use the 20mm x 5mm steel anchors provided. The wall or floor must be in a condition that will ensure the anchors hold securely. Larger steel fixings may be used if deemed appropriate. Ensure the annular gap between the wall and pipe is minimal and seal this gap with a bead of acrylic, intumescent or silicone sealant. Attach a collar to both faces of the wall. Fire tests were conducted with two brackets on pipes 69mm and under. For framed walls, three brackets are recommended if framing studs are not available to screw in to.

#### Fire Resistance (BS 476: Part 20)

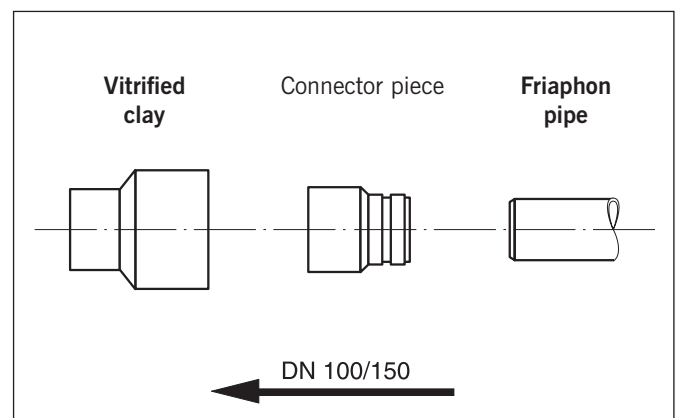
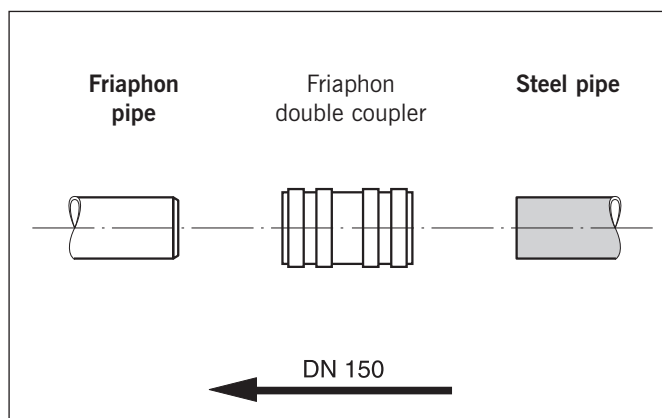
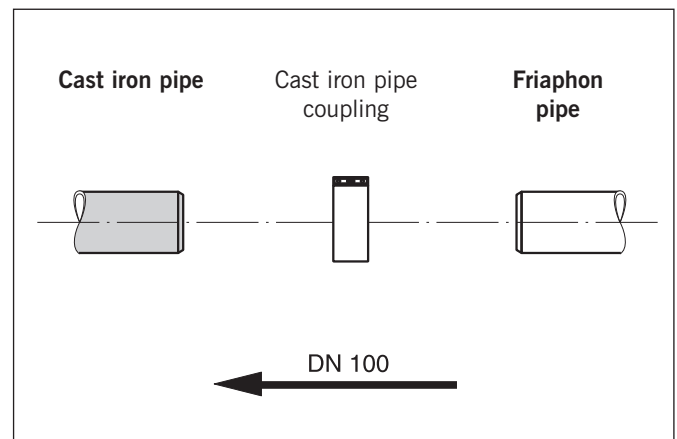
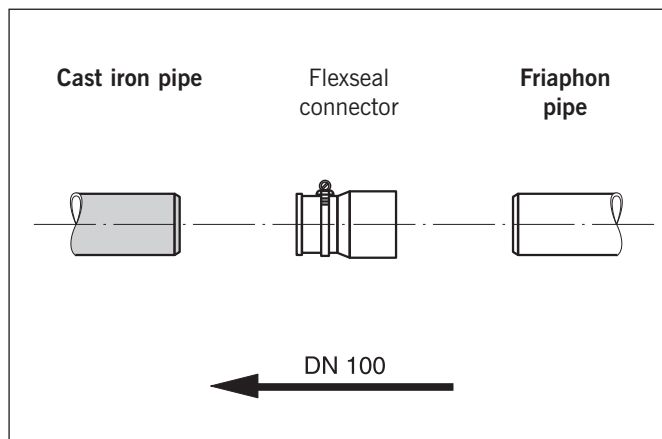
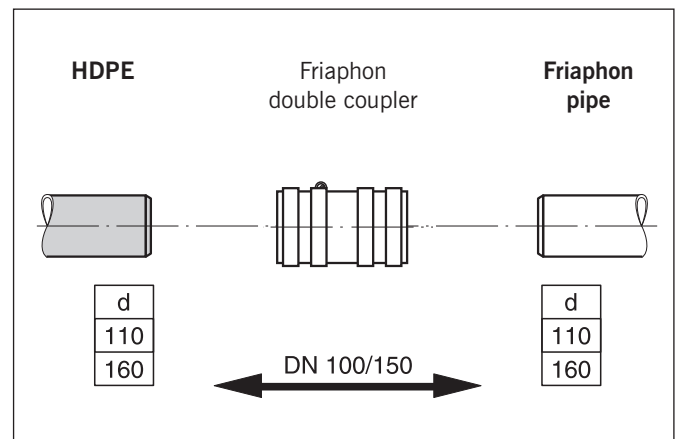
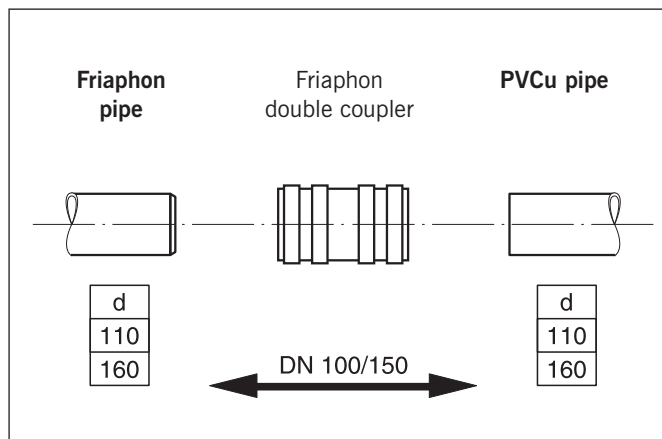
Pipe Size	Integrity
110mm	2 hours
160mm	2 hours

For details of suitability and approvals for use of Unicollar for other pipe materials and sizes contact the technical support department on 01543 272446.

## Transition to other Pipe Systems

Overview of outside diameter 'd' of other materials in mm

DN	Friaphon	Cast iron	PE/PP mineral-reinforced	PVCu	HD PE	Fibre cement	Steel
100	110	110 <sup>+2</sup> <sub>-1</sub>	110	110	110	116	102
150	160	160 <sup>+2</sup> <sub>-2</sub>	160	160	160	168	159



## Site Work

### Inspection and testing

Inspection and testing should be carried out in accordance with BS 12056: 2000 and Building Regulations noting especially the details given in respect of air testing and the fact that smoke testing of plastics pipework should be avoided as the materials can be adversely affected.

### Air test

The installation should be capable of withstanding an air test of positive pressure of at least 38mm water gauge for at least three minutes. During this time every trap should maintain a water seal of at least 25mm.

### Handling

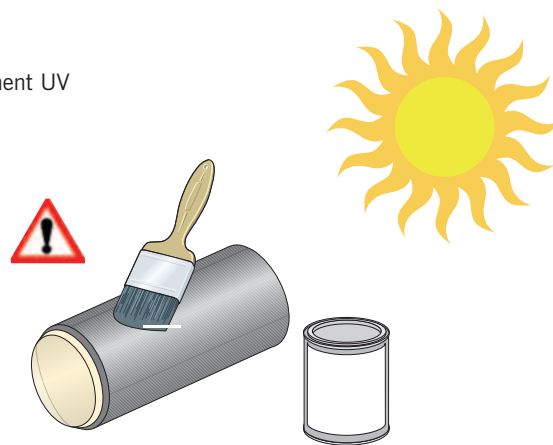
Friaphon pipes are strong, though lightweight and therefore very easily handled. However, reasonable care should be exercised while handling, particularly in extremely cold conditions. Pipes should preferably be loaded and unloaded by hand but if mechanical handling is used, protected slings are recommended.

### Recyclability

All plastic components in the Friaphon domestic drainage system are completely recyclable.

### Installation Outdoors

Protect the FRIAPHON® product range against permanent UV radiation.



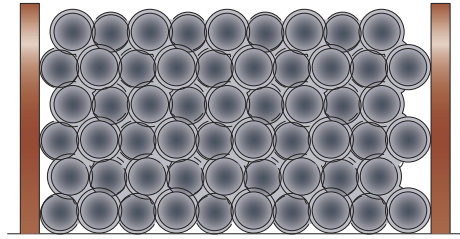
Use water-based paint (solvent free).

### Condensate insulation

Friaphon pipes do not require insulation against condensation.

Friaphon, being a thicker wall pipe constructed of 2 different layers of pipe has a much lower thermal transfer value than that of, say, cast iron and therefore condensation is less likely to form during periods of cooling.

Pipe Material	Thermal Transfer Value
Friaphon	0.16 W /mk
Cast Iron	50-60 W /mk



## Conformity Certificates

**DEUTSCHES INSTITUT FÜR BAUTECHNIK**  
Anstalt des öffentlichen Rechts

10829 Berlin, 30. Januar 1997  
Königsplatz 30  
Telefon: (0 30) 7 87 30 - 276  
Telefax: (0 30) 7 87 30 - 320  
GeschZ.: II 22-1.42.1-19/96

**Allgemeine bauaufsichtliche Zulassung**


Zulassungsnummer: Z-42.1-220

Antragsteller: Friatec AG  
Keramik- und Kunststoffwerk  
Steinzeugstraße  
68229 Mannheim

Zulassungsgegenstand: Zweischicht-Verbandabwasserrohr und Formstücke mit homogenem Wandaufbau aus Styrol Copolymerisatlen DN 50 bis DN 150 der Baustoffklasse B2 - normalentflammbar nach DIN 4102 für Hausabflüsse


Geltungsdauer bis: 30. November 2001

Der obengenannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen.  
Diese allgemeine bauaufsichtliche Zulassung umfasst sieben Seiten und 29 Blatt Anlagen



Deutsches Institut für Bautechnik

\* Diese allgemeine bauaufsichtliche Zulassung ersetzt den Prüfbescheid vom 10. Juli 1991 mit Prüfzeichen Nr. FA 13776.  
Dem Gegenstand ist zusätzlich am 10. Juli 1991 ein Prüfbeschein zugestellt worden.

  
**Fraunhofer** Institut  
Bauphysik

10829 Berlin  
Univ.-Prof. Dr.-Ing. habil.  
Dr. h.c. mult. Dr. E.h. mult.  
Karl Genis

P-BA 354/1996

**Bestimmung des Geräuscherhaltens eines Abwassersystems mit Brandschutzmanschetten**

Antragsteller: Friatec AG - Sanitair Division  
Postfach 71 02 61  
D-68222 Mannheim

**1. Zweck der Prüfung**

Für das Abwassersystem "Friaphon" mit Brandschutzmanschetten (Hersteller Fa. Friatec) war das Geräuscherhalten an einer Installationswand mit einer flächenbezogenen Masse von 220 kg/m<sup>2</sup> zu untersuchen.

Hebelstr. 12, D-77689 Neustadt, Postfach 8014489, D-70504 Stuttgart - Telefon 027113771-00, Telefax 027110270-3330  
Münchener Str. 10, D-85344 Seibersdorf, Postfach 1112, D-85609 Hallertau, Telefon 089240141-0, Telefax 089240141-99  
Ludwig-Bohm-Str. 10, D-14195 Berlin, Telefon 03043481-35-1, Telefax 03043481-37-24

**DEUTSCHES INSTITUT FÜR BAUTECHNIK**  
Anstalt des öffentlichen Rechts

10829 Berlin, 6. Juli 1999  
Königsplatz 30 L  
Telefon: (0 30) 7 87 30 - 357  
Telefax: (0 30) 7 87 30 - 320  
GeschZ.: IV 3/-1.19.17-27/98

**Allgemeine bauaufsichtliche Zulassung**


Zulassungsnummer: Z-19.17.1271

Antragsteller: FRIATEC Akkengesellschaft  
Steinzeugstraße 50  
68229 Mannheim

Zulassungsgegenstand: Rohrabbechtung "FRIAPHON Brandschutzmanschette DE und NE" der Feuerwiderstandsklasse R 90 nach DIN 4102-11

Geltungsdauer bis: 31. Juli 2002

Der obengenannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen.  
Diese allgemeine bauaufsichtliche Zulassung umfasst acht Seiten und acht Anlagen.



Deutsches Institut für Bautechnik

**THE GERMAN INSTITUTE FOR CONSTRUCTION ENGINEERING**  
A Statutory Body

**Notification**  
on  
the Renewal of the Currency Period of the **General Approval Proving Compliance With the Requirements Specified by the Construction Supervisory Authority**  
Issued on 30 January 1997


**Approval number:** Z-42.1-220

**Subject matter of approval:** Double-layer wastewater pipes and form parts with homogeneous wall structure made of styrene copolymers DN 50 up to DN 150 of building material class B2 – normally combustible – as per DIN 4102 for in-house wastewater pipes

**Currency period expires on:** 30 November 2006

**1**

**Fraunhofer Institute for Construction Physics**

  
Fraunhofer Institut  
Bauphysik

Officially acknowledged test institute for the approval of new building materials, elements and methods – Research, development, testing, demonstration and consultancy services in the areas of construction physics

Head of Institute:  
Univ.-Prof. Dr.-Ing. habil.  
Dr. h.c. mult. Dr. E.h. mult.  
Karl Genis  
P-BA 354/1998

**Determination of the Noise Behaviour of a Wastewater System With Fire Protection Collars**

**2**

**THE GERMAN INSTITUTE FOR CONSTRUCTION ENGINEERING**  
A Statutory Body

**General Approval Proving Compliance With the Requirements Specified by the Construction Supervisory Authority**

**Approval number:** Z-19.17-1271

**Subject matter of approval:** Fire-protective sheathing "Friaphon fire protection collar DE and NE" Fire rating R 120 and R 90 as per DIN 4102-11

**Currency period expires on:** 31 July 2007

**3**

## Terms and Conditions

### DURAPIPE UK CONDITIONS OF SALE

1. **DEFINITIONS:**  
 'Seller' shall mean Glynwed Pipe Systems Limited, registered in England under number 1698059. 'Buyer' shall mean any company, organisation or individual to whom a quotation is offered, or whose order is accepted by the Seller.
2. **CONDITIONS:**  
 All offers, quotations, estimates, acceptances and contracts are subject to these Conditions of Business and any terms or conditions which any other person shall seek to impose or make part of any contract shall, so far as is inconsistent with these Conditions of Business, not apply unless expressly agreed by the Seller in writing. The headings in these conditions are for convenience only and shall not affect their interpretation.
3. **QUOTATIONS AND PRICE VARIATION:**
  - a) Any quotation given by the Seller is an invitation to the Buyer to make an offer only and no order of the Buyer placed with the Seller in pursuance of a quotation or otherwise shall be binding on the Seller unless and until it is accepted in writing by the Seller.
  - b) Unless stated otherwise, all quotations and published price lists are ex works, exclusive of VAT and shall remain valid for 30 days or such a period as may be quoted but nevertheless the Seller may amend or withdraw any quotation by written or oral notice. Quotations may be varied if the Buyer makes variations in his specifications.
4. **STATEMENTS OR REPRESENTATIONS TO THE BUYER:**  
 If any statement or representation has been made to the Buyer upon which the Buyer relies other than in the documents enclosed with the Seller's quotation, the Buyer must set out that statement or representation in a document to be attached to or endorsed on the order in which case the Seller may submit a new quotation.
5. **DELIVERY - TIME:**
  - a) Any period for delivery given at any time and in any manner by the Seller is an estimate only and is not binding on the Seller. Delivery periods are normally calculated from the later of:
    - i) acceptance of order; or
    - ii) where applicable, the receipt by the Seller of a detailed specification or drawings.
  - b) Time shall not be deemed to be of the essence of the contract. Failure by the Seller to meet any quoted delivery period for any part or the whole of the order shall not entitle the Buyer to rescind the contract or to claim damages of any nature.
  - c) The Seller will endeavour to comply with reasonable requests by the Buyer for postponement of delivery but shall be under no obligation to do so. Where delivery is postponed otherwise than due to default by the Seller the Buyer shall pay all costs and expenses including a reasonable charge for storage and transportation occasioned thereby and an extra charge for split delivery if applicable.
  - d) The Buyer will receive delivery of any consignment between the hours of 8.00am and 4.00pm Monday to Friday inclusive, unless otherwise agreed in writing. Cost incurred by the Seller arising from the Buyer's refusal to accept consignments within the agreed hours shall be borne by the Buyer.
6. **DELIVERY AND RISK:**
  - a) Except where stated to the contrary in the contract, delivery shall be made as follows:
    - i) where the Buyer provides the transport, delivery shall be made ex the Seller's works;
    - ii) where the Seller provides the transport, delivery shall be made to the premises of the Buyer, or the premises of the Buyer's customer or works site if the Buyer has requested delivery to be so made but where the Buyer has made such a request the Seller will make a first delivery to the Buyer's customer or works site as so much of the goods as is available for that delivery but subsequent deliveries will be made to the premises of the Buyer.
  - b) The Seller may at its discretion make partial delivery of orders and invoice the same.
  - c) Risk in the goods shall pass on delivery.
  - d) Where goods are sent FOB the Seller's responsibility shall cease when the goods are placed on board ship or aircraft without the need for the Seller to give notice to the Buyer and the provisions of Section 32(3) of the Sale of Goods Act 1979 shall not apply.
7. **OWNERSHIP OF GOODS:**
  - a) The goods shall remain the sole and absolute property of the Seller as legal and equitable owner until such time as the Buyer shall have paid to the Seller the contract price together with the full price of any other goods the subject of any contract between the Seller and the Buyer.
  - b) The Buyer acknowledges that until such time as the property in the goods passes to the Buyer he is in possession of the goods as a bailee and fiduciary agent for the Seller and the Purchaser shall store the goods in such a manner that they are clearly identifiable as the property of the Seller.
  - c) Until payment due under all contracts between the Buyer and the Seller had been made in full, in the event of sale of the goods by the Buyer:
    - i) the Seller shall be entitled to trace all proceeds of sale received by the Buyer through any bank or other account maintained by the Buyer; and
    - ii) the Buyer shall if requested by the Seller in writing to so assign its rights to recover the selling price of the goods from the third parties concerned. Such monies to be held separately by the Buyer as agent on behalf of the Seller.
  - d) The Seller may for the purpose of recovery of its goods enter upon any premises where they are stored or where they are reasonably thought to be stored and may repossess the same.
8. **TERMS OF PAYMENT:**  
 In the event of default in payment according to the agreed payment terms between the Seller and the Buyer – i.e. by the end of the month following the month of despatch of the goods the Seller shall be entitled without prejudice to any other right or remedy to suspend all further deliveries and to charge interest on any amount outstanding at the rate of 2% per month until payment in full is made (a part of a month being treated as a full month for the purpose of calculating interest).
9. **SHORTAGES AND DEFECTS APPARENT ON DELIVERY:**
  - a) It shall be the responsibility of the Buyer to inspect or arrange for an inspection of the goods on delivery whether the goods are delivered to the Buyer's premises or to the premises of the Buyer's customer or to a works site. If no such inspection is made the Buyer shall be deemed to have accepted the goods.
  - b) The Buyer shall have no claim for shortages or defects apparent on inspection unless:
    - i) a written complaint is made to the Seller within three days of receipt of the goods specifying the shortage or defect; and
    - ii) the Seller is within seven days of receipt of the complaint given an opportunity to inspect the goods and investigate the complaint before any use is made of the goods.
  - c) If a complaint is not made to the Seller as herein provided then in respect of such shortages or defects the goods shall be deemed to be in all respects in accordance with the contract and the Buyer shall be bound to pay for the same accordingly.
10. **CLAIMS FOR DEFECTS NOT APPARENT ON INSPECTION:**
  - a) The Buyer shall have no claim for defects not apparent on inspection unless the Seller is notified of defective workmanship or materials within twelve months from delivery of the goods. Provided that the goods have been installed and applied in accordance with any relevant recommendations made by the Seller, the Seller will at its option replace the goods or refund the net invoiced price in respect of the goods which have been shown to be defective. If the Seller does so supply substitute goods the Buyer shall be bound to accept such substituted goods in full satisfaction of the obligations of the Seller under the contract.
  - b) The Buyer shall in any event have no claim or set-off in respect of defects unless a written complaint is sent to the Seller as soon as the defect is noticed and no use is made of the goods thereafter or alteration made thereto by the Buyer before the Seller is given an opportunity to inspect the goods.
  - c) The Buyer is responsible for ensuring that the goods are fit for any particular purpose, and no warranty or condition of fitness for any particular purpose is to be implied into the contract.
11. **LIABILITY:**  
 Save as stated in Conditions 9 and 10 (and save in respect of death or personal injury resulting from the negligence of the Seller its servants or agents) the Seller shall not be liable for any claim or claims for direct or indirect consequential or incidental injury loss or damage made by the Buyer against the Seller whether in contract or in tort (including negligence on the part of the Seller its servants or agents) arising out of or in connection with any defect in the goods or their fitness or otherwise for any particular purpose or any act omission neglect or default of the Seller its servants or agents in the performance of the contract.
12. **FORCE MAJEURE:**  
 Notwithstanding anything herein contained neither the Buyer nor the Seller is to be held liable for any delay or failure to carry out the contract due wholly or in part to an act of God action by any Government whether British or foreign civil war strikes and/or lockouts wheresoever occurring fire trade disputes floods or unfavourable weather or any material becoming unavailable or irreplaceable (whether at all or at commercially acceptable prices) or any other circumstances beyond the control of the Seller.
13. **SUB-CONTRACTING:**  
 The Seller reserves the right to sub-contract the fulfilment of any order or any part thereof.
14. **INSOLVENCY AND BREACH OF CONTRACT:**  
 In the event that:
  - a) the Buyer commits any breach of the contract and fails to remedy such breach (if capable of remedy) within a period of thirty days from receipt of a notice in writing from the Seller requesting such remedy; or
  - b) any distress or execution is levied upon any of the goods or property of the Buyer; or
  - c) the Buyer offers to make any arrangements with or for the benefit of its creditors or (if an individual) becomes subject to a petition for a bankruptcy order or (being a limited company) has a receiver appointed of the whole or any part of its undertaking property or assets; or
  - d) an order is made or a resolution is passed or analogous proceedings are taken for the winding up of the Buyer (save for the purpose of reconstruction or amalgamation with insolvency and previously approved in writing by the Seller) the Seller shall thereupon be entitled without prejudice to its other rights hereunder forthwith to suspend all further deliveries until the default has been made good or to determine the contract and any unfulfilled part thereof or at the Seller's option to make partial deliveries. Notwithstanding any such termination the Buyer shall pay to the Seller at the contract rate for all the goods delivered up to and including the date of termination.
15. **INDUSTRIAL PROPERTY RIGHTS:**  
 If goods supplied by the Seller to the Buyer's design or specifications infringe or are alleged to infringe any patent or registered design right or copyright the Buyer will indemnify the Seller against all damages, costs and expenses incurred by the Seller as a result of the infringement or allegation. The Buyer will give the Seller all possible help in meeting any infringement claim brought against the Seller.
16. **BUYER'S ERROR IN ORDERING:**  
 In the event the Buyer orders incorrectly the Seller will be under no obligation to the Buyer to rectify or assist in rectifying the error.
17. **LAW AND JURISDICTION:**  
 The contract shall be subject in all respects to English Law and to the jurisdiction of the English Courts.

Durapipe UK reserves the right to modify the details in this publication as products and specifications are updated and improved. The content of this publication is for general information only and it is the user's responsibility to determine the suitability of any product for the purpose intended.

For further information on all Durapipe UK products and services contact our Customer Services Department as detailed below.

**Customer Services**

Tel: 01543 273100

Fax: 0800 317875

Durapipe UK is a trade name of Glynwed Pipe Systems Ltd. Company Number 1698059.

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