



HOTELS



APARTMENTS



THEATRES



LIBRARIES



friaphon

Sound attenuated drainage

Technical Data and Dimensions

SOUND ATTENUATED DRAINAGE

A purpose-designed sound reducing soil and rainwater 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)

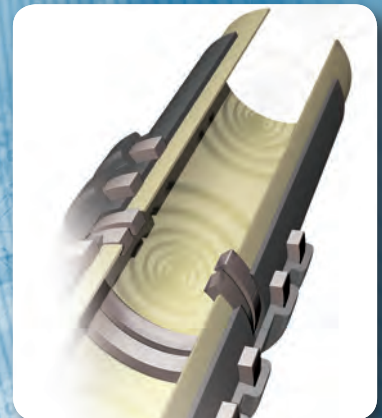
Key Product Features

- 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

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Understanding Sound

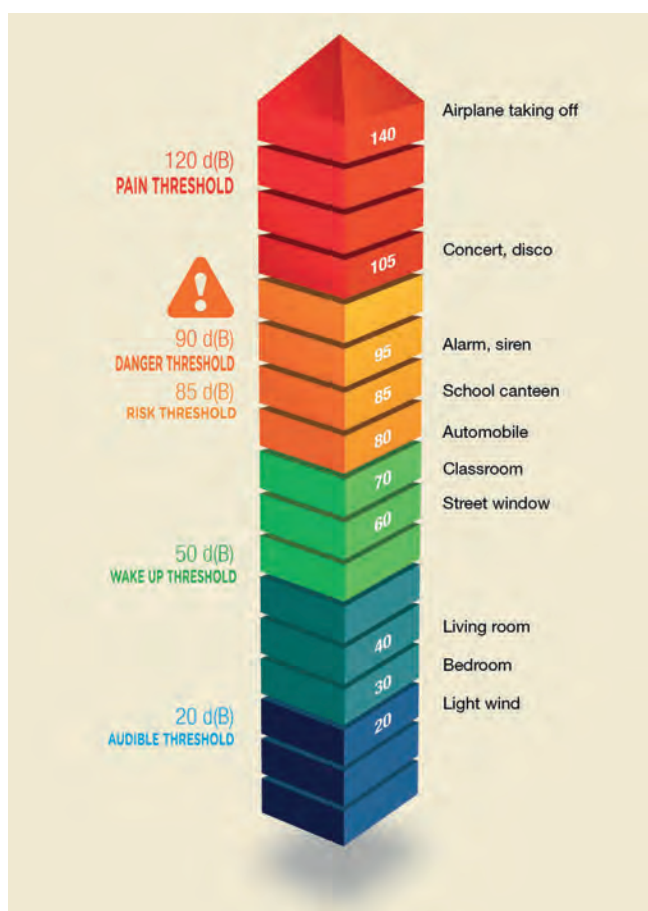
Sound travels in invisible waves through the air creating positive and negative changes in air pressure. These changes in air pressure (oscillations) are measured by their frequency (in Hertz/Hz) and sound level or loudness (in Decibels/dB). The louder a sound is, the larger the change in air pressure. The change here is from normal atmospheric pressure to the pressure disturbance made by the sound.

Sound pressure is usually measured in pascals (Pa) with one pascal equal to a force of one newton per square metre. A pascal is a small unit; the smallest sound pressure a human ear can hear is 20 micropascals (0.000020 Pa) with the sound of a jet engine from one yard equal to 630 Pa.

To make working with this range of numbers more manageable a special logarithmic scale was devised; the dB scale. Using this scale, if we were to take the lowest level we can hear (the threshold of hearing) and call it 0dB, that would make a sound one trillion times more powerful (a level known as the threshold of pain) register as 120dB. In other words, if we take the quietest sound our ear can hear (0dB) then a sound of 10dB would be 10 times more powerful or twice as loud; 20dB would be 100 times more powerful or 4 times as loud; 30dB would be 1,000 times more powerful or 8 times as loud, all the way up to 120dB, which would have 1,000,000,000,000 times the power of 0dB.

The dB logarithmic scale gives us a range of sound pressure levels that is more convenient (ranging from 0dB to 120db). But important to remember that a doubling of sound pressure levels from different sources is not the same as a doubling of loudness; two sound sources of 30dB would equate to 33dB, an increase of 3dB which we would experience as being just a bit louder.

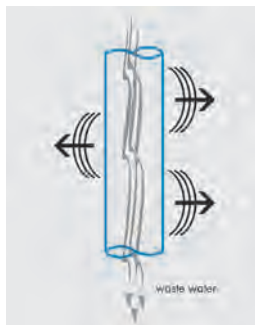
Subjective Impression	$10 \log p^2 / p_r^2$ (dB)	Pressure (10^{-6} Pa)
threshold of pain	120	20 000 000
very painful	100	2 000 000
very noisy	80	200 000
noisy	60	20 000
quiet	40	2 000
very quiet	20	200
threshold of hearing	0	20



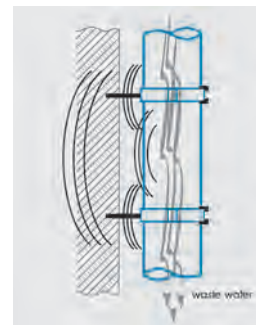
Sound from Soil & Rainwater Pipes

There are two types of noise to consider: Air-borne noise & Structure-borne noise. Air-borne noise is created as waste water flows through the soil pipe. Structure-borne noise is created as the soil pipe vibrates as waste water flows through it (acoustic resonance) which is transmitted through the building's structure and heard in the neighbouring rooms.

The Friaphon sound attenuated drainage system is purpose-designed to reduce these noises from soil & rainwater systems.



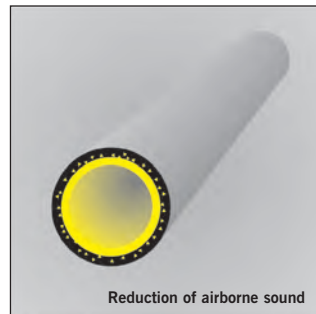
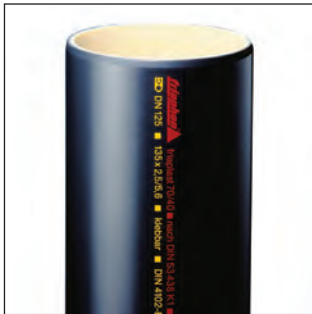
Air-borne noise



Structure-borne noise

The Friaphon System

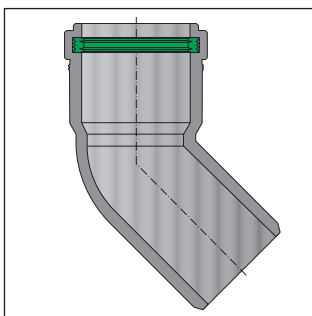
Friaphon pipe is manufactured by dual forming two materials of different density. Friaphon Dual Technology, with a mineral reinforced outer PVC layer, guarantees the excellent sound insulation and airborne sound reduction properties of the system.



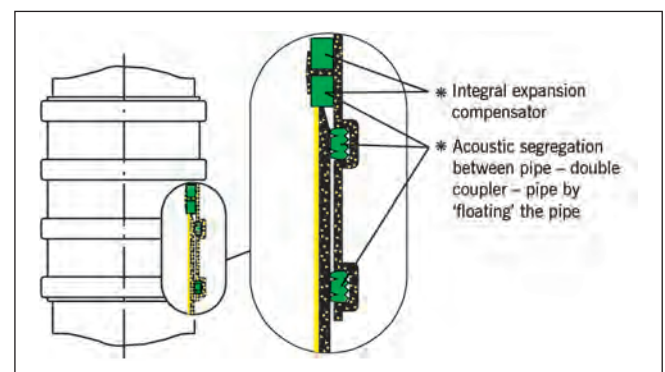
Sound waves are partially reflected along the boundary layers to be absorbed by the pipe's mass.



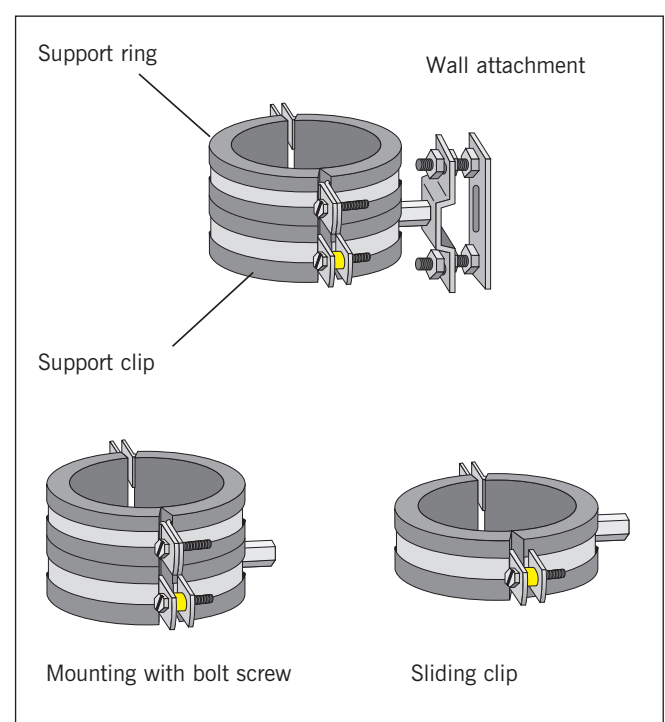
Fittings in the Friaphon range achieve a high sound insulation level due to increased wall thickness and rubber ring joints.



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 an integral expansion compensator enables expansion to be accommodated.



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



Friaphon is a purpose-designed sound attenuated drainage system in sizes 110mm & 160mm for installation in accordance with BS EN 12056 suitable for above ground soil & waste and internal rainwater services.

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 EN 1451.

Friaphon has been sound tested at the Fraunhofer Institute for Building Physics, Stuttgart, according to BS EN 14366: Laboratory measurement of noise from waste water installations. Test report P-BA 154/2010e.

Friaphon Specifications

Characteristics	Performances
Material	Pipes: Internal layer: PVC-U in beige colour External layer: PVC-U modified for improved acoustic performances using mineral compounds; colour grey Fittings: PVC-U in grey Gaskets: EPDM hardness 50 Shore A according to BS EN 681-1 standard
Volumetric mass/density	Pipes: 1600 kg/m ³ +/- 100 kg/m ³ Fittings: 1400 kg/m ³ +/- 100 kg/m ³
Durability	Equivalent to that of compact PVC-U pipes covered by NF-T 54030 and BS EN 1329-1 standards
Fire Reaction Rating	B s1 d0 Euroclass according to BS EN 13501
Temperature Rating	95°C (short term) according to BS EN 476
Creep at 150°C	5% maximum
Expansion coefficient	0.08 mm/m/°C
Pressure resistance	With push-fit fittings: 0.5 bar With cemented fittings: 3 bar



Sound Insulation

Overview of the structural requirements for sound insulation

National standards on recommended maximum sound pressure levels in residential buildings vary by country, with 30dB generally accepted as a maximum sound pressure level in rooms requiring protection, e.g. living rooms and bedrooms.

In the UK, Building Regulations Approved Document Part E (2010): Resistance to the passage of sound - stipulates acoustic requirements of 45dB or less. This applies to any kind of building used as a dwelling, including houses and apartments and rooms for residential purposes such as students and nurses accommodation, nursing homes, hotels, etc.

According to Building Regulations Part E, pipes and ducts that penetrate a floor separating habitable rooms in different flats should be enclosed for their full height in each flat. The enclosure should be constructed of material having a mass per unit of at least 15 kg/m². Either line the enclosure or wrap the duct of pipe within the enclosure with 25mm unfaced mineral wool.

Friaphon acoustic performance

The acoustic performance of the Friaphon sound attenuated drainage system has been measured at the Fraunhofer Institute of Building Physics (IBP), Stuttgart in accordance with BSEN14366: Laboratory measurement of noise from waste water installations. The test set up and the results are shown below.

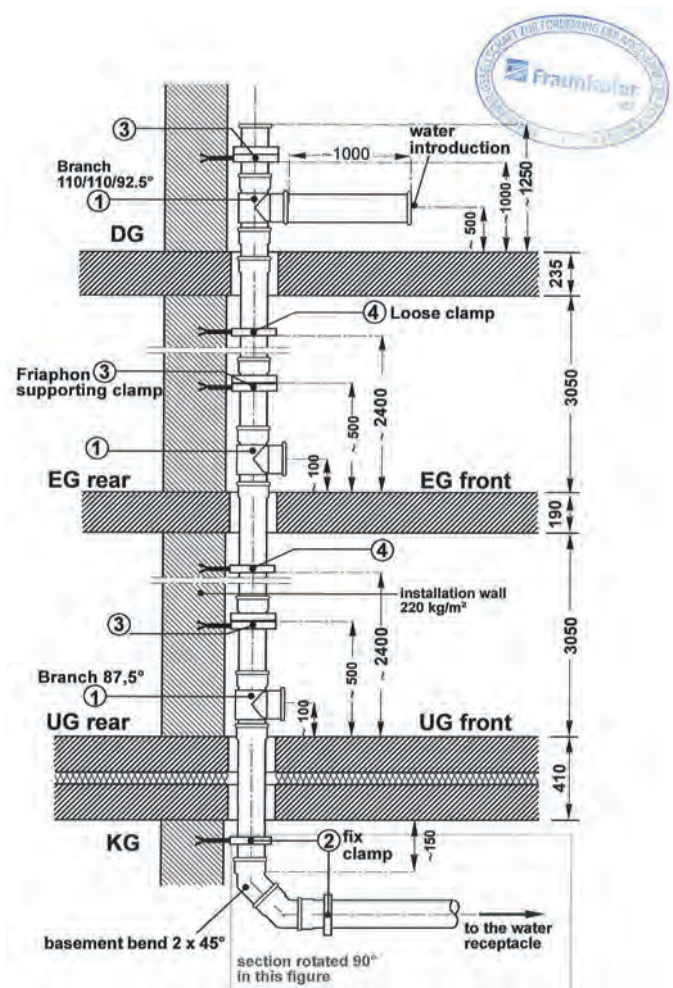
A Friaphon down pipe was installed leading from the top floor (DG) down to the sub-basement (KG) and fastened to the installation wall by means of the Friaphon rubber lined support clips. A water inlet pipe was connected on the top floor level and water introduced according to the standard BSEN14366.

As the noise generation in a waste water system depends on the flow rate, noise measurements are performed at several typical flow rates; 0.5, 1.0, 2.0 & 4.0 litres per second (l/s). A flow rate of 2 l/s roughly corresponds to the average flow rate required for flushing a toilet.

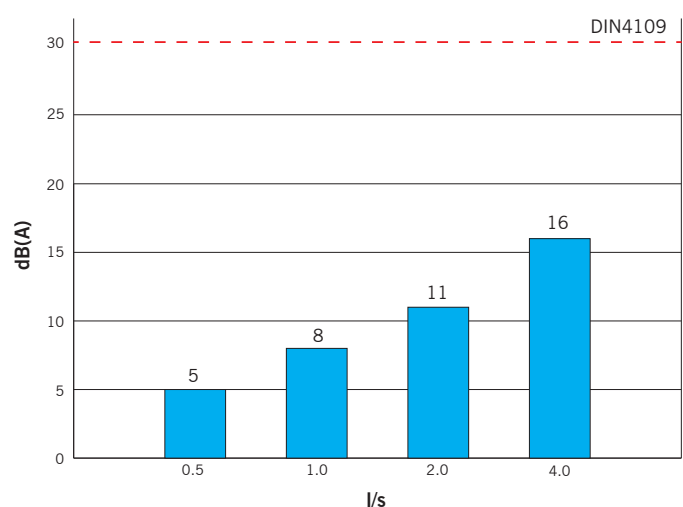
Noise measurements are then taken in the room behind the installation wall (UG rear).

The test results show that Friaphon is comparable with a lagged, single wall plastic soil system in terms of noise reduction and, indeed, is actually quieter at the higher flow rates of 2 l/s and 4 l/s. Friaphon, therefore, meets the noise reduction requirements of Building Regulations, Part E.

Note: The full test reports from the Fraunhofer Institute are available on request.



Friaphon recorded sound levels according to BS EN 14366



Note: Noise tests and measurements were performed according to BS EN 14366: Laboratory measurement of noise from waste water installations. Sound levels below 10dB(A) are subject to increased measurement uncertainty and moreover are not noticeable in a normal living environment.

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 DN 100 3000	160 x 6.3 DN 150 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 ¹ / ₂ °	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 ¹ / ₂ °	110/110	
	Corner branch 92 ¹ / ₂ °	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 $\cong$ DN 100	d = 160 $\cong$ 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 (Waste Manifold)	50	
	Support clip with support ring and wall fixing	110	160
	Intermediate sliding clip	110	160

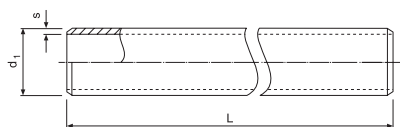
System Description

Product range overview

Illustration	Description	Size d in mm	
		d = 110 $\cong$ DN 100	d = 160 $\cong$ DN 150
	Lubricant	125 gram	
	Adhesive	500 ml	
	Primer	1 ltr	
	Pipe cutter	50/125	
	Chamfering tool		

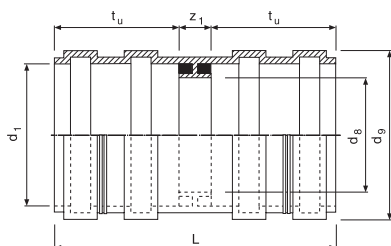
Dimensional Data

Sound insulated pipe with smooth ends



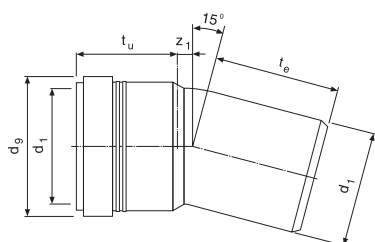
d1 mm	s mm	L mm	kg/m	l/m	Ref. No.
110	5.3	3000	2.65	7.7	FP 12 12 71
160	6.3	3000	4.59	17.0	FP 12 12 73

Double couplers (standard connector)



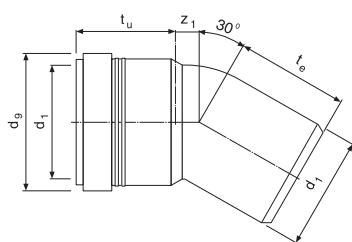
d1 mm	d8 mm	d9 mm	z1 mm	tu mm	L mm	Ref. No.
110	95.0	132	14	61.5	137	FP 12 22 70
160	142.0	187	14	78.0	170	FP 12 22 72

Bends 15°



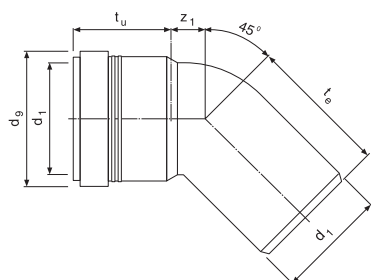
d1 mm	d9 mm	z1 mm	tu mm	te mm	Ref. No.
110	132	14	60	72	FP 12 20 19
160	187	19	71	93	FP 12 20 31

Bends 30°



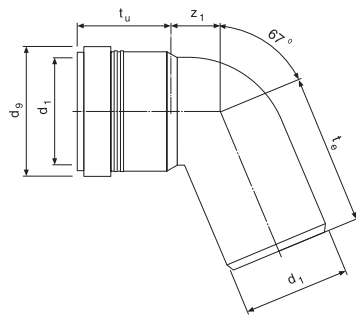
d1 mm	d9 mm	z1 mm	tu mm	te mm	Ref. No.
110	132	21	60	80	FP 12 20 20
160	187	30	71	104	FP 12 20 32

Bends 45°



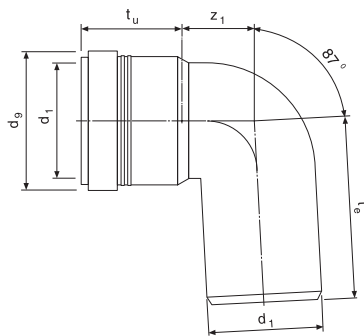
d1 mm	d9 mm	z1 mm	tu mm	te mm	Ref. No.
110	132	29	60	88	FP 12 20 21
160	187	42	71	116	FP 12 20 33

Bends 67°



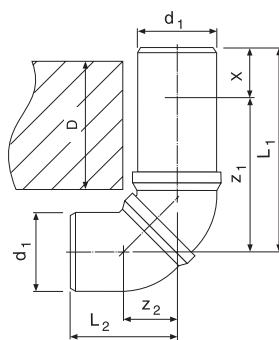
d1 mm	d9 mm	Z1 mm	tu mm	te mm	Ref. No.
110	132	49	60	107	FP 12 20 22

Bends 87°



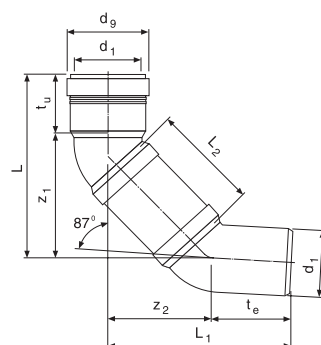
d1 mm	d9 mm	Z1 mm	tu mm	te mm	Ref. No.
110	132	61	60	120	FP 12 20 24
160	187	89	71	163	FP 12 20 36

Short cushioning sections height of fall up to 10m



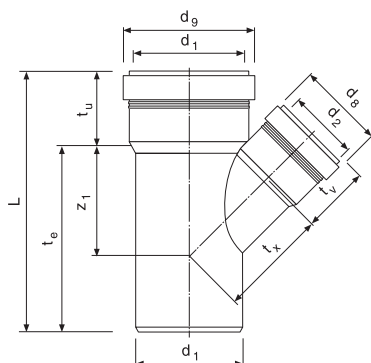
d1 mm	z1 mm	z2 mm	X mm	L1 mm	L2 mm	D mm	Ref. No.
110	170	56	120	285	144	145-270	FP 12 23 07
160	237	73	60	296	189	220-270	FP 12 23 09

Long cushioning sections height of fall exceeding 10m



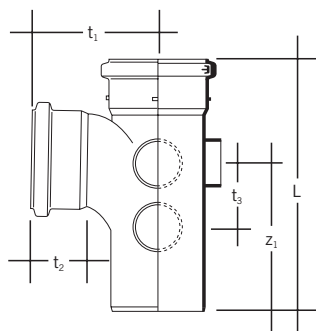
d1 mm	d9 mm	z1 mm	z2 mm	tu mm	te mm	L mm	L1 mm	L2 mm	Ref. No.
110	132	266	213	60	88	320	301	250	FP 12 23 01
160	187	295	230	71	116	361	346	250	FP 12 23 03

Branch 45°



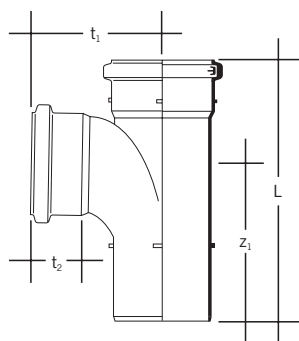
d1 mm	d2 mm	d8 mm	d9 mm	z1 mm	tu mm	te mm	tv mm	tx mm	L mm	Ref. No.
110	110	132	132	134	60	223	60	134	283	FP 12 22 24
160	110	132	187	159	71	240	60	168	311	FP 12 22 39
160	160	187	187	194	71	310	71	194	381	FP 12 22 45

Single branch 92½° five boss



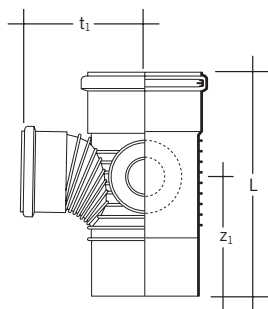
Size mm	L mm	t1 mm	t2 mm	z1 mm	t3 mm	Ref. No.
110	300	150	60	175	76	FP 12 26 01

Single branch 92½°



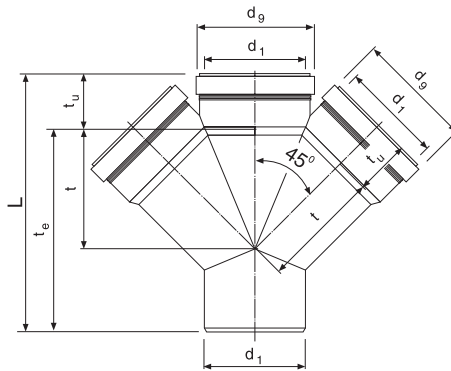
Size mm	L mm	t1 mm	t2 mm	z1 mm	Ref. No.
160	438	245	96	260	FP 12 27 03

Single branch 92½° two boss, unequal



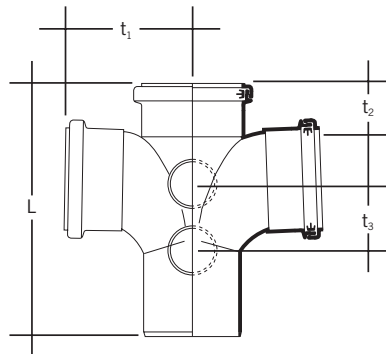
Size mm	L mm	t1 mm	z2 mm	Ref. No.
160 x 110	337	175	175	FP 12 28 03

Double branch 45°



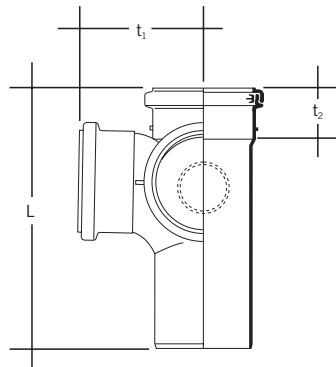
d1 mm	d9 mm	t mm	te mm	tu mm	L mm	Ref. No.
110	132	130	223	60	283	FP 12 22 48

Double branch 92½° four boss



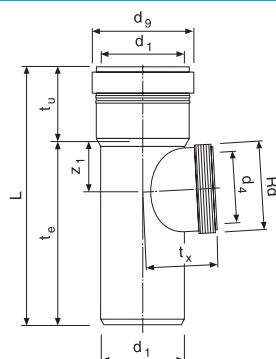
Size mm	L mm	t1 mm	t2 mm	t3 mm	Ref. No.
110	288	141	54	76	FP 12 30 01

Corner branch two boss/access upstands



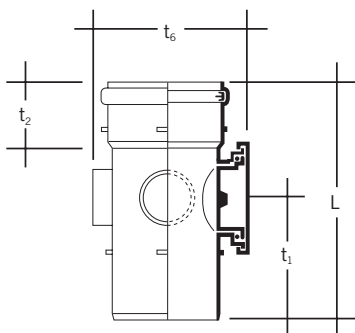
Size mm	L mm	t1 mm	t2 mm	Ref. No.
110	384	242	190	FP 12 31 01

Access pipes



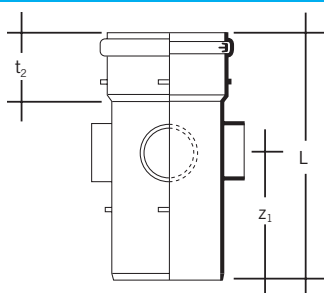
d1 mm	d4 mm	d9 mm	Rd mm	z1 mm	tu mm	te mm	tx mm	L mm	Ref. No.
110	93	132	110 x 1/6	62	60	182	80.0	242	FP 12 25 26
160	93	187	110 x 1/6	89	71	252	110.0	323	FP 12 25 28

Access boss pipe three boss upstands



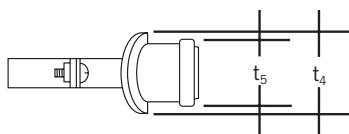
Size mm	L mm	t ₁ mm	t ₂ mm	t ₆ mm	Ref. No.
110	244	123	70	152	FP 12 32 01

Boss pipes four boss upstands, one open



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

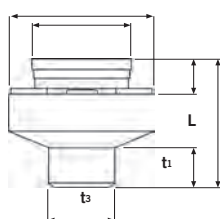
Strap-on bosses



Size mm	t ₄ mm	t ₅ 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

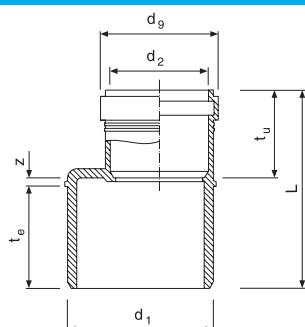
*For 32mm, 40mm and 50mm waste pipe connection use boss connectors/adaptors detailed on page 18.

Waste manifold (32, 40, 50mm)



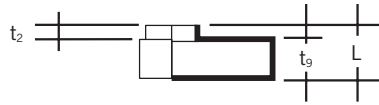
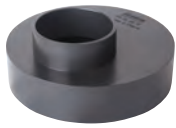
Size mm	L mm	t ₁ mm	t ₂ mm	t ₃ mm	t ₄ mm	t ₅ mm	Ref. No.
110	208	68	51	110	132	183	FP 12 43 01

Reducer



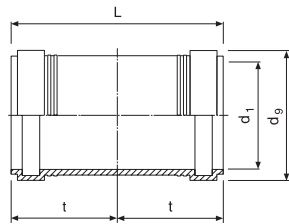
d ₁ mm	d ₂ mm	d ₉ mm	t _u mm	t _e mm	z mm	L mm	Ref. No.
160	110	132	60	80	4.0	144.0	FP 12 25 10

Reducer solvent socket, single boss upstand



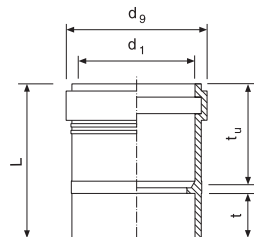
Size mm	L mm	t ₉ mm	t ₂ mm	Ref. No.
110 x 50	48	25	19	FP 12 38 01

Sleeves



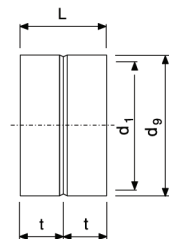
d ₁ mm	d ₉ mm	t mm	L mm	Ref. No.
110	132	62.5	125	FP 12 25 30
160	187	79.0	158	FP 12 25 32

Bonding sleeves



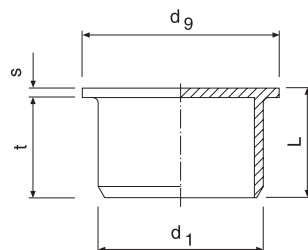
d ₁ mm	d ₉ mm	t _u mm	t mm	L mm	Ref. No.
110	132	60	32	95	FP 12 25 44
160	187	71	42	117	FP 12 25 46

Double bonding sleeves



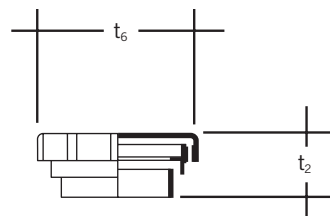
d ₁ mm	d ₉ mm	t mm	L mm	Ref. No.
110	115	35	73	FP 12 25 62
160	167	42	88	FP 12 25 64

Socket plug



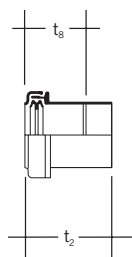
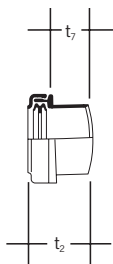
d ₁ mm	d ₉ mm	t mm	s mm	L mm	Ref. No.
110	120	32.0	5	37.0	FP 12 25 40

Access cap solvent socket, screwed



Size mm	t ₆ mm	t ₂ 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 ₂ mm	t ₇ mm	Ref. No.
32	87½°	43	21	FP 12 39 01
40	87½°	43	21	FP 12 39 02

Size mm	Angle	t ₂ mm	t ₈ 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/waste manifold)*



Size mm	Ref. No.
50 (90°)	FP 12 41 01

*For 50mm waste pipe connection to waste manifold.

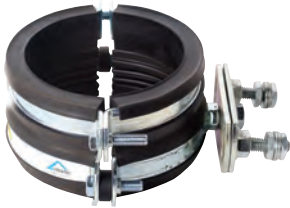
Fire Collars

NEW



Size mm	Collar ID mm	Collar OD mm	Hole Centres mm	Anchor Depth mm	Ref. No.
110	120	142	150	60	FC6/110
160	170	200	210	60	FC6/160

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 ltr	Ref. No.
1	GD171P

Adhesive



Contents ml	Ref. No.
500	03 462 397

Tools

Pipe cutter



Size	Ref. No.
50-125 mm	FT 80 00 03
110-168 mm	FT 80 00 09

Chamfering tool



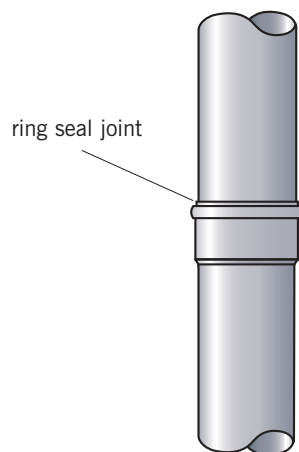
Ref. No.
FT 55 05 10

Design

Methods of jointing

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

Note: For internal rainwater pipes use Friaphon bonding sleeves. See pages 24-25.



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

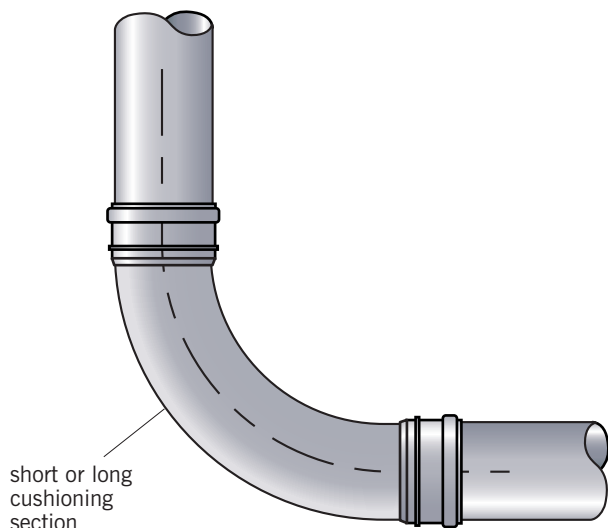
All sanitary pipework systems should be designed in accordance with BS EN 12056: 2000, Parts 1 to 5.

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.



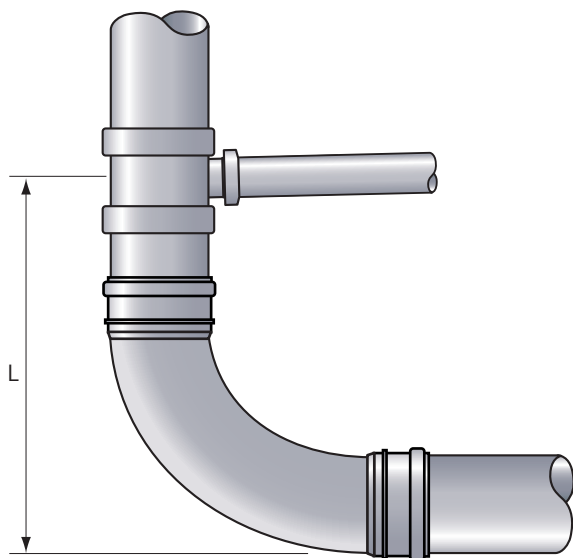
Bends at the base of stacks

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.



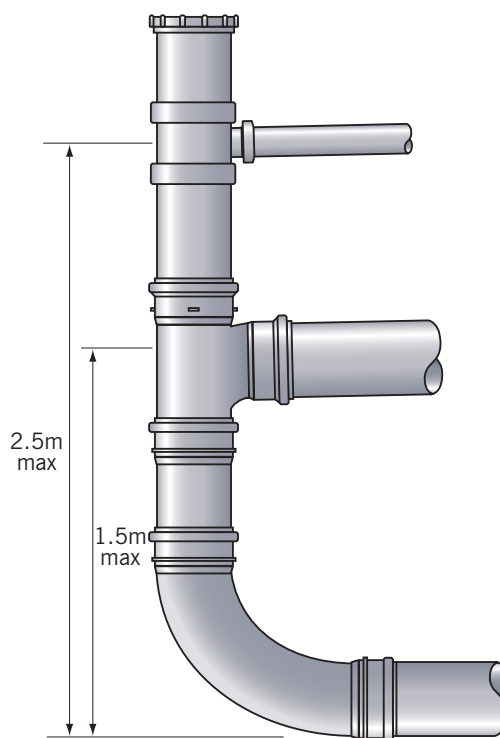
L = 450mm up to three storeys high
L = 740mm up to five storeys high
L = one storey height, over five storeys

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.

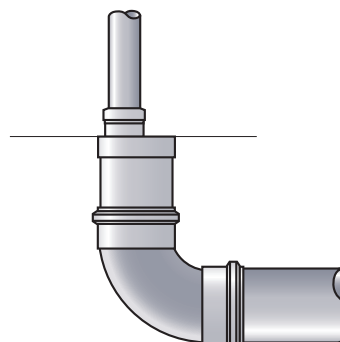
Stub stacks

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.



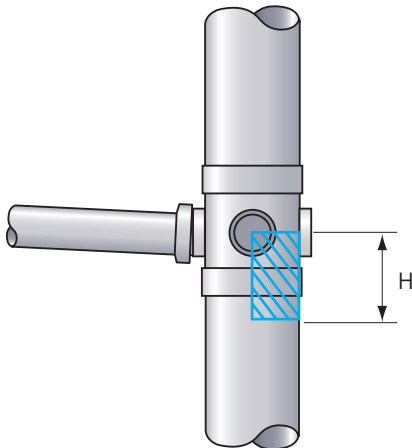
Stub waste

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.



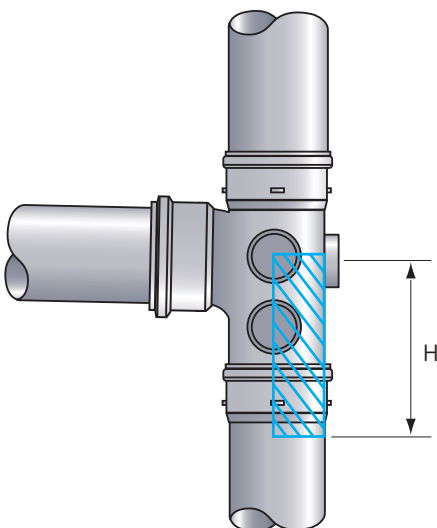
Prevention of cross-flow

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.

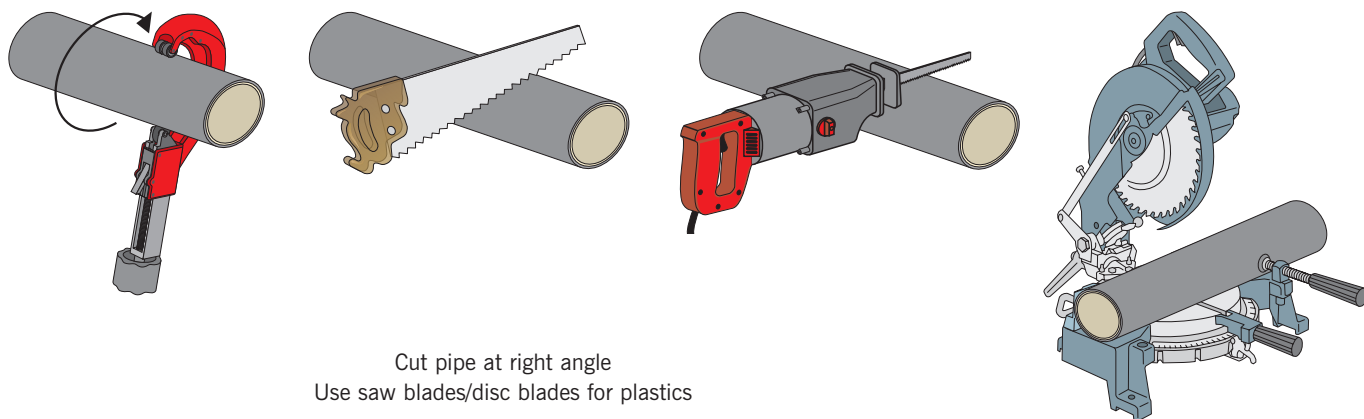


'H' = 200mm irrespective of stack diameter

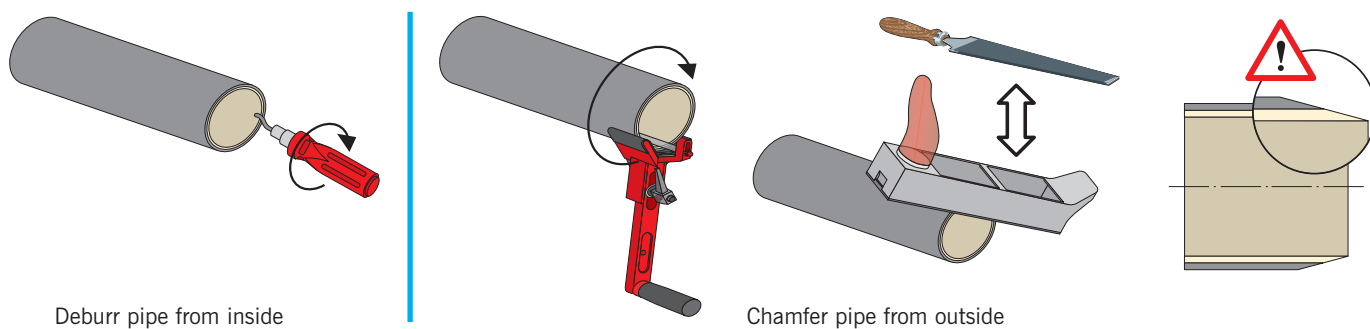
Joining

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

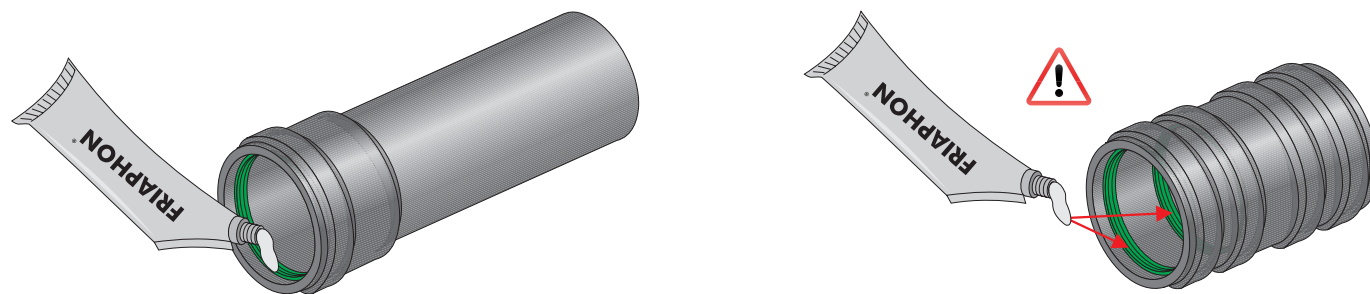
Pipe cutting



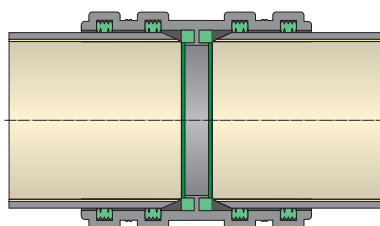
Chamfering/deburring



Push-fit jointing



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



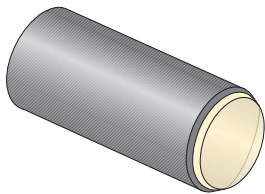
Push part as far as it goes

Bonding

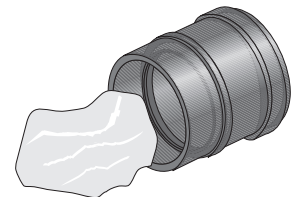
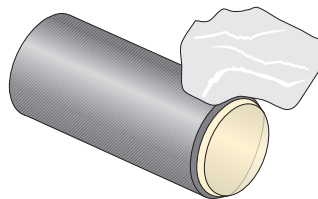


Only use primer and adhesive approved for Friaphon products. Any use of inappropriate primers and adhesives may damage the pipe material and cause leaky connections.

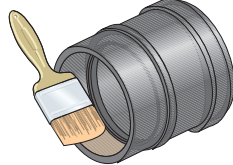
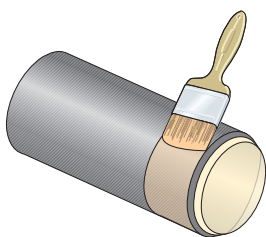
Bonding



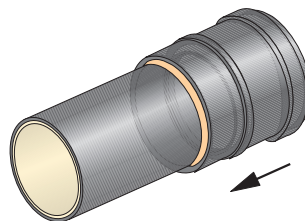
Chamfer pipe



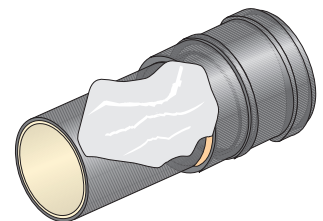
Clean faces to be bonded



Apply adhesive all over faces with brush

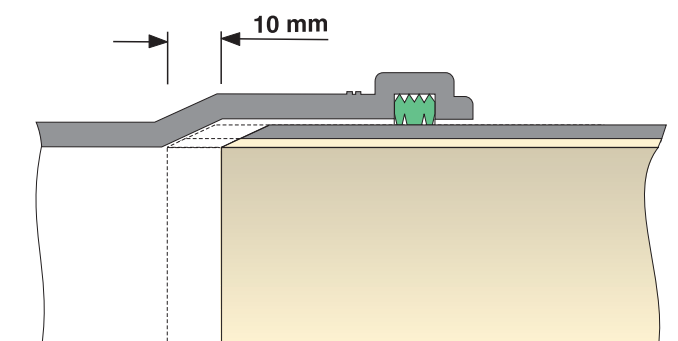


Insert pipe to maximum depth

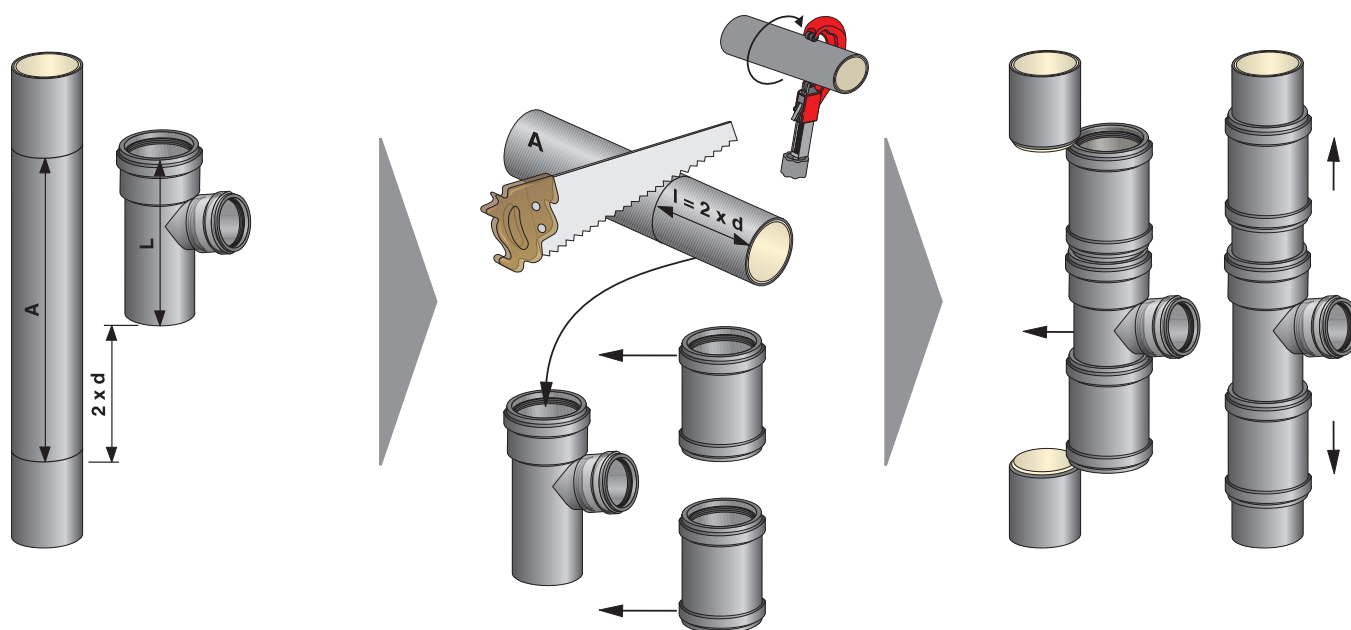


Remove excess adhesive

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



Subsequent installation of branches



Cut off pipe length $A = L + 2 \times d$ using a roller pipe cutter or saw; 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

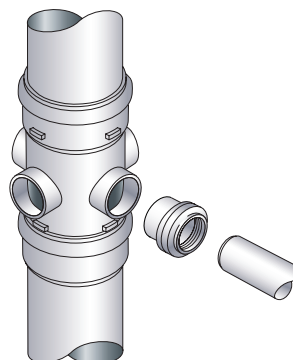
1. Multiple entry boss pipes

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.

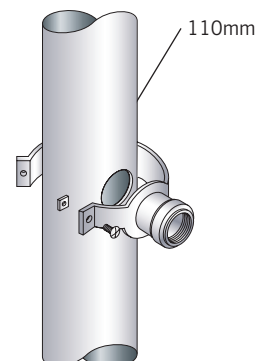
2. Strap-on-bosses

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.

1.



2.



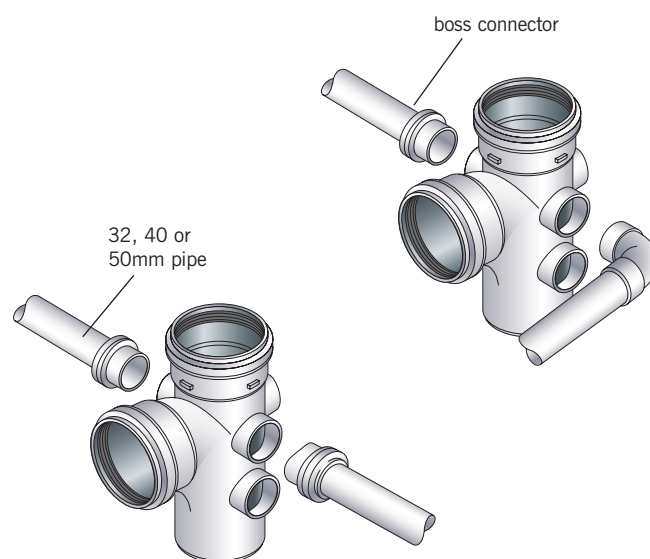
Boss branches

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 EN 1451 and metric size copper to BS EN 1057.

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

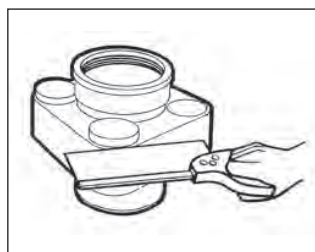
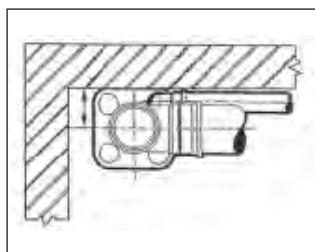
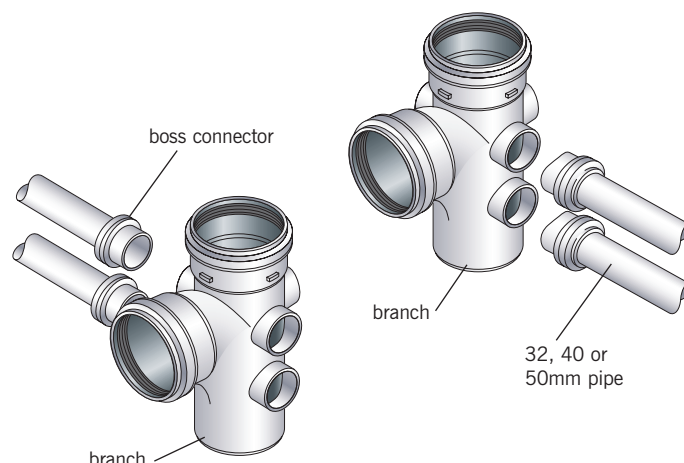
Boss pipes were developed for use in horizontal situations where it is recommended that connection to the larger diameter pipe is made at 45°. These have solvent weld sockets to receive 50mm diameter PVC to BS EN 1566 or abs waste pipes to BS EN 1566.

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

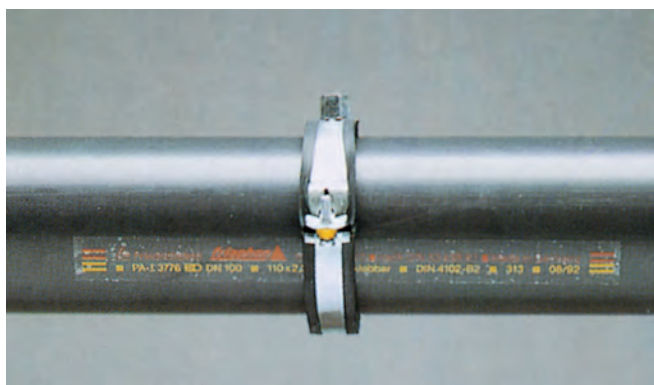
Fixing techniques

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.

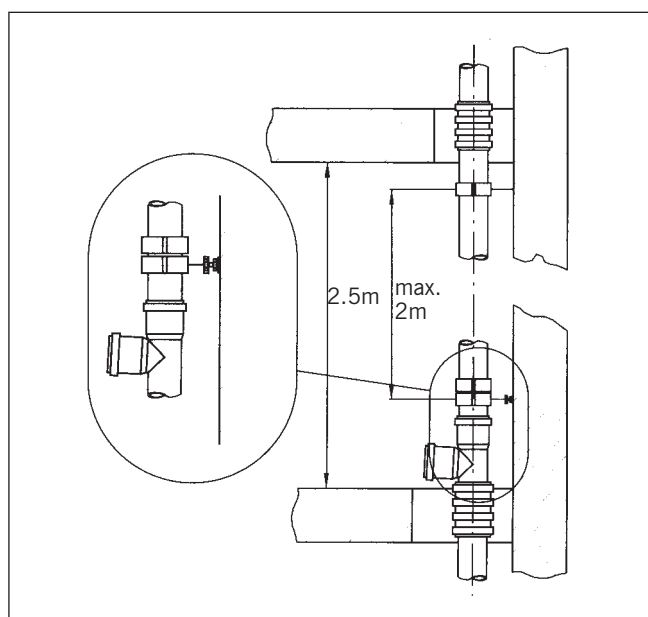


The spacing of the pipe clips must not exceed 2m for vertically installed pipes and 10 times the external diameter of the pipe ($10 \times d$) for horizontally installed pipes. Care must be taken to ensure that pipe clips are fitted as close as possible to the floor and the ceiling.

Pipe attachment for vertical runs.

Top: with a sliding clip.

Bottom: with the Friaphon support clip and support ring.



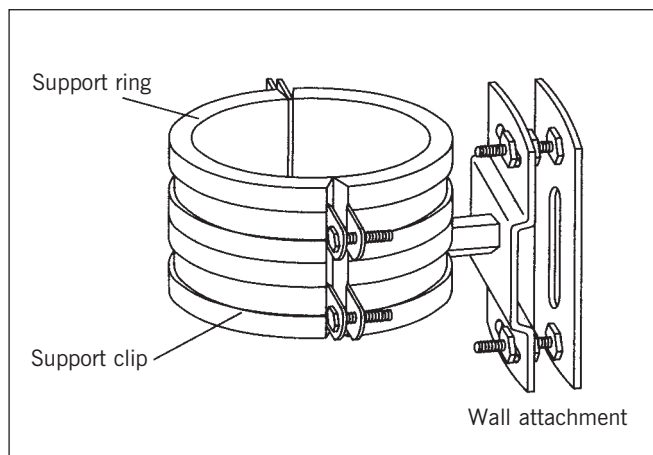
Pipe clip spacings

External diameter d	DN	Horizontal clip spacing $10 \times d$	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.



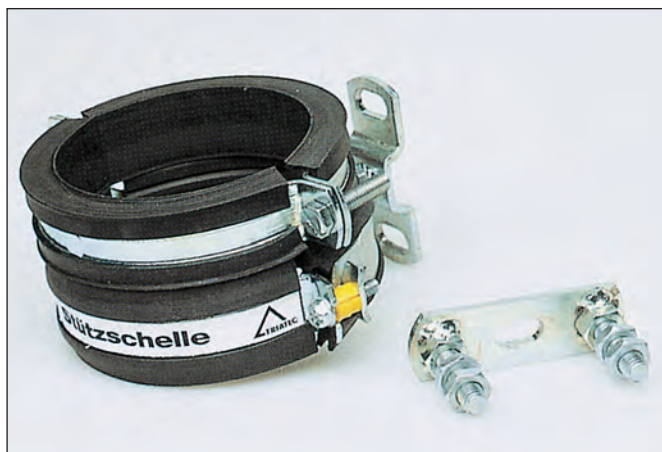
Friaphon support clip complete.



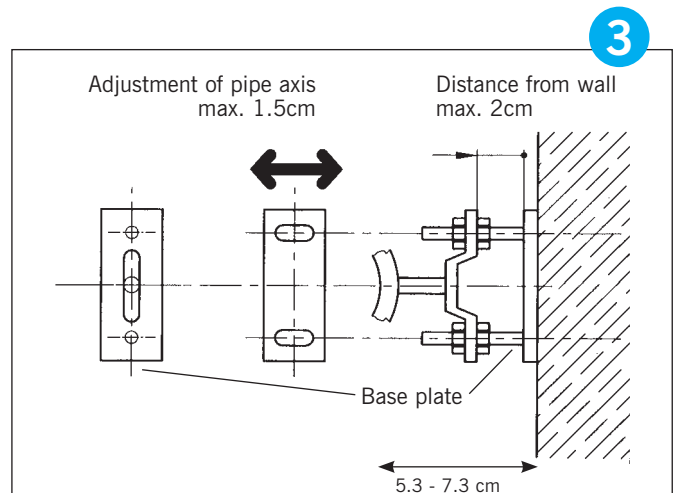
Mark, drill and fit the wall attachment.



Adjusting the distance from the wall.



Friaphon support clip complete.



Adjustment options on the wall fixing.

Installation

Fitting instructions



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



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



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



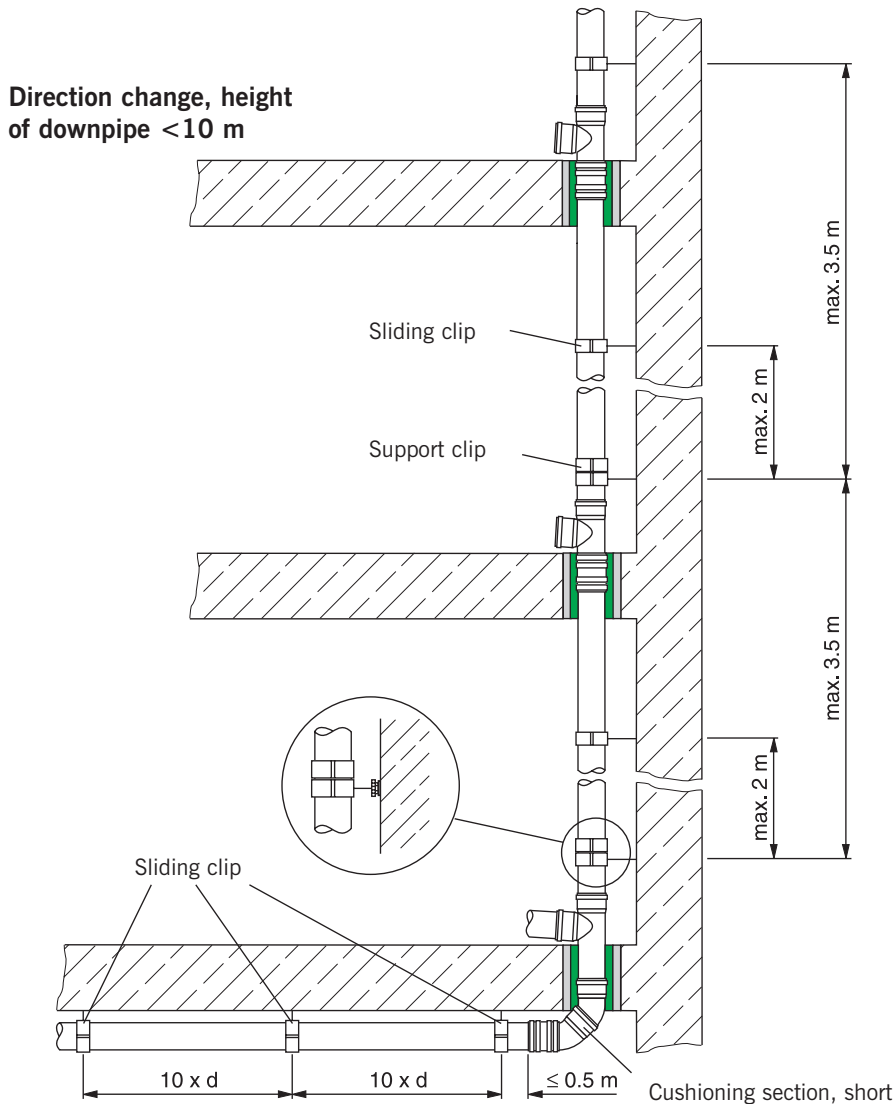
Fix the support ring onto the Friaphon pipe so that it rests on the support clip.



Finished assembly of the complete Friaphon support clip.

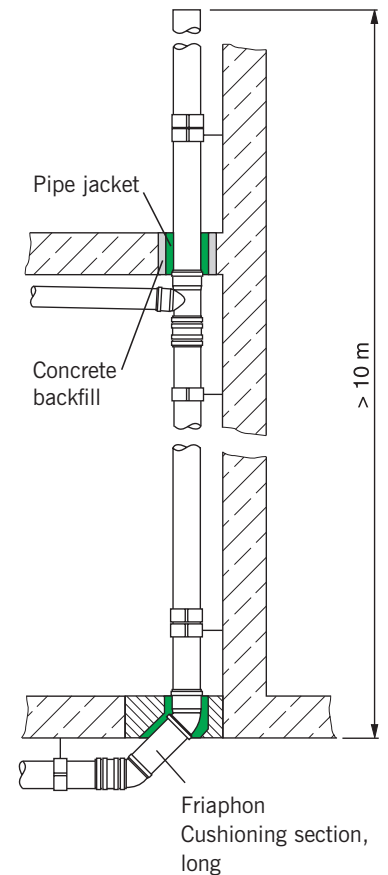
Installation of pipes

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

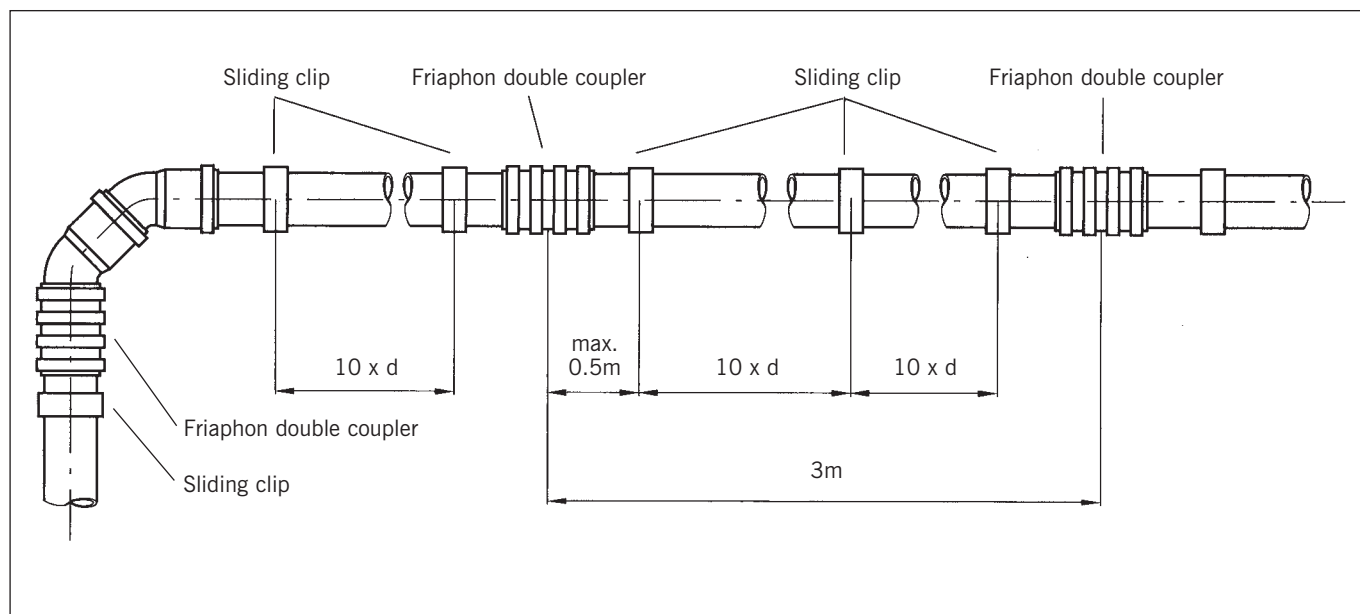


Pipe Jacket

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

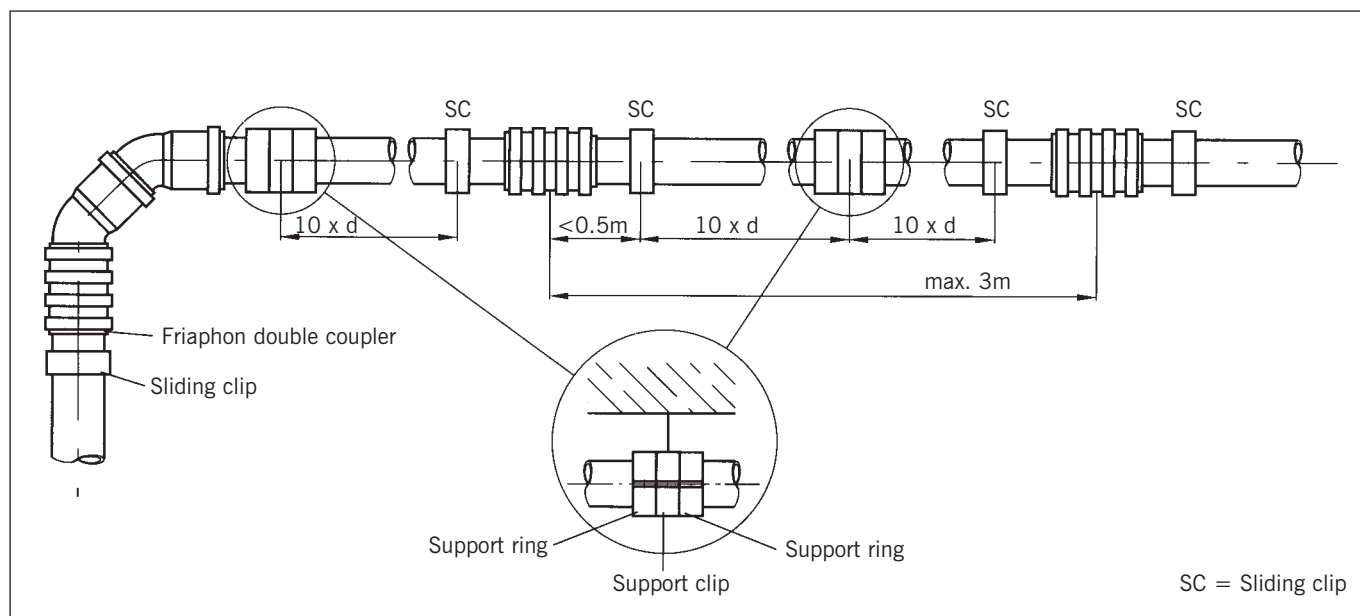
Installation of pipes

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.



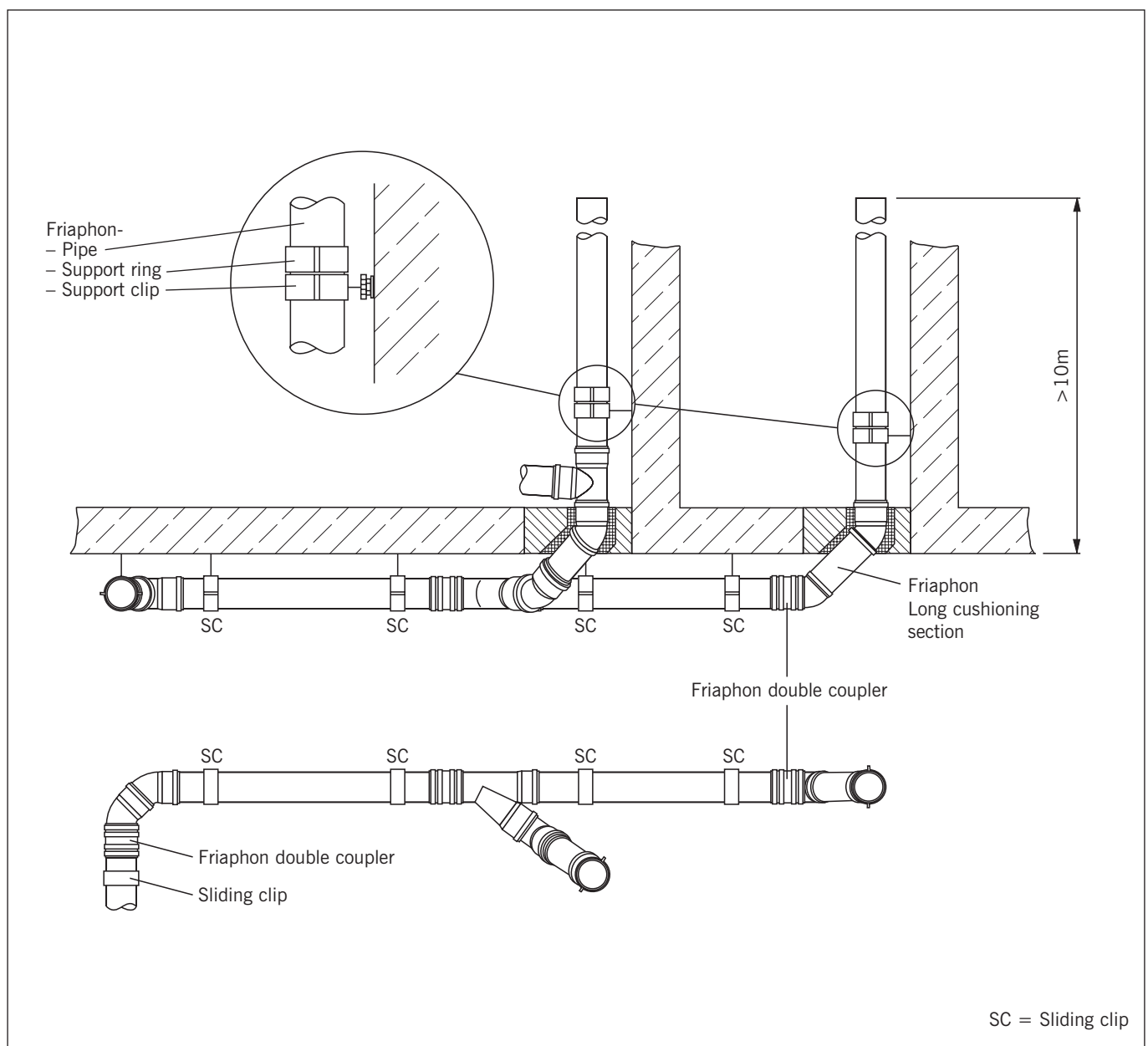
Installation of pipes

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.

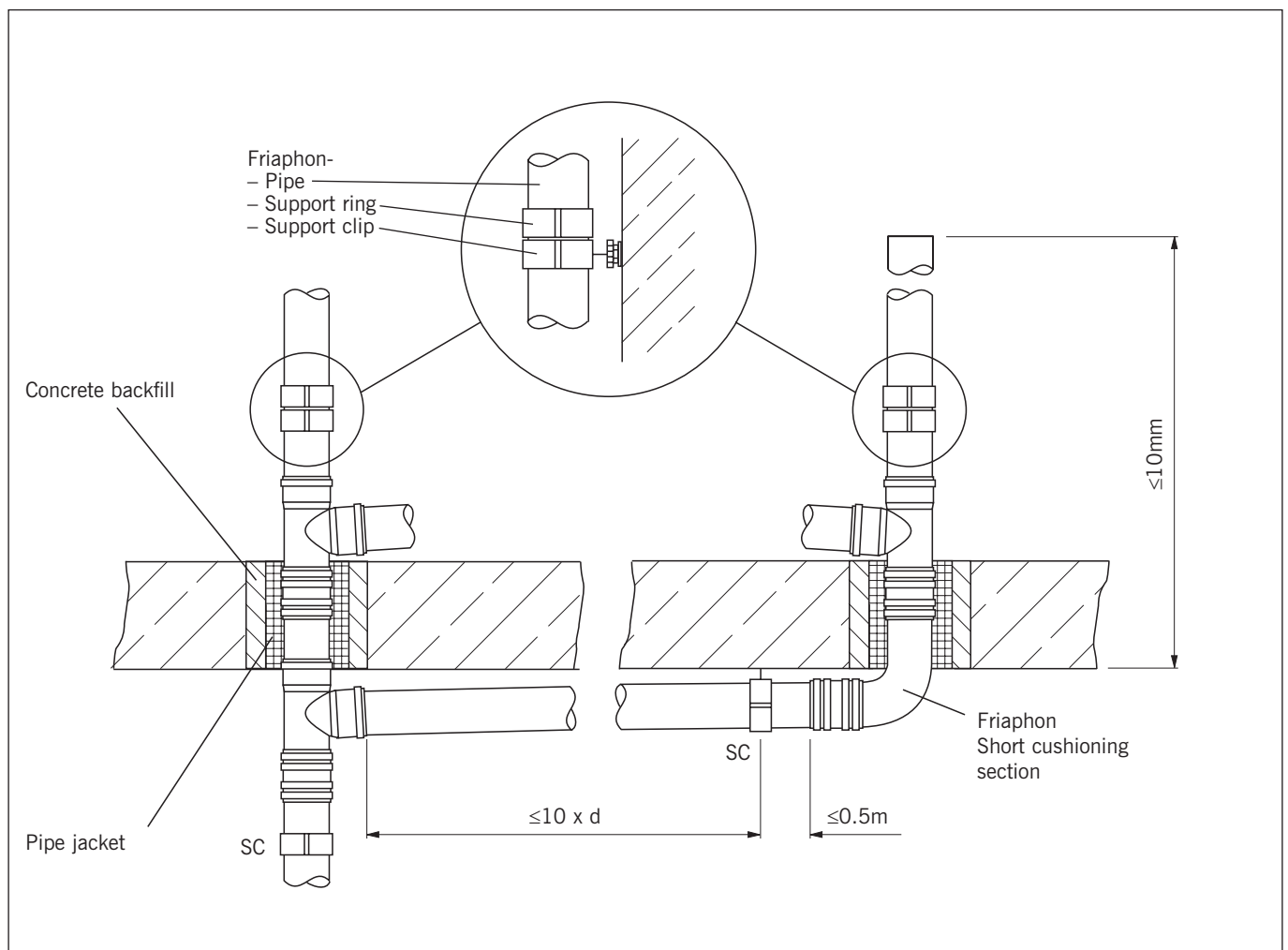
If a horizontal pipe is fixed to the ceiling as a collector pipe, every change of direction from vertical to horizontal must be made with two 45° bends and one 250mm cushioning section (i.e. a long cushioning bend).



Installation of pipes

Assembling short runs of pipes

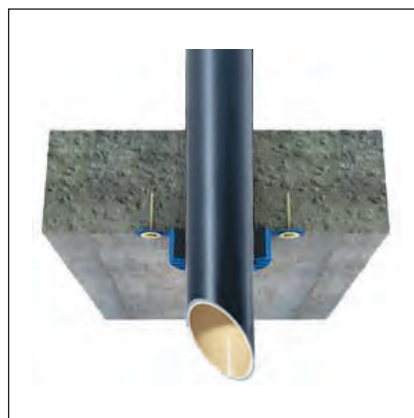
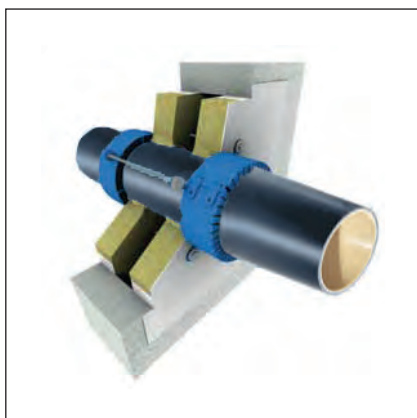
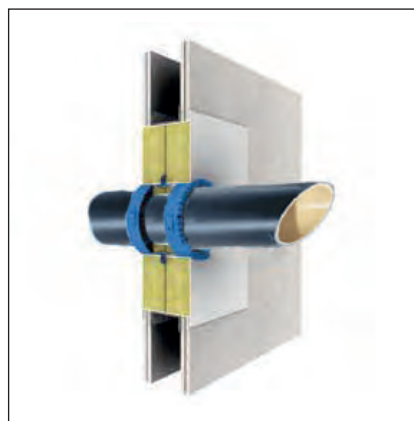
Even when assembling short horizontal runs of pipe with a length $\leq 10 \times d$, as shown in the illustration, a sliding clip must be fitted as close as possible to the cushioning section in order to stabilise the position.



Fire protection collar

Durapipe recommends the use of Promat's PROMASTOP® FC6 fire collars for Friaphon.

Reference	FRIAPHON pipe OD (mm)	Collar ID (mm)	Collar OD (mm)	Hole centres (mm)	Anchoring depth (mm)
FC6/110	110	120	142	150	60
FC6/160	160	170	200	210	60

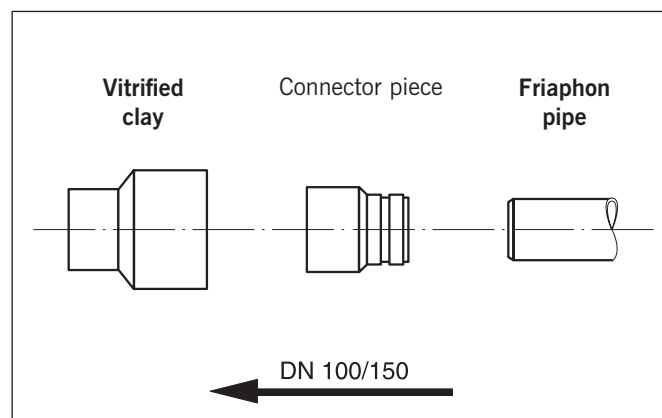
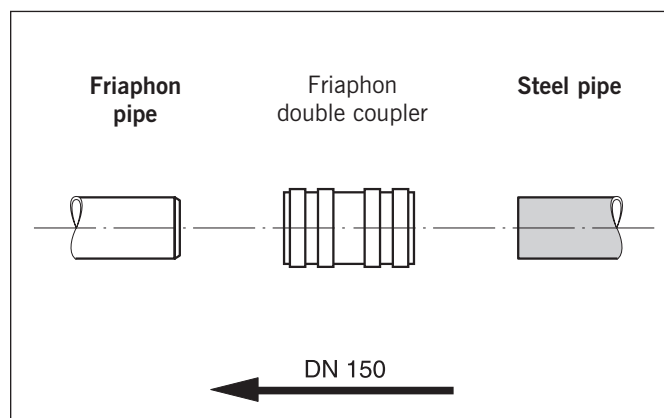
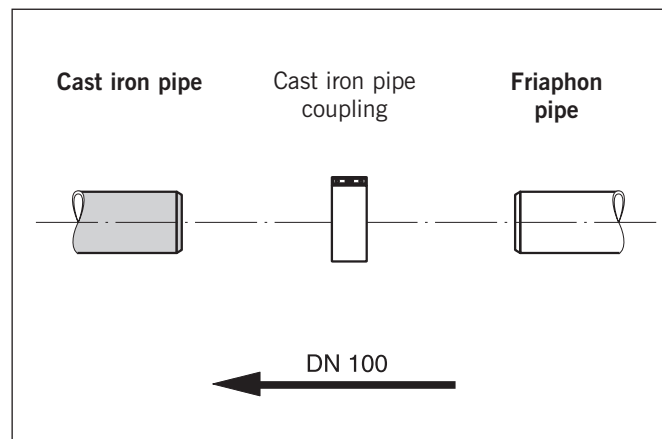
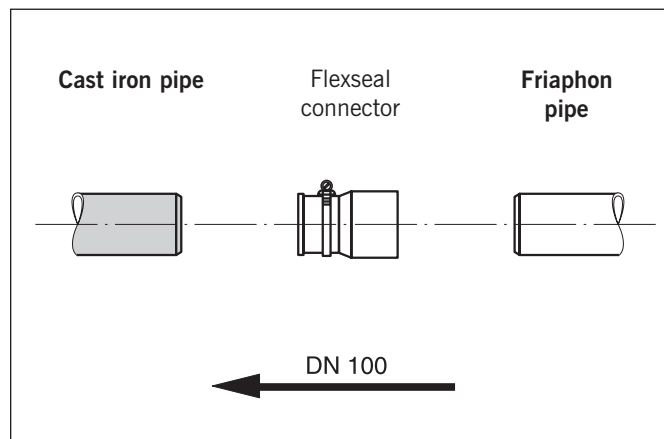
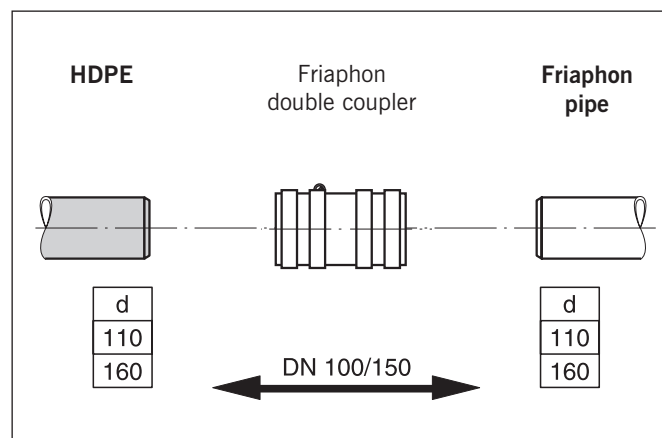
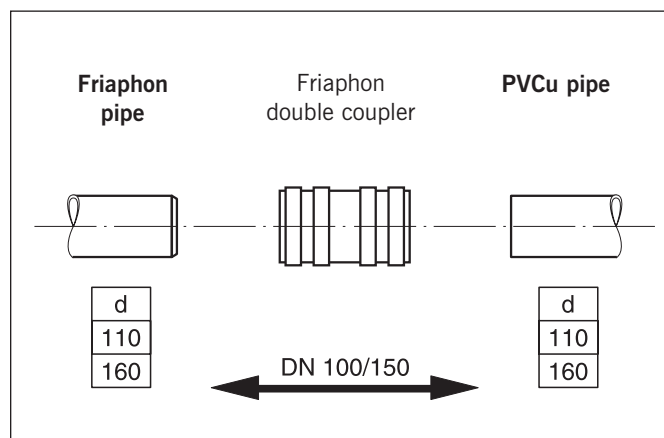


For installation guidance, copies of test reports or product data sheets contact the Durapipe Technical Support Department.

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	110	110	110	116	102
150	160	160	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

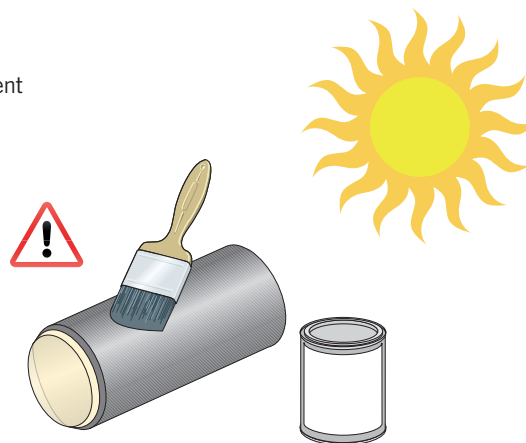
Friaphon pipes are strong, though lightweight and therefore very easily handled. However, reasonable care should be exercised while handling, particularly in extremely cold conditions. Pipes should preferably be loaded and unloaded by hand but if mechanical handling is used, protected slings are recommended.

Recyclability

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

Installation Outdoors

Protect the FRIAPHON product range against permanent UV radiation.



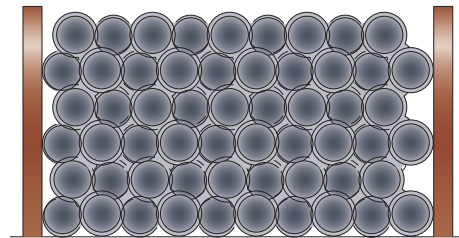
Use water-based paint (solvent free).

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



Beetham Tower, Manchester

The Friaphon system was specified for all drainage requirements across 43 floors throughout the hotel, residential bathrooms and Sky Bar. "Friaphon was specified because it incorporates excellent sound insulation, which was a crucial requirement to minimise the noise emitted by sanitary installations within this development. It is also ideal for a large scale project like Beetham Tower, as separate insulation is not needed."



Post Box, Birmingham



The Post Box development comprises luxury apartments on five floors. It was important that a drainage system was fitted to minimise any noise emitted by sanitary installations within the luxury accommodation.

Friaphon's built in sound insulation properties also meant that extra services were not required to lag the casts between lower and higher apartments.

FRIAPHON Case Study Examples

Abraham Darby Academy, Telford



Friaphon was specified in various sizes due to its acoustic properties, the system has a proven track record of delivering outstanding noise reduction results. Minimising noise from drainage applications is key to creating a comfortable and stimulating learning environment, so this was an important factor when considering products. It is also a lower installed cost alternative to cast iron as it does not need to be lagged, and combining this with its push fit assembly, makes the installation process quicker and easier.

Kingsland Apartments, London

Friaphon was specified in 100mm to upgrade the existing drainage system. The pipework system was chosen as it boasts exceptional noise minimising properties and proves to be yet another plastic pipework system that outperforms traditional materials.



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.
 - c) Certain products are denoted 'MTO' in the Seller's published price lists. These products are Made to Order Goods and the Seller manufactures or procures these goods on a bespoke basis only. Where a Buyer has made an offer for 'MTO' products that the Seller has accepted in writing the Buyer forfeits their right to cancel their offer unless the Seller confirms in writing that it will accept cancellation by the Buyer. Where the Seller does not provide written confirmation of the Buyer's cancellation the Buyer remains liable for the full contractual value of all 'MTO' products. 'MTO' 'Call-Off' orders must be taken within 12 months of the original order date.
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 – ie: 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: +44 (0)844 800 5509

Fax: +44 (0)1543 471682

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

Registered office:

Durapipe UK

Hyslop Close

Swaffield Park

Cannock

Staffordshire

WS11 7FU

United Kingdom

Tel: +44 (0)1543 471680

Fax: +44 (0)1543 471682

email: enquiries@durapipe.co.uk

web: www.durapipe.co.uk

Twitter: @DurapipeUK

Distributor

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