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Introduction to the company

Saint-Gobain PAM UK is the leading UK manufacturer of ductile iron pipes and fittings, valves, manhole covers, gullies and grates, as well as being the leading producer of cast iron above and below ground drainage systems. Its markets include water and sewerage, telecommunications, highways, civil engineering construction and housing. Saint-Gobain specialises in the manufacture of cast iron above and below ground drainage systems and rainwater and gutter systems.

Ensign meets the requirements of ISO 6594 offering individual cast iron drainage systems for above and below ground applications, and is the **only** system tested and **kitemark** approved to the product standard BS EN 877 in the UK. The above ground soil and waste system is red coated with the below ground system coated grey.

The Ensign system offers the specifier and installer a combination of material and installation savings which has significantly reduced the price differential between cast iron and other drainage materials, offering a premium system at a competitive rate cutting the 'Price of Quality'.

Saint-Gobain PAM UK utilises state-of-the-art equipment and analysis techniques for production and process performance. This along with continual investment in plant and technology, the recruitment of qualified personnel and on going programme of product development, reflects the commitment of Saint-Gobain PAM UK to maintain its position as the premier manufacturer of cast iron pipes and fittings.

Product ranges

Other soil and drain products manufactured by Saint-Gobain PAM UK:

EPAMS
A complete syphonic rainwater system, consisting of steel syphonic roof outlets and cast iron pipework to BS EN 877 and BBA Approved Cert No. 06/4328

Timesaver
Above ground range kitemarked to BS 416 Part 2. Pipes and fittings 50-150mm in diameter, black coated. Includes a range of push-fit couplings with traditional socket appearance and 1.8m (6ft) pipes – the ideal solution for external soil stacks.

The below ground range is kitemarked to BS 437. Pipes and fittings 100-225mm in diameter, black coated. Range includes many fittings of traditional British standard design gullies, raising pieces, traps, inspection chambers and anti-flooding valves – the extra section thickness provides superior strength, making Timesaver the ideal solution for under-building drainage.

Classical
The classical range of traditional cast iron rainwater and gutter systems manufactured in accordance with BS 460, is the only cast iron system to be awarded British Board of Agrément (BBA Cert No. 97/3434) for its standard ranges. Range offers eight gutter profiles and circular and rectangular downpipe systems, supplied in a black water-based primer coat.

Classical Plus
Classical cast iron rainwater systems supplied in a tough polymer powder coated finish for immediate installation. Supplied black as standard, further colours have been introduced – example blue, green, red, light/dark brown and grey on a made to order basis.

Classical Express
A unique cast iron gutter system in 125mm true half round profile which is installed using simple jointing clips. Higher flow capacity available in primer and Plus finish.

Technical Advisory Service
In support of Saint-Gobain PAM UK extensive manufacturing resources, an advisory service department is available to customers to provide technical assistance and guidance on soil and drain installations. Telephone Technical Helpline: 01952 262529.

Website: www.saint-gobain-pam.co.uk
The Soil and Drain and Rainwater sections contains all the product literature for the soil and drain brands Ensign, Timesaver, EPAMS and Classical including downloadable Ensign CAD drawings.

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Quality commitment

Environment Standard BS EN ISO 14001:2004
Saint-Gobain PAM UK manufacturing sites including Sinclair, at Telford, have been awarded the 'Manufacturing to Environmental Standards' accreditation BS EN ISO 14001:2004 which was developed to help manufacturers maintain and improve their management of environmental responsibilities and assist them in ensuring compliance with environmental laws and regulations.

Saint-Gobain PAM UK operates Integrated Pollution and Preventative Control (IPPC) regulations and have implemented comprehensive environmental management systems throughout the manufacturing sites.

Quality assurance

BS EN ISO 9001:2000 – Registered No: FM12908
The Ensign System is manufactured under the BS EN ISO 9001: 2000 Quality Assurance Scheme. Continual checks made throughout the year by the BSI inspectorate, ensure that the set standards are maintained.

Product certification

BS EN 877:1999 Kitemark KM51733
Ensign is the only cast iron system to be tested and awarded Kitemark approval to the product standard in the UK. (See scope below).

Ensign EEZI-FIT has been included in kitemark certificate KM51733 for sanitary gravity applications and 0.5 bar (accidental static water pressure) performance.

BS EN 14366:2004
Ensign and EEZI-FIT have been tested to the criteria laid down in BS EN 14366:2004. Laboratory measurement of noise from waste water installations at the IBP laboratory in Stuttgart. A number of test reports are available.

Summary of applicable standards

STANDARDS
European Standard BS EN 877:1999
This new Product Standard applies to cast iron pipework elements used for the construction, normally as gravity pipe systems, of discharge systems for buildings and of drains. The range of nominal diameters extends from DN40 to DN600 inclusive. This standard specifies the requirements for the materials, dimensions and tolerances, mechanical properties, appearance and standard coatings for cast iron pipes, fittings and accessories. It also indicates performance specifications for all components, including joints. It covers, above ground soil, waste, rainwater and buried systems and performance requirements in these applications.

Product Standards
ISO 6594: International standard for socketless drainage systems in cast iron.

BS EN 681/ISO 4633: Specification for elastomeric seals for joints in pipework and pipelines.

Codes of Practice Standards
BS EN 12056-2: Code of practice for gravity drainage systems inside buildings – sanitary pipework.

BS EN 12056-3: Code of practice for gravity drainage systems inside buildings – for drainage of roofs.

BS EN 752-1: Code of practice for drain and sewer systems outside buildings.

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Why specify cast iron

1 – Fire safety (The Burning Question)

The Ensign cast iron drainage system answered the burning question through tests carried out by the MPA North-Rhine Westphalia laboratory in Germany. The tests were set up over three floors with the objective to examine the reaction to fire on a number of materials and to measure their ability to contain the fire within the compartment, preventing the spread of fire to another floor.

The test results highlighted the limitations of the standard fire collars used on the plastic-based systems tested – in the floor below ALL collars remained inactive. In the case of HDPE, dripping molten droplets passed through the fire collar to the floor below which generated a further fire outbreak.

In the fire compartment – all plastic type systems tested generated dense, dangerous smoke (the biggest killer in any fire).

Ensign cast iron is non-combustible, does not require any fire protection (approved document B), will not propagate fire and will not emit toxic gases like PVC-based systems, or sooty smog like HDPE.

2 – Acoustic performance (Hearing is Believing)

The Ensign and EEZI-FIT systems have been tested to the new standard BS EN 14366:2004 (laboratory measurement of noise from waste water installations).

Its surface mass and density results in unquestionable superior performance over UPVC and stainless steel.

Ensign and EEZI-FIT both significantly outperform the latest acoustic-lined plastic systems and HDPE acoustic systems by up to 10dB(A) for structure-borne noise and 4-5dB(A) for airborne-noise. *(See page 59).*

Therefore, ALL alternative systems to Ensign will require significant levels of acoustic insulation to match its performance. An allowance of £10 per metre is not untypical for acoustic pipework insulation, which can develop into a substantial cost on multi-storey flats and apartments, a factor often not considered during the selection process in deciding which material best suits the application.

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Why specify cast iron

3 – No expansion joints

The co-efficients of linear expansion for cast iron and concrete are almost identical. This makes cast iron a highly suitable material where drainage systems are required to pierce concrete floor slabs.

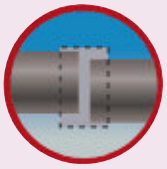
No special jointing to allow for differential expansion is needed. In contrast HDPE and UPVC piping requires an expansion joint every 3 metres, as well as expensive thermal limiters.

Strength

Cast iron is renowned for its strength and robustness in resisting impact damage and mishandling on site. It is the perfect solution for car parks, shopping centres, schools or generally any exposed areas that are liable to damage.

Less maintenance

The strength of modern cast iron and improved coatings means that cast iron drainage needs minimal maintenance during the lifetime of the building in normal conditions. This makes cast iron the first choice for concealed, built-in or otherwise inaccessible systems where access for repair or maintenance would cause a high degree of inconvenience to the occupants. This benefit of minimal maintenance and long life service makes cast iron the first choice material for PFI projects.



4 – Resistance to damage

The strength of cast iron means that accessible parts of the drainage system, ie. basement car parks are more resistant to damage than other drainage materials – whether from vandalism or accidental impact.

5 – Ground movement

The demand for building land has resulted in the greater use of made-up land or other locations that may be subject to ground movement. Cast iron below ground offers greater resistance to such movement, and is less likely to fail in unfavourable conditions.

6 – Less embedment

In areas where ground disturbance or extra loading is likely, other drainage materials may need additional protection, for example a covering concrete slab or a concrete surround. Cast iron needs no additional protection in most circumstances, saving time, labour and materials in construction.

7 – Less fixings

Besides the fixings required by fittings, modern cast iron drainage systems usually need only one load bearing support only every 3 metres in vertical stacks – UPVC and HDPE usually requires supporting brackets at every metre, and stainless steel every 2 metres. (See BS EN 12056-2 Guidelines Table NF.1). Therefore cast iron can save considerable time, labour and components in construction and steel every 2 metres.

8 – Longevity

There are two elements of an above ground drainage system that should be designed and specified to last the lifetime of the building.

1. the internal rainwater pipes
2. the soil discharge stacks

Even when a building is modernised every 15 or 20 years, these elements along with the structure will likely remain. If the toilet or kitchen area is refurbished, the branch discharge pipes will often be renewed and therefore it may be appropriate to specify other materials for that element.

But if the main stacks are to be specified to last the lifetime of a building, perhaps 50-70 years or more, the appropriate material is mechanical jointed cast iron, for it is one of few materials you can reasonably fit and forget, as recognised by specifiers on many of the new PFI-type projects.

9 – Resistance to extreme temperatures

Faulty or incorrect bracketing could lead to UPVC and HDPE demonstrating excessive distortion when subjected to extreme temperatures. Consequently hot environments, or handling hot wastes can cause damage to the UPVC drainage system. Cast iron's low co-efficient of expansion means it does not have this disadvantage.

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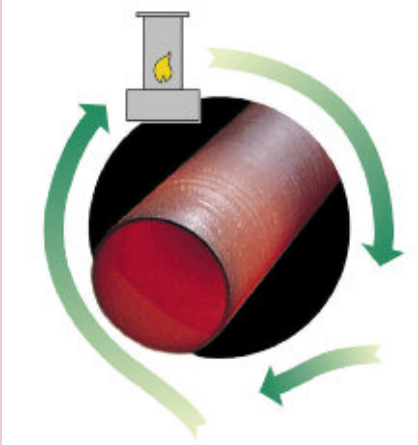
Why specify cast iron



Sustainable environment

The environmental concerns of building materials is becoming a major issue for all involved in the construction industry. But, those specifying, installing and supplying cast iron pipes, fittings and accessories, are working with a material that is not only recyclable, but made from almost 100% recycled scrap metals and therefore should not be disposed of in landfill. The extended life span of the system – proven to be over 50 years in many buildings, and extremely longer than other materials – reduces the use of natural resources and protects the environment.

Fit/forget drainage

Cast iron is often referred to as fit and forget material – impervious to degradation by UV light and most mechanical damage, including aggressive or careless maintenance, and with a track record measured in centuries, cast iron is the only proven lifetime choice. Prestigious projects worldwide utilise cast iron systems, including multi-storey commercial and residential developments, retail parks, hospitals, schools, car parks and prisons, to name a few.

Risk assessment – damage to buried pipe

To decide which of the three main types of material for below building use, cast iron, vitrified clay and plastic is appropriate, it is necessary to carry out a risk analysis.

Most engineers would agree that the risk of settlement, sheer pressure and over zealous maintenance methods are potential problems more likely to take a clay or plastic system out of operation than a cast iron one. It can bridge major voids caused by settlement, resist sheer pressures and successfully take the internal knocks from the rodding.

Hazard	Vit clay	Plastic	Cast iron
Settlement	High risk	Med risk	Low risk
Sheer pressure	High risk	Low risk	Low risk
Rodding damage	Med risk	High risk	Low risk

Courtesy of GTA

The cost of failure

It is accepted that cast iron drainage systems will be least likely to fail in any situation. In order to establish when the use of cast iron drainage is most appropriate for any given application, it is best to consider the relative seriousness of the consequences arising from failure. Here a table has been compiled illustrating how such consequences may be compared under a series of different considerations.

Considerations	House or small commercial	Hospital or commercial/residential	Retail store
People affected	Few	Many	Many
Potential losses	Low	High	High
Repair type	Cut in-situ slab or divert pipe	Cut RC slab	Cut RC slab
Consequences	Disturbance Noise Hygiene	Disturbance Noise Hygiene	Disturbance Noise Hygiene
Cost	Low	High	High

Courtesy of GTA

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Why specify Ensign

Internal/external rainwater system Soil and waste system Suspended drainage system	Red coated
Buried drainage system Bridge drainage	Grey coated

Complete pipe system

Ensign fully meets the requirements of Product Standard BS EN 877 providing the complete drainage solution to a building needs. Ensign is an above and below ground drainage system, transporting fluid waste, through the building, out and beyond.

Ductile iron couplings with electrical continuity

The Ensign systems are jointed by unique two-piece ductile iron couplings, that are high performance, quick and easy to install. For above ground applications, the coupling design incorporates iron 'nibs' which will provide built-in electrical continuity. Couplings destined for below ground use do not include this continuity feature. The coupling naturally meets the requirements of BS EN 877, fully satisfying the requirements of IEE Regulations. The couplings incorporate a set screw design utilising hexagonal socket cap screws reducing the threat of wanton dismantling of couplings by vandals.

Push fit drain couplings

Cast iron push-fit joints, that utilise two EPDM rubber gaskets, simplifying installation, providing a flexible alternative to mechanical couplings, when there is opportunity for fast pipe laying (ie. long straight runs). *(See page 53)*.

Ductile iron brackets

Included within the range is an all purpose ductile iron bracket, versatile and lightweight, the bracket incorporates an elongated slot at the fixing point allowing adjustment without dismantling the pipe system.

Quietest drainage system

Ensign has been tested to the new standard BS EN 14366:2004 (laboratory measurement of noise from water waste systems) and has achieved exceptionally low levels recording 11dB(A) at 4 litres/second for structure borne measurement and 47dB(A) for airborne measurement, when installed using the ductile iron bracket fitted with the acoustic dampener. Ensign is the quietest cast iron system and as a material is quieter than the best plastic system by up to 10dB(A) and up to 20dB(A) quieter than standard HDPE for structure-borne noise. All materials, twin-wall PVC, HDPE, stainless steel require substantial insulation to match the performance of Ensign. (Full test report available). *(See pages 59-60)*.

Easy access for maintenance

The Ensign system contains an extensive range of access fittings, providing ease of maintenance at vital points in the stack to relieve any blockages which may occur. The access door is contoured, specifically designed to unobstruct the flow of waste within the pipe system.

Economical connections to waste pipes

Ensign provides a number of alternative methods to connect to plastic and copper waste, including 'compression fit' boss pipes, that utilise 'O' ring rubber compression gaskets to connect to waste pipes without the need for conventional threaded male adaptors.

Also the popular multi-waste manifold which accommodates up to three waste pipes from various sources such as bath, bidets, and showers to one internal point (see photo to the left). Now available in 100 and 150mm diameters.

Superior internal coating for pipes

Ensign pipes for above and below ground applications, are now internally lined with a new two-part epoxy (ochre in colour). The new coating has been developed to provide greater performance against exposure to aggressive substances or high temperature waste, far exceeding the requirements stipulated in BS EN 877 *(see coating – page 83)*. The epoxy coated fittings match the performance of the pipes.

Lightweight

The Ensign system is considerably lighter in weight compared to previous cast iron systems making it much easier to handle, whilst retaining the inherent strength qualities of cast iron. The system has been designed to comply with European above and below ground applications, which have been well proven over many years.

Superior cast iron pipes

Ensign pipes are manufactured using the De Lavaud process which undergoes a rapid cooling stage followed by a specific dual heat treatment process which significantly improves its mechanical and impact-resistant properties, and makes the pipes easier to cut.

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Why specify Ensign

Flexible system

The Ensign systems consist of pipes and fittings from 50-600mm diameter for above ground applications, and 100, 150-600mm diameter for below ground.

Ensign can be connected by cast iron mechanical joints or push-fit joints, for above and below ground applications. Allowing total interchangeability, making Ensign the most versatile cast iron system on the market.

Cost effective

Independent research involving on-site measurement studies to BS 3138, resulted in the calculation of labour constants for the BS EN 877 systems, such as Ensign, considerably lower to those quoted in the price guides for many years.

These labour constants are reflected in the leading price guides (such as Spons. Griffiths etc), identifying the fact that it is actually quicker to install cast iron systems like Ensign than UPVC solvent weld systems a fact confirmed in the labour hours/charge calculations.

With the additional savings on fire collars, sound insulation, bracketing, expansion joints, on-site damage, and longevity of the system, cast iron has never been so competitive against lesser materials – 'cutting the price of quality'.

New Ensign EEZI-FIT

Push-fit assembly

All the benefits of cast iron with the advantages of push-fit assembly. The system utilises a new gasket design that makes jointing simple, and completed in seconds. (Electrical continuity can be accommodated).

Compatibility with Ensign

EEZI-FIT connects to standard Ensign double spigot pipe and is fully compatible with all Ensign plain-ended fittings. The installation of an Ensign mechanical joint positioned in the system can allow dismantling for future retro-fit.

New connections to waste

The EEZI-FIT range includes many options to connect to waste pipes, providing even greater system flexibility, branches, single and double radius curve with four boss options, and short boss pipes with single option to three boss positions.

A new manifold connector with 2 x 50mm waste connections with an extended spigot which avoids the need for a joint in the floor slab, to further ease installation.

Ideal for flats and apartments

Ensign EEZI-FIT is the ideal system for flats and apartments where the main stack will unlikely change in time, and the specification will demand a high level of acoustic performance and fire safety.

Ease of installation

Ensign EEZI-FIT provides opportunities for the installer to improve installation time, and also reduce time allocated for testing the stacks after completion.

Applications

EEZI-FIT is intended for use for gravity above ground sanitary applications in accordance with BS EN 12056 (0.5 bar performance).

Acoustic performance

EEZI-FIT has been tested to BS EN 14366 criteria and recorded acoustic levels even lower than Ensign, 4dB(A) at 2 l/s and 9dB(A) at 4 l/s. The acoustic difference between Ensign EEZI-FIT and standard HDPE and plastic is massive, and can only strengthen the case for using EEZI-FIT in flats/apartments where acoustic performance is so important.

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Section 1

Pipes and Fittings – above ground

Ensign cast iron drainage 1st choice for hospitals

Ensign has the strength and durability to maintain a safe environment:

- non-combustible – will not drip as molten, burning globules (unlike HDPE) or emit toxic smoke (like UPVC) – the biggest killer in any fire, contributing to spread of fire and threat of injury
- secure – virtually eliminates the health risk which might arise from a system failure
- dependable – minimises the risk of ward closure for repair or maintenance
- silent in operation – helps create a tranquil environment essential for recovering patients (quietest system on the market)

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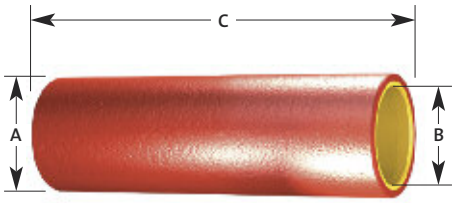
Pipes double spigot

Pipe – EP000

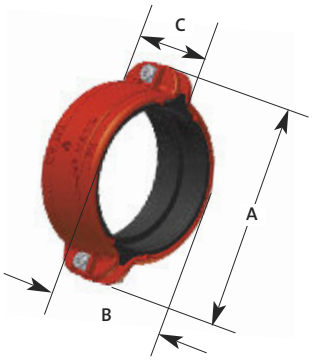


Product Code	CAD Ref	Dia	A Max O/dia	B Min I/dia	Min Section	C Metre Lengths Available	Nom. Wt kg
156363	**0023**	50	60	47.5	3	3	13.0
156455	**0033**	70	80	68.25	3	3	19.0
156563	**0043**	100	112	97.5	3	3	25.5
156736	**0053**	125	137	121.87	3.5	3	35.0
156827	**0063**	150	162	146.25	3.5	3	43.0
156951	**0083**	200	212	195	4	3	69.3
157049	**0093**	250	276.5	243.75	4.5	3	99.8
157114	**00123**	300	328.5	292.5	5	3	129.7
157171	**00163**	400	431	390	5	3	175.0
157187	**00203**	500	534	487.5	5.2	3	244.9
157203	**00243**	600	637	585	5.8	3	321.9

Pipes coated internally with a two part epoxy and externally with a red protective coating (see page 82).

Couplings

Two-piece ductile iron coupling – EC002

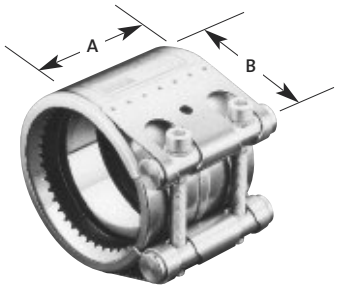


Ductile iron coupling with built-in electrical continuity

Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
156398	**022**	50	113	79	58	0.6
156493	**023**	70	129	103	58	0.6
156634	**024**	100	170	137	58	0.8
156777	**025**	125	188	158	58	0.9
156888	**026**	150*	217	183	80	1.7
156998	**028**	200*	278	243	82	3.5
175552	**029**	250*	343	308	82	4.4
175510	**0212**	300*	395	360	82	5.4

**150-300mm incorporates four socket bolts. Patent No. 2 305 481.*
Nitrile gaskets will be considered on request, on a quotational basis.

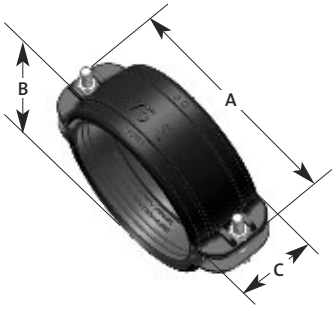
High performance stainless steel – EC002HP



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
156630	**024HP**	100	98	154	1.9
156886	**026HP**	150	115	211	3.0
156993	**028HP**	200	140	270	3.4
157081	**029HP**	250	140	330	4.2
157145	**0212HP**	300	140	470	4.5
157180	**0216HP**	400	142	520	8.0
157196	**0220HP**	500	142	576	8.8
177225	**0224HP**	600	142	635	9.9

Couplings technical section for applications (see page 47).
Capable of withstanding high pressure (>5 bar).

Ductile iron transitional coupling – GT12 transitional coupling Ensign to Timesaver – BS 416



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191429	**123**	70-75	158	110	55	1.0

Timesaver coupling assembly. Black coated, incorporating two set screws and nuts, and transitional elastomer seal. For jointing 70mm Ensign system to 75mm Timesaver soil system BS 416. Black gasket with identity markings.

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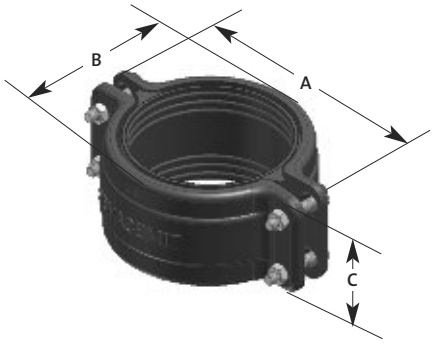
Couplings

Ductile iron transitional coupling – TD02 transitional coupling Ensign to Timesaver – BS 437



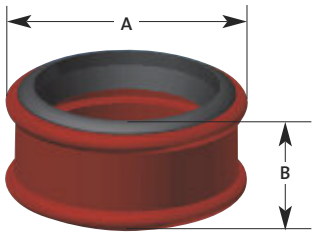
Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191297	**02D4**	100	203	140	75	2.8
191298	**02D6**	150	252	195	75	3.6

Timesaver drain coupling assembly. Black coated, incorporating four set screws and nuts, and transitional elastomer seal. For jointing Ensign system to Timesaver drain BS 437.

Transitional couplings incorporate black gaskets with identity markings.
Nitrile gaskets will be considered on request, on a quotational basis.
Electrical continuity available supplied extra (see page 49).

Ensign PFJ

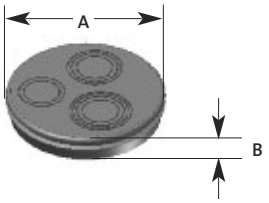
Joint • Plain no ears – EC001P



Registered Design No. 2 083 167

Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
192288	**01P2**	50	99	73	0.9
192269	**01P3**	70	120	73	1.2
192272	**01P4**	100	152	73	1.8
192315	**01P6**	150	205	95	2.8

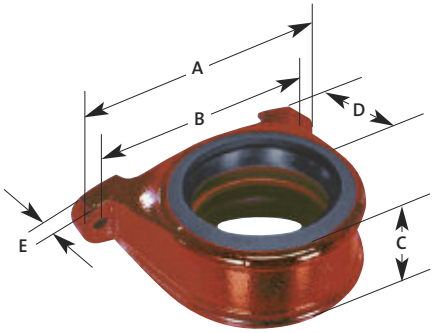
Multi-inlet waste connector to suit 100mm PFJ – EF076



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
192322	**0764**	100	138	25	0.22

3 x connectors 56/48/40 options.

Joint • With fixing ears – EC001E



Product Code	CAD Ref	Dia	A	B	C	D	E	Nom. Wt/kg
192287	**01E2**	50	146	114	73	62	20	1.4
192268	**01E3**	70	178	146	73	71	20	1.9
192271	**01E4**	100	213	181	73	90	20	2.6
192316	**01E6**	150	273	235	95	115	20	3.6

Joint • Slip – EC001S with reduced central register

Product Code	CAD Ref	Dia	A	B	C	D	E	Nom. Wt/kg
192286	**01S2**	50	146	114	73	62	20	1.4
192270	**01S3**	70	178	146	73	71	20	1.9
192273	**01S4**	100	213	181	73	90	20	2.6
192317	**01S6**	150	273	235	95	115	20	3.6

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Ensign PFJ

Reducing gasket

To connect Ensign PFJ – 100mm diameter to 90mm traditional soil . Utilise reducing gasket EC001T – Product code 156132.

Cast iron wall spacer – EC003

Product Code	CAD Ref	Dia	Nominal Wt/kg
192296	**032**	50	0.2
192297	**033**	70	0.2
192298	**034**	100	0.3

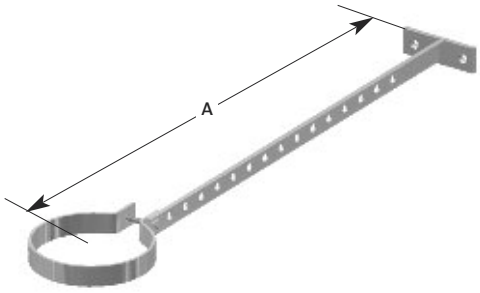
To suit eared PFJ EC001E.

Restraining bracket for Ensign PFJ – EF053

Product Code	CAD Ref	Dia	Nominal Wt/kg
192333	**0534**	100	0.5

To suit 100mm PFJ Eared EC001E.

Restraining bracket for Ensign PFJ – EF053A

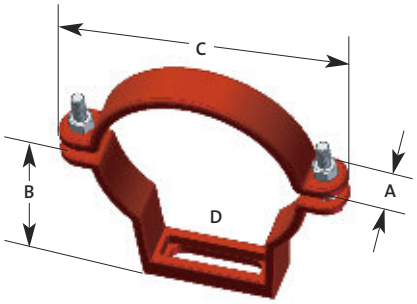


Product Code	CAD Ref	Dia	A	Nominal Wt/kg
192363	**0534A**	100	450	0.5

To suit 100mm diameter pipe work.

Brackets

Ductile iron bracket – EF048



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
156408	**482**	50	27	64	110	0.3
156505	**483**	70	27	74	132	0.5
156646	**484**	100	27	90	166	0.6
156898	**486**	150	30	115	214	0.8
177745	**488**	200	35	150	266	1.6

Elongated slot at fixing point (D) to ease fixing. Brackets for 125, 250, 300 and 400mm diameter (see mild steel brackets on page 13).

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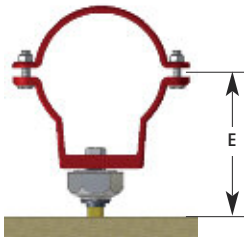
Brackets

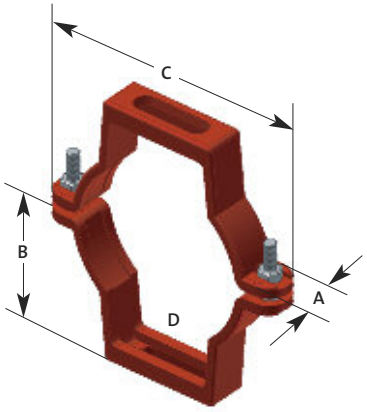
Ductile iron bracket with acoustic dampener – EF048AD



Product Code	CAD Ref	Dia	E	Nominal Wt/kg
199881	**48AD2**	50	112	0.3
199882	**48AD3**	70	122	0.5
199883	**48AD4**	100	138	0.6
199884	**48AD6**	150	163	1.6

For exceptional acoustic performance (see pages 59 and 60 for applications).

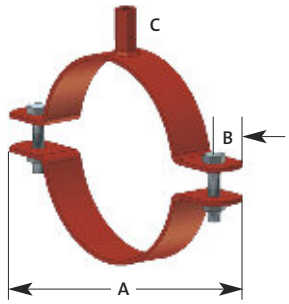
Ductile iron bracket – EF049



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
177744	**494**	100	27	90	166	0.8

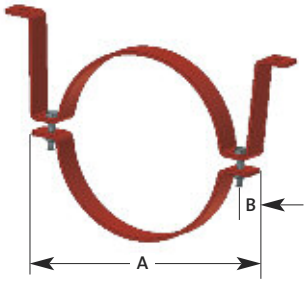
Elongated slot at fixing point (D) to ease fixing.

Vertical mild steel bracket – EF048MS



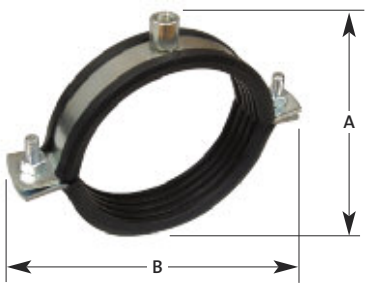
Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
192259	**48MS5**	125	247	20	M10	0.5

Stand-off mild steel bracket – EF048MS



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
192414	**48MS8**	200	296	40	1.9
192260	**48MS10**	250	371	40	2.3
192261	**48MS12**	300	420	40	2.6
192362	**48MS16**	400	555	40	3.2

Rubber lined steel bracket – EF048MSL



Product Code	CAD Ref	Dia	A	B	Fixing Bolt	Nominal Wt/kg
173628	**48MSL2**	50	84-88	108	M6x20	0.1
173630	**48MSL4**	100	137-141	158	M8x35	0.3
173642	**48MSL6**	150	193-347	219	M8x45	0.6
173643	**48MSL8**	200	250-256	292	M10x40	1.2
173644	**48MSL10**	250	316-347	356	M10x40	1.4
173645	**48MSL12**	300	362	410	M12x40	2.9

Rubber lined steel brackets for use where extra sound insulation is required (see page 59). 70mm available upon request.

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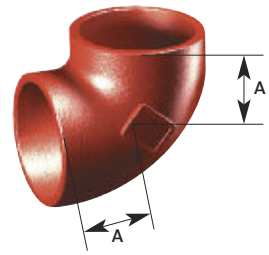
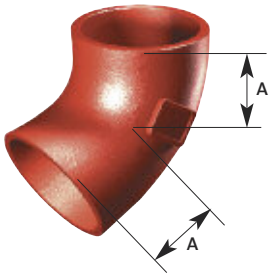
Bends short, medium, long radius

88° bend • Short radius – EF002



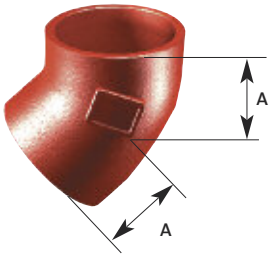
Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191437	0220088	50	75	0.7
191442	0230088	70	90	1.3
191447	0240088	100	110	2.2
191454	0250088	125	125	3.2
191459	0260088	150	145	3.9
191462	0280088	200	180	9.6
191463	0290088	250	220	17.3
191431	0212088	300	260	27.4

69° bend • Short radius – EF002



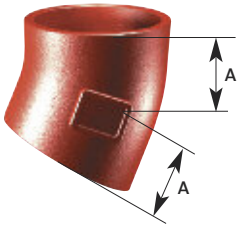
Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191436	0220070	50	65	0.6
191441	0230069	70	75	1.2
191446	0240069	100	90	2.1
191453	0250070	125	105	2.9
191458	0260070	150	120	4.2
† 156968	–	200	145	7.8
† 157067	–	250	170	14.7
† 157132	–	300	200	20.0

45° bend • Short radius – EF002



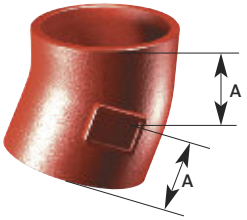
Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191435	0220045	50	50	0.6
191440	0230045	70	60	0.9
191445	0240045	100	70	1.6
191452	0250045	125	80	2.3
191457	0260045	150	90	3.0
191461	0280045	200	110	7.0
191464	02945	250	130	10.9
191432	021245	300	155	18.7
192335	021645	400	247	35.0
† 192376	022045	500	318	53.0
† 192377	022445	600	350	92.0

30° bend • Short radius – EF002



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191434	0220030	50	45	0.5
191439	0230030	70	50	0.8
191444	0240030	100	60	1.7
191451	0250030	125	70	2.0
191456	0260030	150	80	3.2
155933	0280030	200	95	7.0
† 155948	–	250	110	9.7
† 155960	–	300	130	15.5

15° bend • Short radius – EF002



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191433	0220015	50	40	0.4
191438	0230015	70	45	0.7
191443	0240015	100	50	1.3
191855	0250015	125	60	1.7
191455	0260015	150	65	2.7
155932	0280015	200	80	4.6

† *Available to order.*

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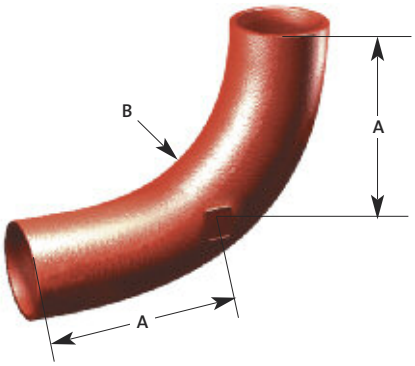
Bends medium, long radius

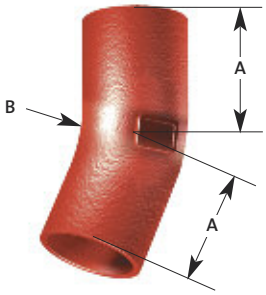
88° bend • Medium and long radius – EF02L



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191549	**2L40088**	100	269	180	4.3
191550	**2M60088**	150	274	150	10.1

Bend with heel rest available grey only (see page 36).

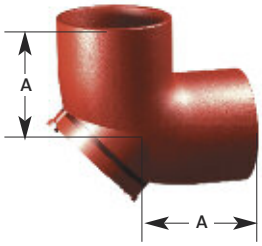
22° bend • Long radius – EF02L



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191548	**2L40022**	100	90	180	1.7

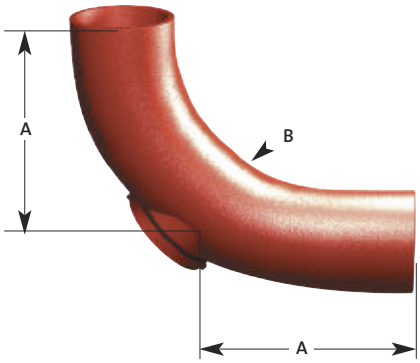
Bends short, medium, long radius door back

88° bend • Short radius door back – EF005



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
156472	**0530088**	70	90	1.8
156589	**0540088**	100	110	3.3
156845	**0560088**	150	145	6.1

88° bend • Long radius door back – EF05L



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
156607	**5L40088**	100	269	180	5.5

88° bend • MR radius door back – EF05M

Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
192357	**5M60088**	150	274	150	11.4

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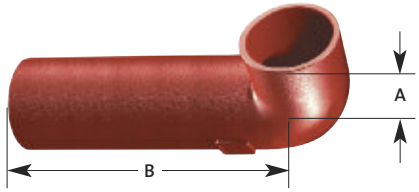
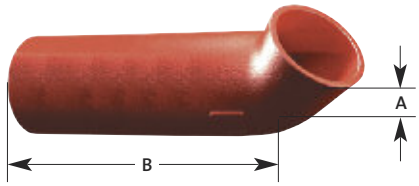
Bends long tail

88° bend • Long tail – EF055



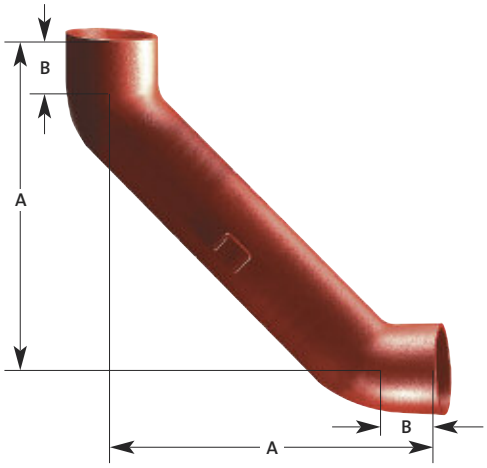
Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191567	**5540088**	100	110	250	4.2

45° bend • Long tail – EF055



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191566	**5540045**	100	70	250	4.0

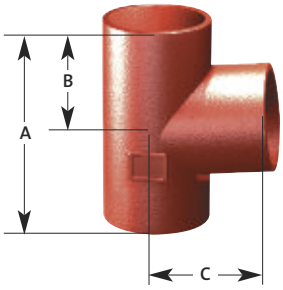
88° bend • Long tail double bend – EF054



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191837	**5430088**	70	273	60	3.1
191838	**5440088**	100	291	70	4.4

Branches single equal and unequal

88° branch – EF006



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191469	**0622088**	50 x 50	145	66	80	1.0
191472	**0632088**	70 x 50	155	72	90	1.6
191475	**0633088**	70 x 70	180	83	95	1.5
191479	**0642088**	100 x 50	170	76	105	2.3
191482	**0643088**	100 x 70	190	88	110	2.5
191485	**0644088**	100 x100	220	105	115	2.7
191490	**0654088**	125 x 100	235	110	130	4.0
191492	**0655088**	125 x 125	260	123	135	4.2
191497	**0664088**	150 x 100	245	115	145	4.4
191499	**0665088**	150 x 125	275	128	150	5.8
191501	**0666088**	150 x 150	300	142	155	5.8
191505	**0688088**	200 x 200	380	180	200	12.8
191508	**0699088**	250 x 250	468	228	243	22.6
191466	**6121288**	300 x 300	530	265	265	35.5

See BS EN 12056-2:2000 for applications.

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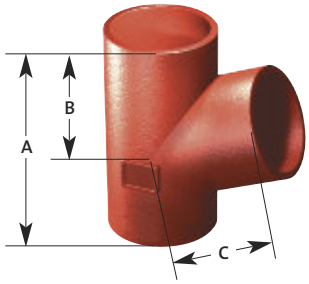
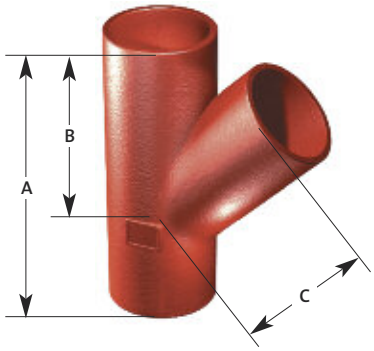
Branches single equal and unequal

69° branch – EF006



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191468	**0622070**	50 x 50	135	80	80	1.0
191471	**0632070**	70 x 50	145	90	90	1.4
191474	**0633070**	70 x 70	170	100	100	1.7
191478	**0642069**	100 x 50	155	100	110	2.2
191481	**0643069**	100 x 70	180	110	120	2.7
191484	**0644069**	100 x 100	215	130	130	2.7
191496	**0664070**	150 x 100	235	150	155	5.1

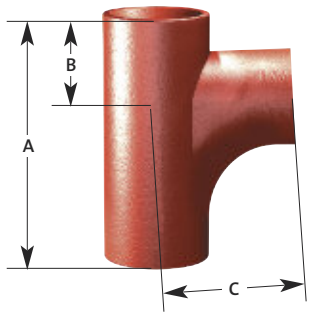
45° branch – EF006



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191467	**0622045**	50 x 50	185	135	135	1.4
191470	**0632045**	70 x 50	170	130	130	1.8
191473	**0633045**	70 x 70	200	145	150	1.9
191477	**0642045**	100 x 50	200	165	165	2.4
191480	**0643045**	100 x70	215	170	170	2.7
191483	**0644045**	100 x 100	275	205	205	3.8
191488	**0653045**	125 x 70	225	185	185	4.0
191489	**0654045**	125 x 100	270	210	210	5.3
191491	**0655045**	125 x 125	305	230	230	5.6
191494	**0663045**	150 x 70	235	205	205	5.1
191495	**0664045**	150 x 100	295	240	240	6.1
191498	**0665045**	150 x 125	315	245	245	7.5
191500	**0666045**	150 x 150	355	265	265	9.0
191502	**0684045**	200 x 100	300	260	260	10.3
191503	**0686045**	200 x 150	375	300	300	13.2
191504	**0688045**	200 x 200	455	340	340	17.3
† 157073	–	250 x 100	330	315	315	13.6
† 157075	–	250 x 150	405	350	350	17.3
† 157078	–	250 x 200	480	390	390	24.3
191507	**0699045**	250 x 250	560	430	430	32.2
† 157138	–	300 x 100	350	345	345	19.3
† 157140	–	300 x 150	415	380	380	23.2
† 157141	–	300 x 200	485	415	440	28.4
† 157142	–	300 x 250	580	465	465	37.2
191465	**6121245**	300 x 300	660	505	505	54.8
192338	**6161245**	400 x 300	660	555	565	55.3
192336	**6161645**	400 x 400	835	645	645	82.5
† 192378	**6202045**	500 x 500	1020	790	790	175.0
† 192379	**6242445**	600 x 600	1180	920	920	215.0

Additional reducing branches (large diameter) available upon request.

88° single branch • Radius curve – EF06R



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
156539	**6R33088**	70 x 70	210	80	130	2.2
156611	**6R42088**	100 x 50	204	90	120	2.4
156612	**6R43088**	100 x 70	221	90	142	2.7
156696	**6R44088**	100 x 100	270	102	150	3.5
156869	**6R64088**	150 x 100	300	117	202	7.6
156926	**6R66088**	150 x 150	400	140	260	12.5
156985	**6R86088**	200 x 150	428	157	283	13.0
157025	**6R88088**	200 x 200	478	182	293	21.0

See BS EN 12056-2:2000 for applications.

† *Available to order.*

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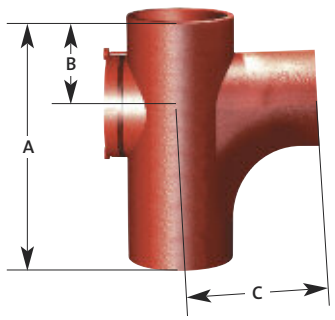
Branches single equal and unequal

88° branch with access • Radius curve – EF07R

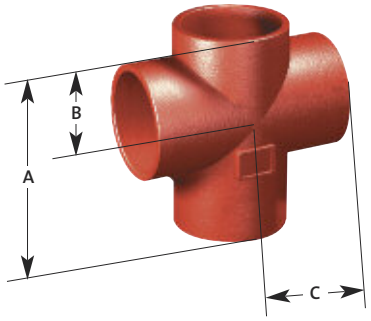


Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
156540	**7R33088**	70 x 70	210	80	130	2.5
156614	**7R42088**	100 x 50	204	90	120	3.0
156621	**7R43088**	100 x 70	221	90	142	3.5
156697	**7R44088**	100 x 100	270	102	150	4.3
156875	**7R64088**	150 x 100	300	117	202	10.4
156927	**7R66088**	150 x 150	400	140	260	13.9

See BS EN 12056-2:2000 for applications.

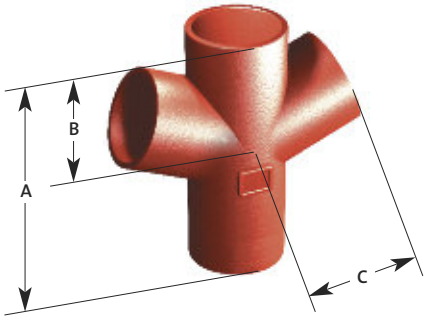
Branches double

88° double branch – EF010



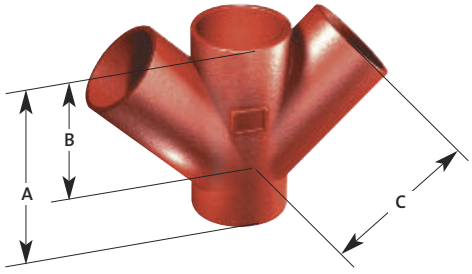
Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
155825	**1042288**	100 x 50	170	76	105	2.2
† 155826	–	100 x 70	190	88	110	2.7
191511	**1044488**	100 x 100	220	105	115	3.3
155907	**1064488**	150 x 100	245	115	145	7.1

69° double branch – EF010



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191510	**1044470**	100 x 100	215	130	130	3.4

45° double branch – EF010



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191509	**1044445**	100 x 100	260	190	190	4.0
191512	**1064445**	150 x 100	280	225	225	8.4
191513	**1066645**	150 x 150	355	265	265	12.6
191514	**1088845**	200 x 200	455	340	340	24.0

† *Available to order.*

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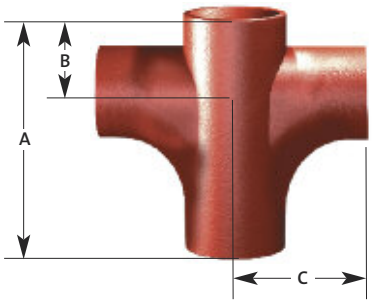
Branches double

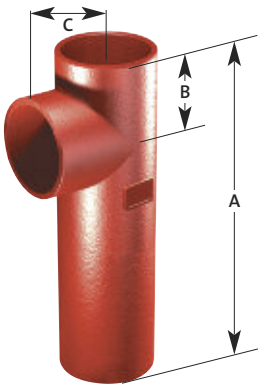
88° double branch • Radius curve – EF010R



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
157643	**0R44488**	100 x 100	270	102	150	4.2
156862	**0R64488**	150 x 100	300	115	200	10.9

See BS EN 12056-2:2000 for applications.

88° branch • Long tail – EF056



88° branch • Long tail – EF056

Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191568	**5644088**	100 x 100	430	105	115	7.0

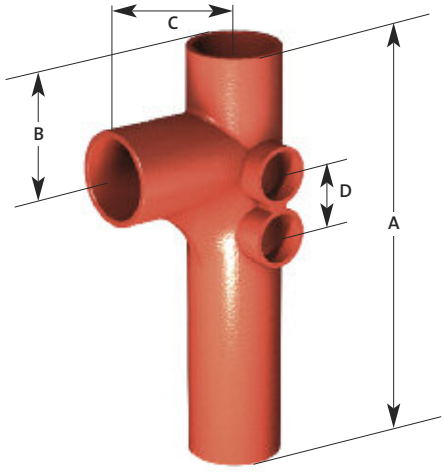
69° branch • Long tail – EF056

Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
156721	**5644070**	100 x 100	460	130	130	5.2

45° branch • Long tail – EF056

Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
156723	**5644045**	100 x 100	445	205	205	5.5
156938	**5666045**	150 x 150	705	265	265	18.5

88° branch • Single long tail – EF096

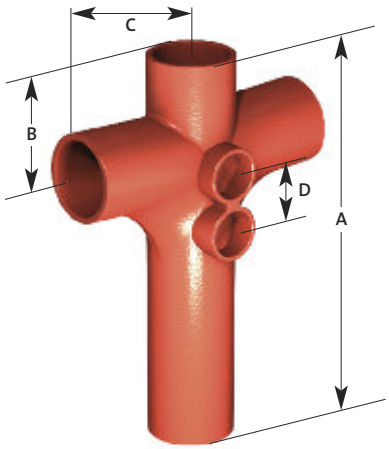


NEW

Product Code	CAD Ref	Dia	A	B	C	D	Nominal Wt/kg
208644	**9644088**	100 x 100	500	100	172	75	9.9

4 x 50mm push-fit boss positions.
To make boss connections see page 66.
Rubber grommets to connect to 54mm OD copper or 56mm OD UPVC waste are supplied separately in bags of 10. (Product code 208205).

88° branch • Long tail – EF097



NEW

Product Code	CAD Ref	Dia	A	B	C	D	Nominal Wt/kg
208653	**9744488**	100 x 100	500	100	172	75	10.2

4 x 50mm push-fit boss positions.
To make boss connections see page 66.
Rubber grommets to connect to 54mm OD copper or 56mm OD UPVC waste are supplied separately in bags of 10. (Product code 208205).

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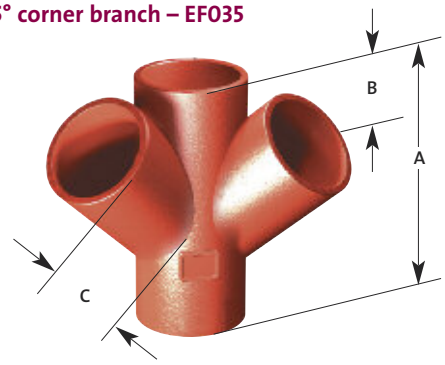
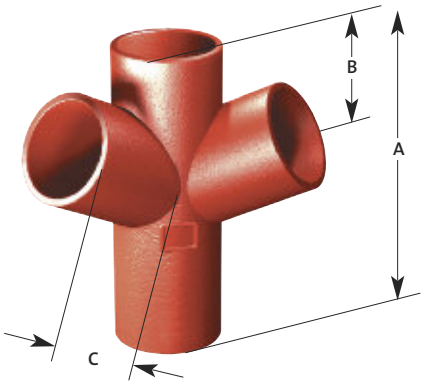
Branches corner

45° corner branch – EF035



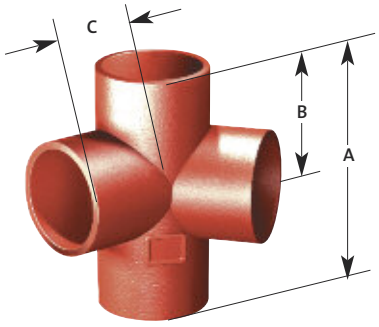
Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
156716	**3544445**	100 x 100	260	190	190	5.2

69° corner branch – EF035



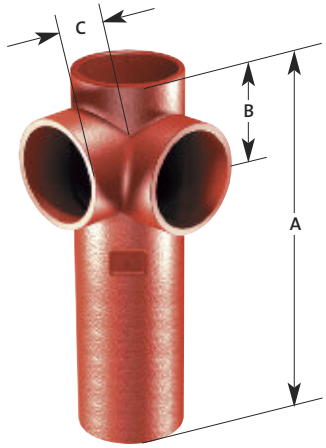
Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
156714	**35444470**	100 x 100	220	130	130	2.3

88° corner branch – EF035



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191558	**3544488**	100 x 100	220	105	115	3.5
155919	**3564445**	150 x 100	245	115	145	6.7

88° corner branch • Long tail – EF036



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191559	**3644488**	100 x 100	430	110	120	6.8

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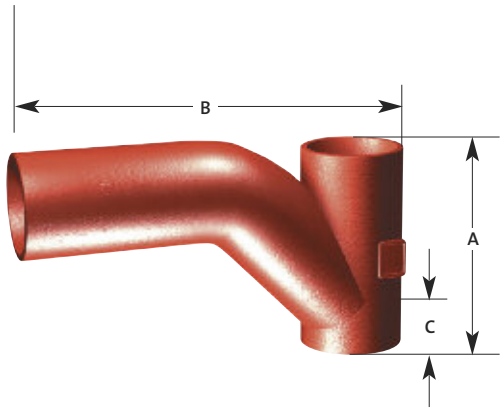
Branches single long arm

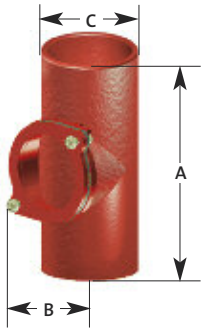
45° branch • Single long arm – EF008



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
156726	**0844045**	100 x 100	260	450	70	6.3

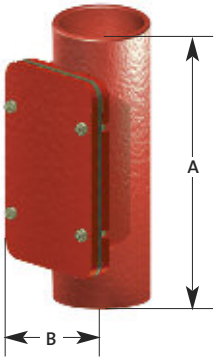
Typical application (see page 68).

Round door – EF014



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191516	**142**	50	175	60	74	1.3
191517	**143**	70	205	65	96	2.0
191518	**144**	100	250	80	116	3.1
191519	**146**	150	280	110	170	6.2

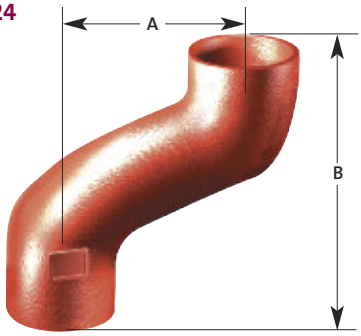
Rect door – EF015



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191840	**154**	100	320	80	6.7
191521	**155**	125	355	93	9.0
191841	**156**	150	395	105	12.2
191522	**158**	200	475	140	20.2
191523	**159**	250	540	160	38.5
191520	**1512**	300	610	190	50.0

Offsets

Offsets – EF024



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191526	**2443**	100	75	215	2.9
191524	**2425**	50	130	230	1.5
191525	**2435**	70	130	250	2.2
191527	**2445**	100	130	270	3.1
191528	**2455**	125	130	290	5.3

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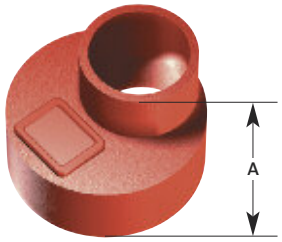
Pipes tapered

Pipes • Tapered – EF028



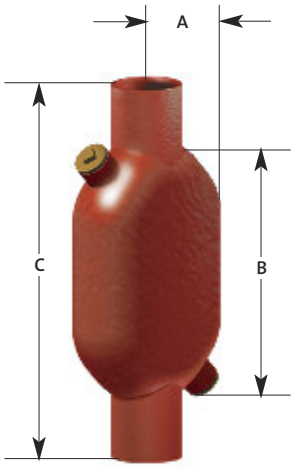
To connect 250mm and 200mm to 225 Timesaver Drain, use TD41 (consult Timesaver catalogue or contact technical department 01952 262529).

Product Code	CAD Ref	Dia	A	Wt/kg
191532	**2832**	70 x 50	75	0.5
191533	**2842**	100 x 50	80	0.9
191534	**2843**	100 x 70	85	0.9
191842	**2852**	125 x 50	85	1.2
191536	**2853**	125 x70	90	1.5
191537	**2854**	125 x 100	95	1.6
191538	**2862**	150 x 50	90	1.7
191539	**2863**	150 x 70	100	1.8
191540	**2864**	150 x 100	105	1.9
191541	**2865**	150 x 125	110	2.0
191542	**2884**	200 x 100	115	3.5
191543	**2886**	200 x 150	125	3.3
191544	**2894**	250 x 100	122	5.5
191545	**2896**	250 x 150	135	6.3
191546	**2898**	250 x 200	145	6.5
191547	**28126**	300 x 150	150	9.9
191529	**28128**	300 x 200	160	10.1
191530	**28129**	300 x 250	170	12.2
191531	**281612**	400 x 300	200	20.0

500mm and 600mm tapers will be considered on request.

Traps

Stench trap – EF081



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
155841	**814**	100	138	408	588	18.5
155921	**816**	150	187	522	742	38.0

Typical application (see page 68).

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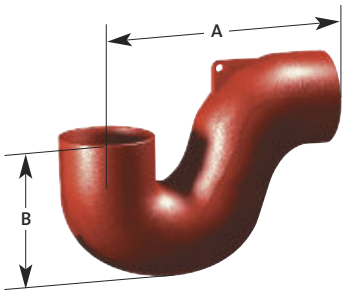
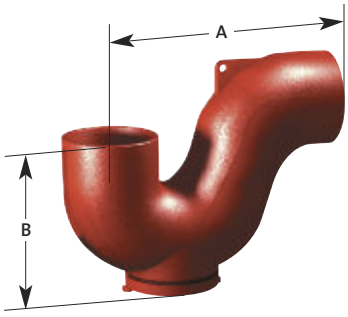
Traps

Traps • Plain – EF034



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
156666	**344**	100	255	160	4.5

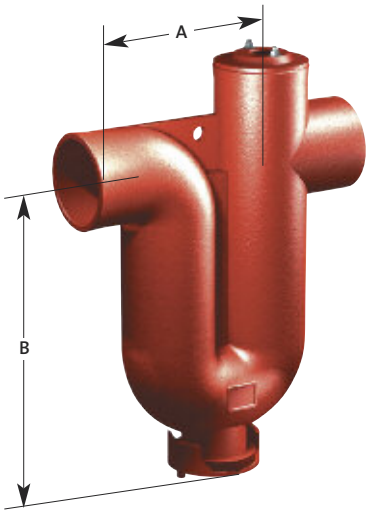
Traps • Plain with access bottom – EF037



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
156419	**372**	50*	160	115	2.0
156518	**373**	70	200	138	2.7
156667	**374**	100	255	175	5.2
156911	**376**	150	350	240	12.1

**Supplied without support lug.*

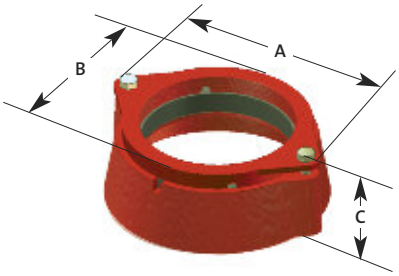
Branch traps – EF080



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191587	**804**	100	215	282	10.2

Connectors roof

Roof connectors for asphalt – EF073



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191581	**734**	100	185	170	72	2.1

See page 69 for typical design applications.

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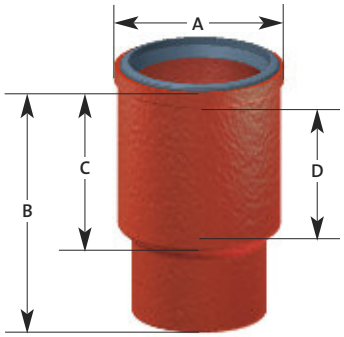
Connectors movement

Push-fit connectors which accommodate building settlement – EF058

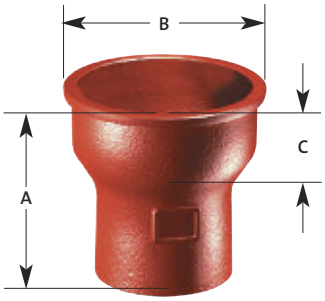


Product Code	CAD Ref	Dia	A	B	C	D	Wt/kg
192304	**584**	100	145	300	200	170	4.3
192306	**586**	150	202	310	200	170	8.2

200mm diameter available upon request.
Allows total 170mm movement.
See page 69 for typical design applications.

Connectors and pipes – transitional

Transitional connector – EF059



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
156650	**594**	100	155	176	80	2.9
156902	**596**	150	155	232	80	4.2

To connect, Earthware,WC, Stoneware, Traditional, Soil/Drain etc.

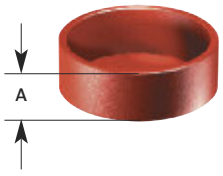
Connectors universal

Universal connector – EF071R

Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
155759	**7122**	50	60	40	0.1

Blank ends

Blank ends • Plain – EF070



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191570	**702**	50	30	0.4
191571	**703**	70	35	0.6
191572	**704**	100	40	0.8
191573	**705**	125	45	1.1
191574	**706**	150	50	2.0
191575	**708**	200	60	3.2
191576	**709**	250	70	5.7
191569	**7012**	300	90	10.3

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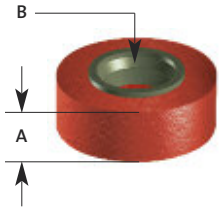
Blank ends

Blank ends • Push-fit connection – EF071

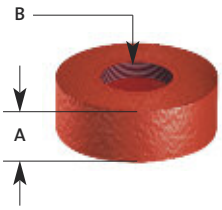


B = rubber grommet which accommodates 50mm waste UPVC or copper.

Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191577	**7132**	70	35	0.6
191578	**7142**	100	40	1.0
191580	**7162**	150	50	2.0

To connect, 50mm diameter Ensign to PVC, use new Rubber Universal Connector EF071R (see page 24).

Blank ends • Drilled and taped – EF071T

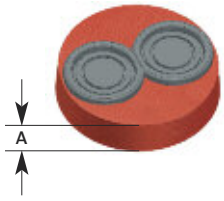


B = D/T 50mm BSPT

Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191579	**7142T**	100	40	1.0

To connect to UPVC/copper waste use 50mm/2" BSPT male iron adaptor.

Blank ends • Push-fit connection – EF077



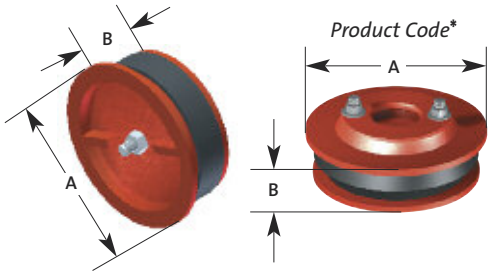
Replacement plugs can be supplied on request.

Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191585	**77415**	100	50	0.4

Two rubber plugs to accommodate 38/32mm dia. waste. Suitable for push-fit connection to plastic/copper waste.

Expansion plugs

Expansion plug – EF074



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
156374*	**742**	50	64	48	0.4
191582	**743**	70	78	40	0.4
191583	**744**	100	110	42	0.7
191584	**746**	150	156	42	1.5
156961*	**748**	200	218	100	4.1
157060*	**749**	250	284	93	6.0
157125*	**7412**	300	336	100	9.1

** Depicts product design type.*

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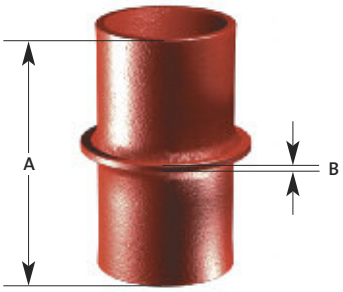
Stack support pipe

Stack support pipe – EF050

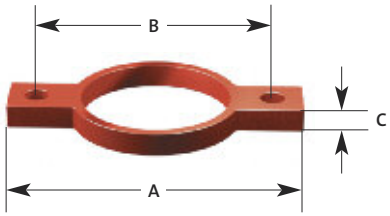


Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191856	**503**	70	220	8	1.6
191562	**504**	100	220	8	2.4
191563	**505**	125	220	8	3.2
191564	**506**	150	220	8	4.0
157014*	**508**	200	220	8	5.9
157097*	**510**	250	300	8	12.4
157160*	**512**	300	300	8	16.8

** Item supplied complete with bracket and seal (see dimensions below).*
See below for bracket dimensions.

Stack support bracket

Stack support bracket – EF051

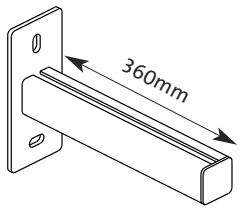


Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191857	**513**	70	215	170	20	1.1
191843	**514**	100	259	214	20	1.5
191844	**515**	125	275	228	20	1.7
191845	**516**	150	300	255	22	2.6
157014	**518**	200	362	310	22	3.5
157097	**510**	250	444	394	40	6.1
157160	**512**	300	498	448	40	14.0

Supplied with rubber sound deadening seal.
See page 58 for typical application and range of wall fixings.

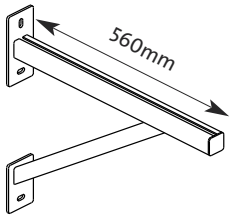
Consoles support brackets

Cantilever arm **EF052**



Product code **192329**

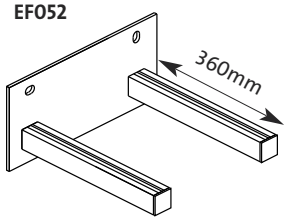
Cantilever arm with support **EF052**



For stack support pipes 200-300mm dia.

Product code **205016**

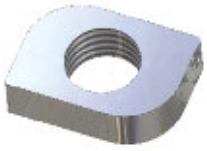
Stack support console **EF052**



To suit 100mm stack support bracket and pipe only.

Product code **192331**

10mm retaining nut **To suit 09183/09185**



To be used with a 10mm set screw, to secure the stack support bracket to the cantilever arm or console. ***(See page 58).***

Product code **192332**

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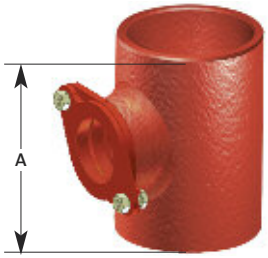
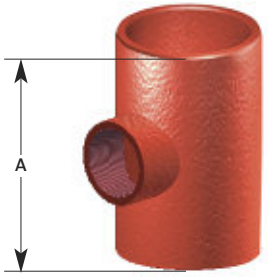
Boss pipes

Single boss • With boss at 88° – EF090



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
156371	**902**	50	150	1.2
156460	**903**	70	146	1.6
156573	**904**	100	155	2.1
156836	**906**	150	175	3.8

'O' Ring rubber compression fit.
Connects 50mm copper or UPVC waste. To connect 32/38mm waste pipes (see page 63).



50mm BSPT bosses.

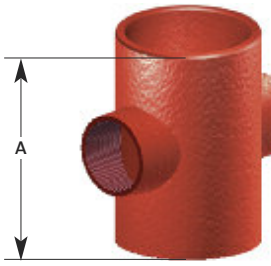
Single boss with drilled/tapped 2"/50mm BSPT boss – EF090T

Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191847	**904T**	100	155	2.1

Double boss • With bosses (opposed) at 88° – EF091

Product Code	CAD Ref	Dia	A	Nominal Wt/kg
156575	**914**	100	155	2.5
192359	**916**	150	175	4.4

'O' Ring rubber compression fit.
Connects 50mm copper or UPVC waste. To connect 32/38mm waste pipes (see page 63).

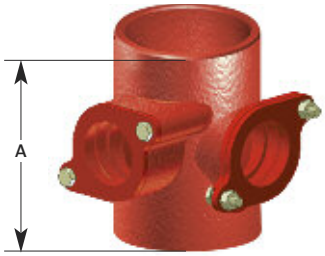


50mm BSPT bosses.

Double boss with drilled/tapped 2"/50mm BSPT bosses – EF091T

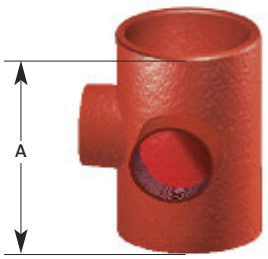
Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191848	**914T**	100	155	2.5

Double boss • With bosses at 90° – EF092



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191849	**924**	100	155	2.9

'O' Ring rubber compression fit.
Connects 50mm copper or UPVC waste. To connect 32/38mm waste pipes (see page 63).



50mm BSPT bosses.

Double Boss with drilled/tapped 2"/50mm BSPT bosses – EF092T

Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191850	**924T**	100	155	2.9

Plastic moulded protection caps EF093, for blanking off push-fit boss connections. Size 50mm x 30mm. Order product code 192255.

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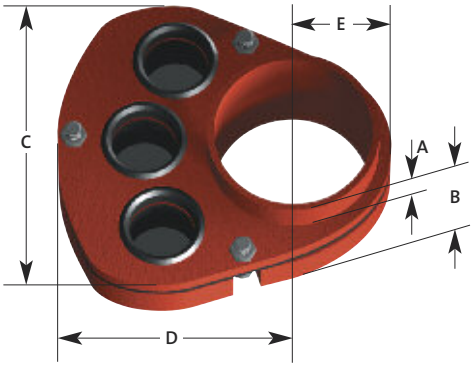
Multi manifold

Manifold connector – EF094



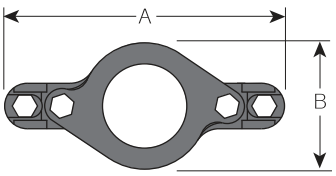
Replacement plugs can be supplied on request.

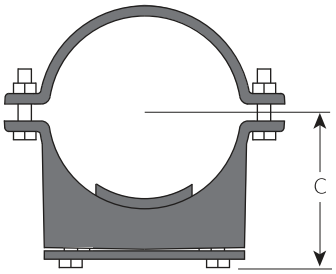
Product Code	CAD Ref	Dia	A	B	C	D	E	Nom. Wt/kg
175626	**944**	100	43	125	200	142	62	3.2
175629	**946**	150	70	165	290	184	81	6.1

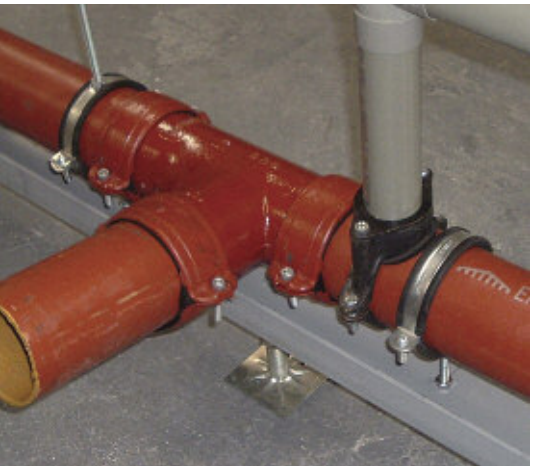
100mm: Three rubber plugs to accommodate 38/32mm dia. waste.
150mm: Three rubber plugs to accommodate 50mm dia. waste.
Suitable for push-fit connection to plastic/copper waste.

Strap-on boss fitting

Strap-on boss – GT133







The strap-on boss provides a simple solution for fitting a 50mm copper or waste pipe to an existing 100mm cast iron soil pipe to BS EN 877 (pipe outside diameter min/max 109/112mm).

Installation

- Simply determine where the waste pipe is to be positioned
- Cut a 64mm hole into the cast iron soil pipe with a hole saw (the metal from the hole remains in the cutter – see tools below)
- Mechanically fit the boss strap in position (do not forget the rubber washer), tighten until fully secure
- Insert in the waste pipe until fully seated in the boss
- Tighten the boss plate to grip the rubber 'O' ring on the outside of the waste pipe

Tools required

- A 64mm hole saw (Code 192326)
- Arbour (Code 192327)
- ¼" pilot drill (Code 192328)
- 13mm socket EF101 (Code 191202) or
- Ratchet spanner EF100 (Code 191201) or
- 13mm t-box spanner for mechanically fitting the boss adaptor EF098 (Code 191200)

Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
09168	**1334**	100	166	76	100	1.4

Strap-on boss is a Timesaver product and is supplied black coated.

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Ensign EEZI-FIT

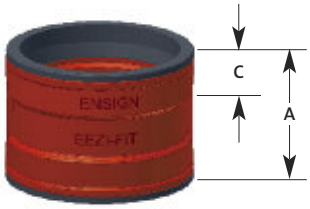
A question of time? The answer's EEZI.

Ensign EEZI-FIT is a new push-fit range of socketed fittings and couplings in 100mm and now 150mm diameters, designed for above ground gravity sanitary applications, that combines all the benefits of cast iron with the simplicity of push-fit assembly.

Ensign EEZI-FIT utilises a new gasket design that makes the joint simple to install and is completed in seconds. Fully compatible with all products within the Ensign range. Ensign EEZI-FIT is designed to meet product standard BS EN 877:1999.

Coupling

EEZI-FIT coupling – EZ001

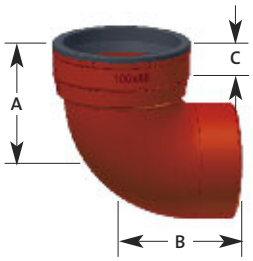


Product Code	CAD Ref	Dia	A	C	Nominal Wt/kg
208191	**014EZ**	100	85	40	1.3
216312	–	150	114	55	2.0

Assembly instructions (see page 54).
Gasket spare are available in bags of 10 – Product code 208204.
For electrical continuity see page 54.

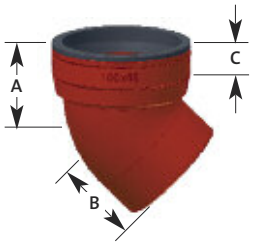
Bends short radius

88° EEZI-FIT bend – EZ002



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
208192	**0240088EZ**	100	112	108	40	2.3
216313	–	150	154	145	50	5.0

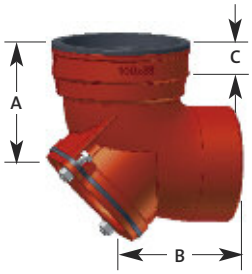
45° EEZI-FIT bend EZ002



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
208193	**0240045EZ**	100	73	69	40	1.9
216319	–	150	102	94	50	4.0

Bends with access

88° EEZI-FIT bend • Short radius door back – EZ005



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
208194	**0540088EZ**	100	112	108	40	3.4
216315	–	150	154	145	50	5.7

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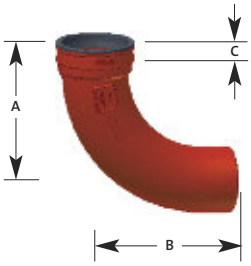
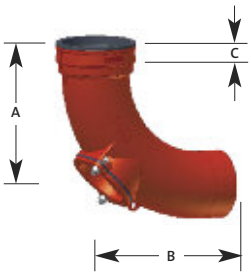
Bends long radius

88° EEZI-FIT bend • Long radius – EZ02L



Product Code	Dia	A	B	C	Nominal Wt/kg
215953	100	243	233	40	4.5

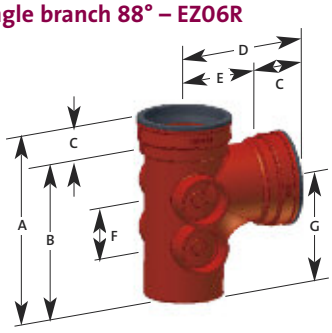
88° EEZI-FIT bend • Long radius door back – EZ05L



Product Code	Dia	A	B	C	Nominal Wt/kg
215952	100	243	233	40	5.6

Single branches

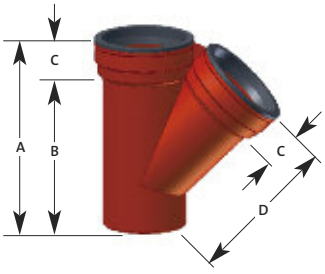
Single branch 88° – EZ06R



Product Code	CAD Ref	Dia	A	B	C	D	E	F	G	Nominal Wt/kg
208195	**6R44088EZ**	100x100	250	210	40	145	105	68	148	5.6
216342	–	150x100	292	237	50	185	130	68	185	7.0

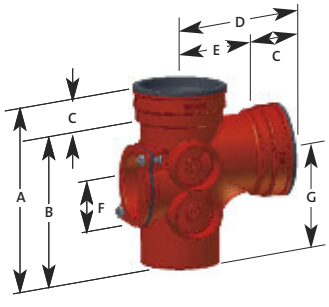
To make boss connections see page 66.
Rubber grommets to connect to 54mm OD copper or 56mm OD UPVC waste are supplied separately in bags of 10. (Product code 208205).

Single branch 45° – EZ006



Product Code	CAD Ref	Dia	A	B	C	D	Nominal Wt/kg
208196	**0644045EZ**	100x100	250	210	40	183	4.1
216320	–	150x100	270	215	50	227	6.5
216341	–	150x150	353	298	50	265	8.9

Single branch 88° with access – EZ07R



Product Code	CAD Ref	Dia	A	B	C	D	E	F	G	Nominal Wt/kg
208197	**7R44088EZ**	100x100	250	210	40	145	105	68	148	6.7
216314	–	150x100	292	237	50	185	130	68	185	8.0

To make boss connections see page 66.
Rubber grommets to connect to 54mm OD copper or 56mm OD UPVC waste are supplied separately in bags of 10. (Product code 208205).

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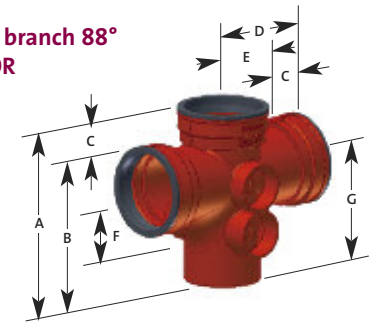
Double branch

Double branch 88° – EZ010R



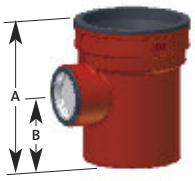
Product Code	CAD Ref	Dia	A	B	C	D	E	F	G	Nominal Wt/kg
208198	**0R44488EZ**	100x100	250	210	40	145	105	68	148	6.0

If 45° double branch is required, use ENSIGN EF010 code 03009 with EEZI-FIT couplings.

To make boss connections see page 66.
Rubber grommets to connect to 54mm OD copper or 56mm OD UPVC waste are supplied separately in bags of 10. (Product code 208205).

Boss pipes

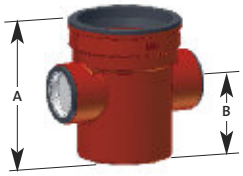
Single boss pipe 1 x 50mm – EZ090



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
208199	**904EZ**	100	158	82	2.1

Supplied with rubber grommets to connect to 54mm OD copper or 56mm OD UPVC waste. For connections to 38/32 waste – see page 65.

Double boss pipe 2 x 50mm – EZ091



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
208200	**914EZ**	100	158	82	2.3

Supplied with rubber grommets to connect to 54mm OD copper or 56mm OD UPVC waste. For connections to 38/32 waste – see page 65.

Double boss pipe 2 x 50mm at 90° – EZ092

Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
208201	**924EZ**	100	158	82	2.3

Supplied with rubber grommets to connect to 54mm OD copper or 56mm OD UPVC waste. For connections to 38/32 waste – see page 65.

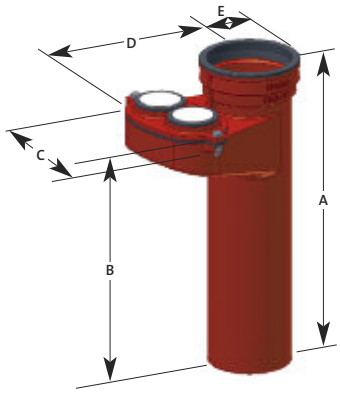
Triple boss pipe 3 x 50mm – EZ093

Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
208202	**934EZ**	100	158	82	2.5

Supplied with rubber grommets to connect to 54mm OD copper or 56mm OD UPVC waste. For connections to 38/32 waste – see page 65.

Manifold connector

Manifold connector – EZ094



Product Code	CAD Ref	Dia	A	B	C	D	E	Nominal Wt/kg
208203	**944EZ**	100	410	345	195	170	66	6.6

Supplied with rubber grommets to connect to 54mm OD copper or 56mm OD UPVC waste.

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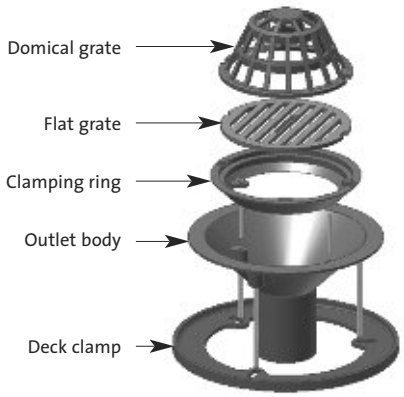
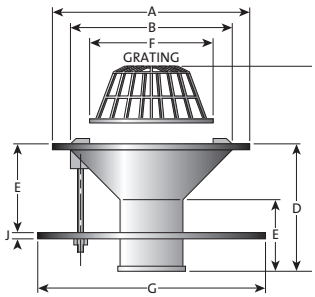
Roof outlets for asphalt or felt





GT9306 Circular roof outlet

This outlet incorporates the following important features:

- The clear throat of the outlet gives an unobstructed flow of water, providing maximum discharge rate
- The grating is secured by means of locating the two notches on the grate under lugs on the clamping ring. The grate is then turned 90° on the seating until it is firmly locked in place
- There are only four working parts
- Uniform outside diameter of spigot permits cutting and still allows jointing by Ensign/Timesaver or run-lead joint
- This outlet can be connected to Ensign by using a Timesaver coupling GT01

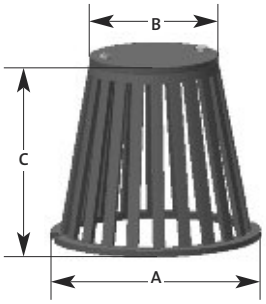
Deck Clamp for 100 Roof Outlets is in two halves and has four x M10 threaded rods and four x M10 securing nuts.

	Component	Nominal Bore 100mm Product Code	Wt/kg	CAD Drawings 100
1	Body and clamping ring	191749	9.0	1+2 – **93064DG**
2	Domical grate	191750	2.2	1+3 – **93064FG**
3	Flat grate	191751	1.6	1+2+4 – **93064DGC**
4	Deck clamp	191738	7.6	1+3+4 – **93064FGC**

	Nominal Bore 100mm		Nominal Bore 100mm		Nominal Bore 100mm
A	355	E	130	H max	140
B	290	F	240	J	18
C	335	G	410		
D	230	H min	40		

See page 70 for typical applications.

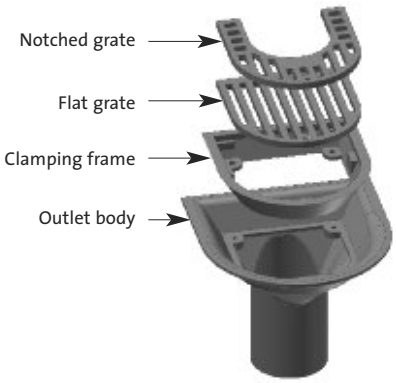
GT9307 Grating for 'inside-out' roof



Product Code	CAD Ref	Nominal Bore	A	B	C	Nominal Wt/kg
191752	**93074**	100	240	145	210	5.6

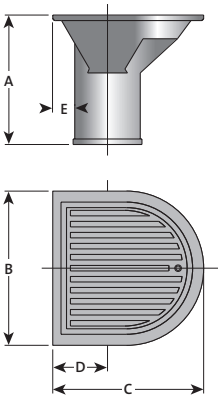
Note: GT9307 is used with roof outlets GT9306 100 nominal bore only.

GT9310 Balcony outlet



	Product Code	CAD Ref	Nominal Bore 100 Wt/kg
Body and clamping frame fitted with flat grate	191735	**93104FG**	9.6
Body and clamping frame fitted with notched grate	191736	**93104DG**	9.0

	Nominal Bore 100mm
A	235
B	280
C	275
D	75
E	40



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Section 2

Pipes and Fittings – below ground

Ensign cast iron drainage 1st choice for schools

Ensign offers the strength, safety and durability for areas where young people work and play:

- non-combustible – will not drip as molten, burning globules (unlike HDPE), contributing to spread of fire and threat of injury to pupils, staff and firefighters alike, or emit toxic smoke like UPVC (the biggest killer in any fire)
- secure – strong enough to withstand the knocks in exposed areas (such as soil stacks on external walls) in playgrounds etc.
- requires minimal up-keep – helps keep maintenance costs to an absolute minimum
- silent in operation – the quietest system on the market, ensuring a noise-free environment for learning without adding lots of insulation
- durable – systems last in excess of 50 years, reducing any further drain on financial resources
- 100% recyclable – reducing landfill problems for future generations

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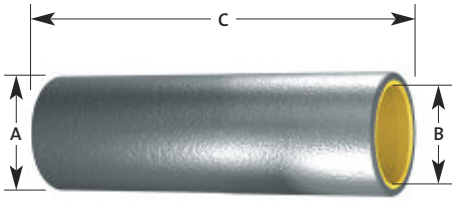
Pipes double spigot

Pipe – ED000

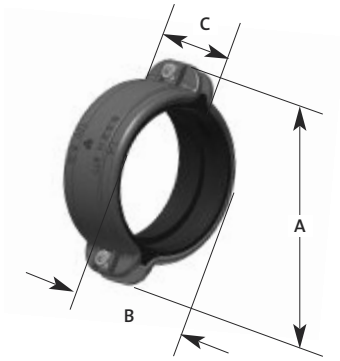


Product Code	CAD Ref	Dia	A Max O/dia	B Min I/dia	Min Section	C Metre Lengths Available	Nom. Wt kg
155349	**0043**	100	112	97.5	3	3	25.5
155414	**0063**	150	162	146.25	3.5	3	43.0
155448	**0083**	200	212	195	4	3	69.3
155476	**0093**	250	276.5	243.75	4.5	3	99.8
155493	**00123**	300	328.5	292.50	5	3	129.7
155508	**00163**	400	431	390	5	3	177.7
155511	**00203**	500	534	487.5	5.2	3	244.9
175630	**00243**	600	637	585	5.8	3	321.9

Pipes coated internally with a two part epoxy and externally with a zinc rich base coat, then the standard grey protective coating. (See page 82).

Couplings

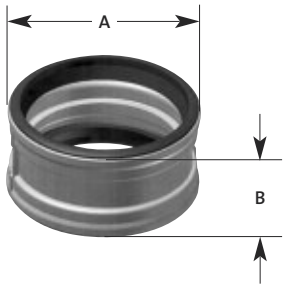
Two-piece ductile iron coupling – ED001



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
155369	**024**	100	170	137	58	0.8
155433	**026**	150*	217	183	80	1.7
155462	**028**	200*	278	243	82	3.5
175591	**029**	250*	343	308	82	4.4
175592	**0212**	300*	395	360	82	5.4

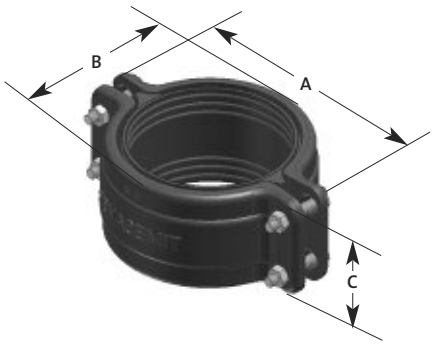
For 400, 500, 600 diameter couplings see EC002HP High Performance Stainless Steel Couplings page 10.
**150-300mm incorporates four socket bolts.*
Patent No. 2 305 481.
Nitrile gaskets will be considered on request, on a quotational basis.

Push-fit socket – ED004



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
175622	**044**	100	140	90	1.2
175623	**046**	150	195	95	2.2

Ductile iron transitional coupling – TD02
Transitional coupling Ensign to Timesaver – BS 437



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191297	**02D4**	100	75	140	203	2.8
191298	**02D6**	150	75	195	252	3.6

Timesaver drain coupling assembly. Black coated, incorporating four set screws and nuts, and transitional elastomer seal. For jointing Ensign system to Timesaver drain BS 437.

Black gasket with identity markings.
Nitrile gaskets will be considered on request, on a quotational basis.
Electrical continuity available supplied extra (see page 49).

To connect Ensign drain to Timesaver 416, use standard Timesaver coupling GT01 (black coated).

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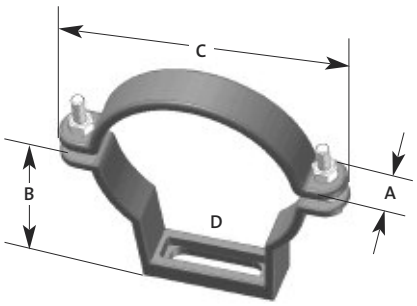
Brackets

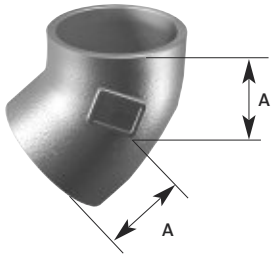
Ductile iron bracket – ED048



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
175593	**484**	100	27	90	166	0.6
175594	**486**	150	30	115	214	0.8
177743	**488**	200	35	150	266	1.6

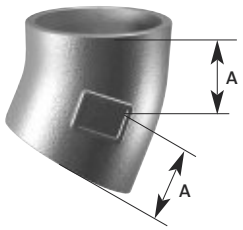
Elongated slot at fixing point (D) to ease fixing.

45° bend • Short radius – ED002



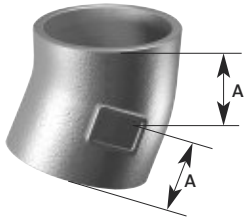
Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191765	**0240045**	100	70	1.6
191766	**0260045**	150	90	3.0
191767	**0280045**	200	110	7.0
191879	**02945**	250	130	10.9
191880	**021245**	300	155	18.7
192370	**021645**	400	247	35.0
† 192382	**022045**	500	318	53.0
† 192383	**022445**	600	350	92.0

30° bend • Short radius – ED002



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191768	**0240030**	100	60	1.7
191769	**0260030**	150	80	3.2

15° bend • Short radius – ED002



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191770	**0240015**	100	50	1.3
191771	**0260015**	150	65	2.7

† *Available to order.*

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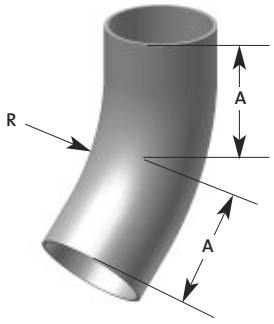
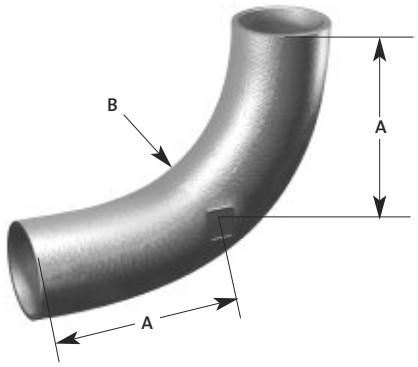
Bends medium long radius door back

45° bend • Medium radius – ED02M



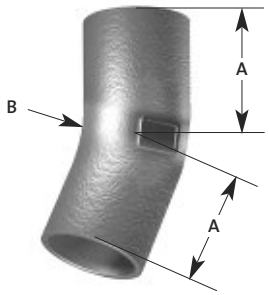
Product Code	CAD Ref	Dia	A	R	Nominal Wt/kg
191772	**2M40045**	100	135	150	3.5
191773	**2M60045**	150	145	150	6.2

88° Bend • Medium & long radius – ED02L



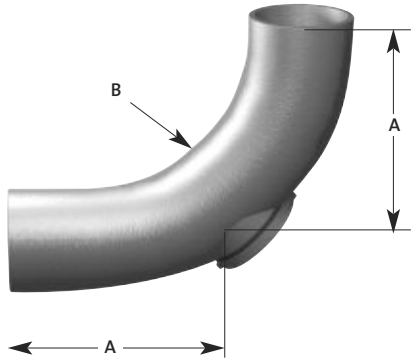
Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191774	**2L40088**	100	269	180	4.3
191775	**2L60088**	150	274	150	10.1

22° bend • Long radius – ED02L



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191776	**2L40022**	100	90	180	1.7

88° bend • Long radius door back – ED05L



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191777	**5L40088**	100	269	180	5.5

88° bend • MR radius door back – ED05M

Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
192358	**5M60088**	150	274	150	11.4

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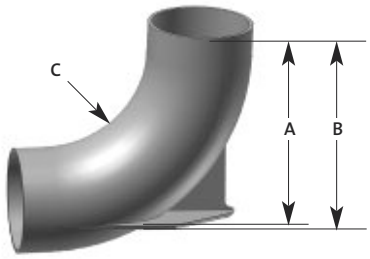
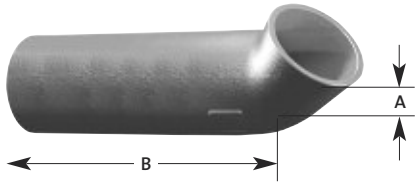
Bends medium long radius door back

88° bend • Medium & long radius with heel rest – ED007



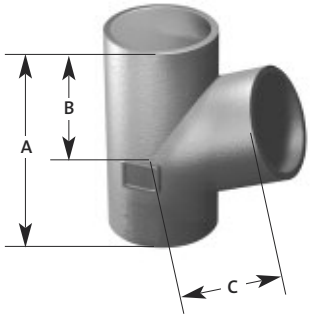
Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
192289	**0740088**	100	269	277	180	5.5
192290	**0760088**	150	274	282	150	11.4

45° bend • Long tail – ED055



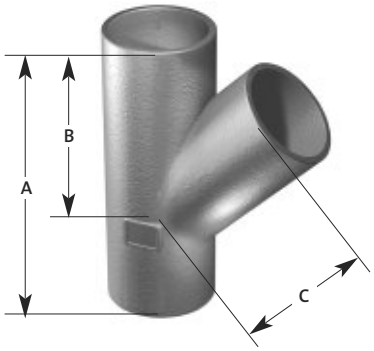
Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191778	**5540045**	100	70	250	4.0

69° branch • Equal and unequal – ED006



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191781	**0644069**	100 x 100	215	130	130	2.7
191851	**0664070**	150 x 100	235	150	155	5.1

45° branch • Equal and unequal – ED006



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191782	**0644045**	100 x 100	275	205	205	3.8
191783	**0664045**	150 x 100	295	240	240	6.1
191784	**0666045**	150 x 150	355	265	265	9.0
191785	**0684045**	200 x 100	300	260	260	10.3
191786	**0686045**	200 x 150	375	300	300	13.2
191787	**0688045**	200 x 200	455	340	340	17.3
191881	**0699045**	250 x 250	560	430	430	32.2
191882	**6121245**	300 x 300	660	505	505	54.8
192384	**6161245**	400 x 300	660	555	565	55.3
192373	**6161645**	400 x 400	835	645	645	82.5
† 192385	**6202045**	500 x 500	1020	790	790	175.0
† 192386	**6242445**	600 x 600	1180	920	920	215.0

† *Available to order.*

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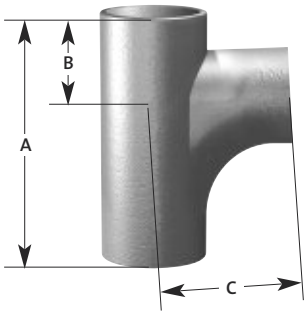
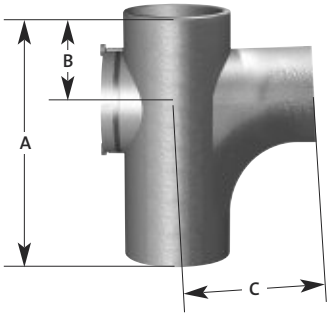
Branches

88° Single branch • Radius curve – ED06R



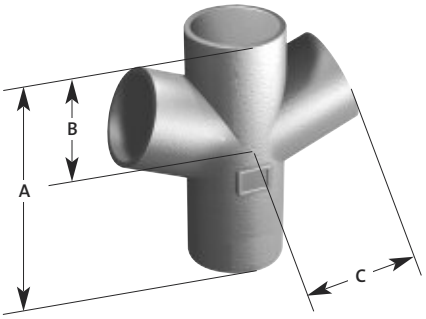
Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191788	**6R44088**	100 x 100	270	102	150	3.5
191789	**6R64088**	150 x 100	300	117	202	7.6
191790	**6R66088**	150 x 150	400	140	260	12.5
191791	**6R86088**	200 x 150	428	157	283	13.0

88° Branch with access • Radius curve – ED07R



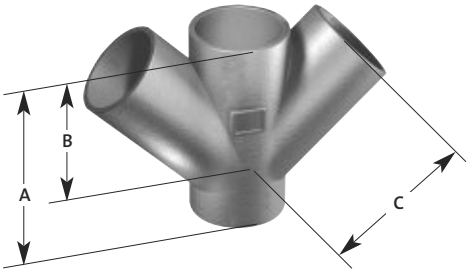
Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191793	**7R44088**	100 x 100	270	102	150	4.3
191794	**7R64088**	150 x 100	300	117	202	10.4
191795	**7R66088**	150 x 150	400	140	260	13.9

69° Double branch – ED010



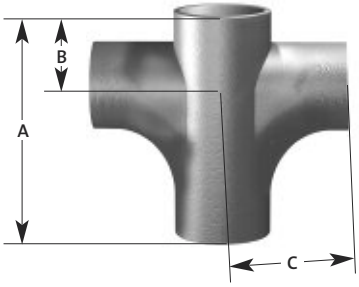
Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191796	**1044470**	100 x 100	215	130	130	3.4

45° Double branch – ED010



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191798	**1044445**	100 x 100	260	190	190	4.0
191799	**1064445**	150 x 100	280	225	225	8.4
191800	**1066645**	150 x 150	355	265	265	12.6
191801	**1088845**	200 x 200	455	340	340	24.0

88° Double branch • Radius curve – ED10R



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
185373	**0R44488**	100 x 100	270	102	150	4.2
191803	**0R64488**	150 x 100	300	115	200	10.9

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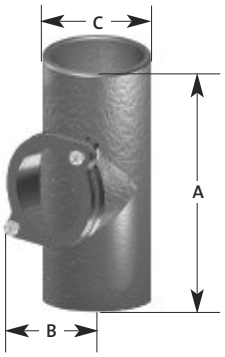
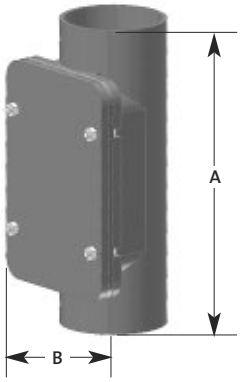
Pipes access

Round door – ED014



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191805	**144**	100	250	80	116	3.1
191806	**146**	150	280	110	170	6.2

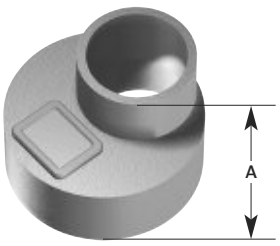
Rect door – ED015



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191807	**154**	100	320	80	6.7
191808	**156**	150	395	105	12.2
191809	**158**	200	475	140	20.2
191883	**159**	250	540	160	38.5
191884	**1512**	300	610	190	50.0

Pipes tapered

Pipes • Tapered – ED028



To connect 250 and 200 Ensign to 225 Timesaver Drain, use TD41 (consult Timesaver catalogue or contact technical department 01952 262529).

Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191810	**2864**	150 x 100	105	1.9
191811	**2884**	200 x 100	115	3.5
191812	**2886**	200 x 150	125	3.3
191889	**2894**	250 x 100	122	5.5
191886	**2896**	250 x 150	135	6.3
191892	**2898**	250 x 200	145	6.5
191890	**28126**	300 x 150	150	9.9
191891	**28128**	300 x 200	160	10.1
191885	**28129**	300 x 250	170	12.2
155504	**281612**	400 x 300	200	20.0

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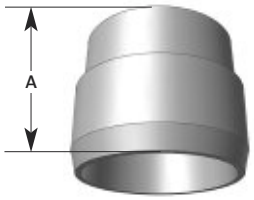
Pipes and connectors transitional

Transitional connector – ED076

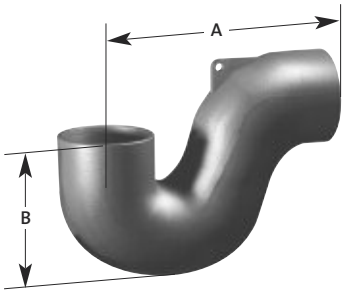


Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191813	**764**	100	100	1.8
191814	**766**	150	125	4.2

Adaptor from Ensign to Supersleve.

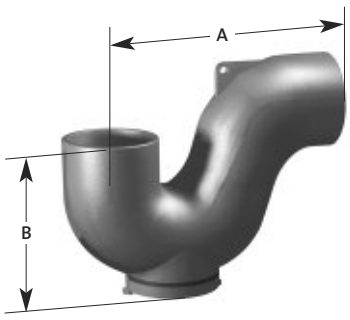
Traps

Traps • Plain – ED034



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191815	**344**	100	255	160	4.5

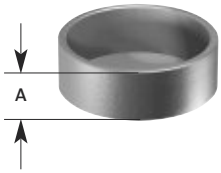
Traps • Plain with access bottom – ED037



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
182482	**374**	100	255	175	5.2
182483	**376**	150	350	240	12.1

Blank ends

Blank ends • Plain – ED070



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191818	**704**	100	40	0.8
191819	**706**	150	50	2.0
191820	**708**	200	60	3.2
191887	**709**	250	70	5.7
191888	**7012**	300	90	10.3

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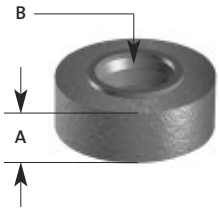
Blank ends

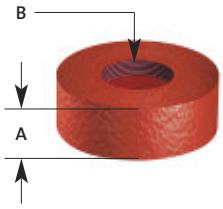
Blank ends • Push-fit connection – ED071



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191821	**7142**	100	40	1.0
191822	**7162**	150	50	2.0

B = rubber grommet which accommodates 50mm waste UPVC or copper.

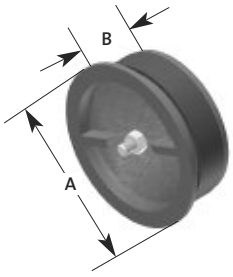
Blank ends • Drilled and taped – EF071T



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191579	**7142T**	100	40	1.0

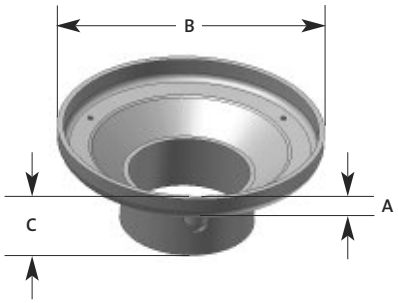
Red coated.
To connect to UPVC/copper waste use 50mm/2" BSPT male iron adaptor.
B = D/T 50mm BSPT.

Expansion plug – ED074



Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191823	**744**	100	110	42	0.7
191824	**746**	150	156	42	1.5

Gully inlet – ED060



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191825	**604**	100	20	215	87	2.4

Can be supplied fitted with solid cover order ED066 (Product Code 191852).

Solid cover

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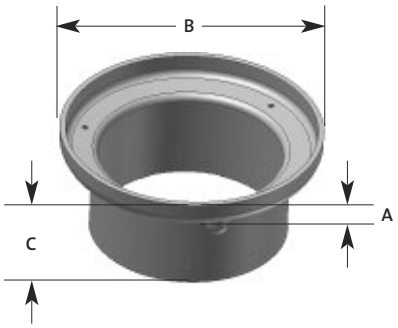
Gully inlet Bellmouth

Bellmouth – ED060



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191826	**606**	150	20	215	95	2.9

Can be supplied fitted with solid cover order ED066 (Product Code 191853).

Solid cover

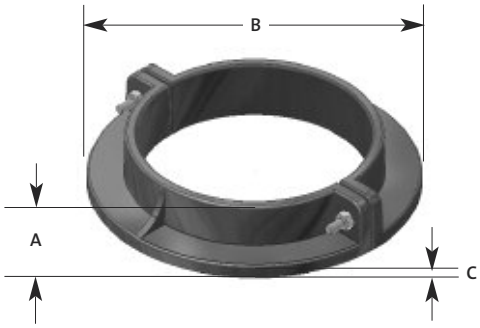
Grating plain – ED065

Product Code	CAD Ref	Dia	Nominal Wt/kg
191828	**65**	200	1.8

Loose grating for ED060. Maximum load 2.0 tonnes.

Puddle flanges

Flange – ED078



Product Code	CAD Ref	Dia	A	B	C	Nominal Wt/kg
191829	**784**	100	50	220	12	4.6
191830	**786**	150	65	275	12	6.6
192318*	**7810**	250	70	405	12	57.9
192319*	**7812**	300	75	460	12	71.2

**Black only.*
This collar is in two halves which can be bolted around the pipe even when pipe is in position. Can also be used as a firestop.
Due to manufacturing tolerances it is recommended that the puddle flange is bedded on Denso tape or similar.

Multi-clamp • Puddle flange – ED078

Product Code	CAD Ref	Dia	A	B	Nominal Wt/kg
191831	**788**	200	370	35	6.3

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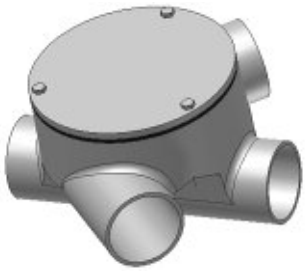
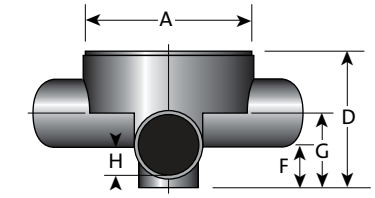
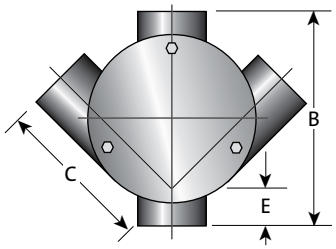
Inspection chambers

Inspection chamber – ED012





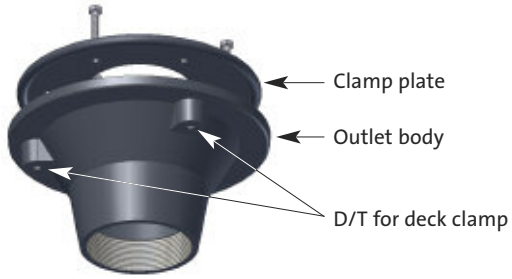


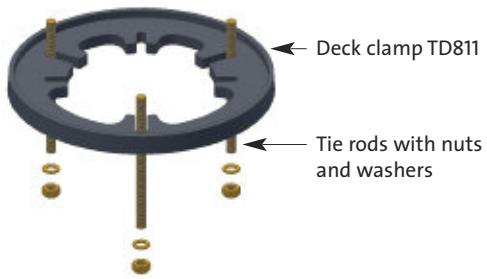
Product Code	CAD Ref	Dia	A	B	C	D	E	F	G	H	Nom. Wt/kg
191832	**12444**	100 x 100	275	373	265	224	73	70	122	50	15.9
191833	**12644**	150 x 100	274	393	265	243	83	95	147	75	17.2
191834	**12666**	150 x 150	274	393	254	295	118	95	175	75	19.4

Supplied with 250mm diameter removable cover for ease of maintenance.

Floor drains adjustable

TD810 Floor drain body with adjustable clamp plate





Adjustable height for use with waterproof membrane

Body options

Product Code	CAD Ref	Part No.	No. Bore	Nominal Wt/kg
191613	**810**	TD810	100	8.2

TD813 floor drain body with adjustable clamp plate D/T for deck clamp (TD811)

Product Code	CAD Ref	Part No.	No. Bore	Nominal Wt/kg
191616	**813**	TD813	100	8.2

TD811 cast iron deck clamp complete with nuts, washers and bolts. Used with TD813

Product Code	CAD Ref	Part No.	No. Bore	Nominal Wt/kg
191614	**811**	TD811	–	1.8

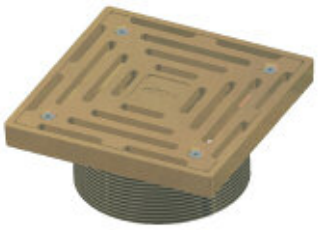
Coating
Floor drains are coated in a black water based primer.

Connections to Ensign above and below ground pipework
Connection achieved from the extension piece TD812, and transitional coupling TD02. (See pages 11 and 45).

Floor drains adjustable

Gratings for use with TD810, TD813, TD822 and TD824

TD826 nickel bronze grating and frame



Product Code	CAD Ref	Size	Nominal Wt/kg
191194	**826**	150 x 150	2.2

TD827 nickel bronze circular grating and frame

Product Code	CAD Ref	Dia	Nominal Wt/kg
191195	**827**	162	2.0

TD828 nickel bronze square inspection cover (sealed)

Product Code	CAD Ref	Size	Nominal Wt/kg
191197	**828**	150 x 150	2.5

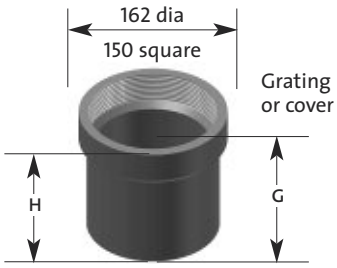
TD829 nickel bronze circular inspection cover (sealed)

Product Code	CAD Ref	Dia	Nominal Wt/kg
191196	**829**	162	2.3

Floor drains adjustable

Alternative for use with non-membrane floors

TD824 cast iron body threaded for use with grating TD826 – TD829

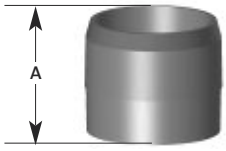


Product Code	CAD Ref	Dia	G min	G max	H	Nominal Wt/kg
191618	**824**	100	150	175	120	2.9

TD812 screwed outlet extension pieces

Product Code	CAD Ref	Dia	Nominal Wt/kg
191615	**812**	100	4.2

TD118 adaptor from Timesaver drain to Supersleve



Product Code	CAD Ref	Dia	A	Nominal Wt/kg
191350	**118**	100	170	2.3

TD822 cast iron screw inlet extension piece for use with grating TD826 – TD829

Product Code	CAD Ref	Dia	Nominal Wt/kg
191617	**822**	100	2.9

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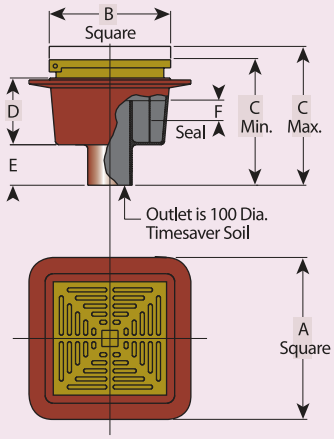
Floor drains technical

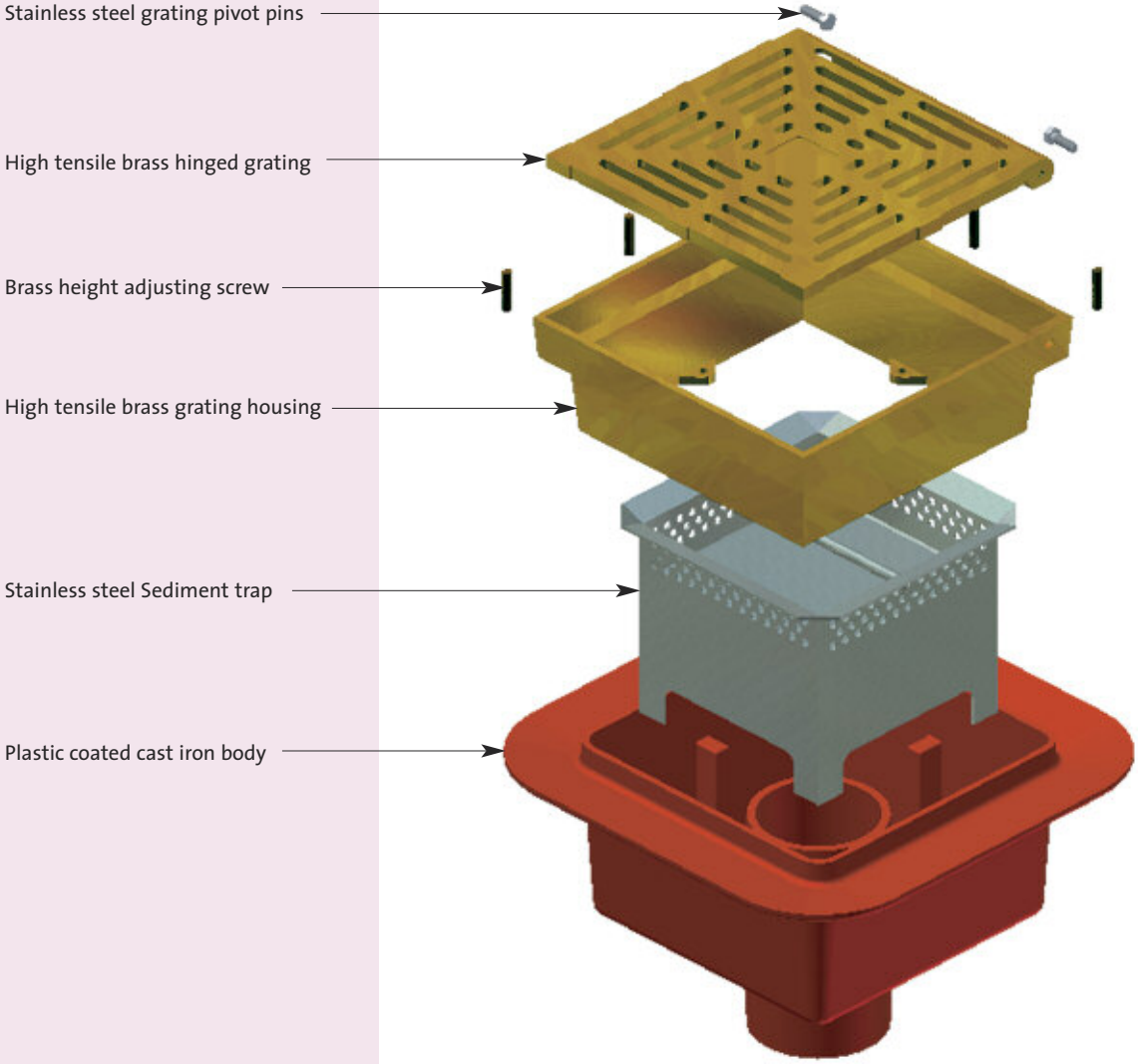


Adjustable height for use with non-membrane floors

TD950 square trapped floor drain
This trapped floor drain has been found useful in brewery installations.

Product Code	CAD Ref	Dia	A	B	C min	C max	D	E	F	kg
191396	**950**	100	400	300	310	335	160	100	50	19.7

Outlet is 100 Timesaver Soil.
To connect to Ensign use standard GT01 coupling.



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Section 3

Couplings – technical

Ensign cast iron drainage 1st choice for bridges

Ensign has the strength to complement the high-performance materials used in bridge construction:

- sympathetic expansion – co-efficient of linear expansion of cast iron is almost identical to that of concrete so, under any change of temperature, system will expand or contract with the structure
- non-combustible – in the event of traffic accidents, the system will not ignite even when subjected to exposure to burning fuels
- rigid and durable – will withstand even the most vigorous of rodding necessary to clear blockages caused by a build-up of rocksalt

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Coupling specification

Above ground

50mm to 125mm two-piece couplings EC002 utilise two socket cap set screws and nuts (M8). 150mm to 300mm couplings utilise four socket cap set screws and nuts (M8), all driven by 6mm Allen key drive.

The couplings incorporate four iron nibs on each half-piece which provide electrical continuity satisfying the requirements of IEE regulations *(see page 49)*.

The couplings are manufactured in ductile iron and incorporate an elastomer seal. The above ground couplings are coated in a red epoxy coating *(see page 83)*.

Nitrile gaskets are available on request.

For 400-600 above ground and below ground *(see high performance couplings, pages 10 and 50)*.

Below ground

100, 150-300mm two-piece ductile iron couplings ED001 utilise stainless steel socket cap set screws and nuts (M8), are grey epoxy coated and do not feature the continuity nibs.

Alternatively a new push-fit coupling is available, ideal for fast pipe laying *(see page 53)*.

					Accidental static water pressure (bar)	
System	**Coupling**	**Material**	**Type**	**Diameter**	**Unrestrained**	**Restrained***
Ensign Soil	EC002	Ductile Iron	Mechanical	50mm to 100mm	Up to 1 bar	Up to 5 bar
Ensign Soil	EC002	Ductile Iron	Mechanical	125mm to 150mm	Up to 0.5 bar	Up to 5 bar
Ensign Soil	EC002	Ductile Iron	Mechanical	200mm to 300mm	Up to 0.3 bar	Up to 3 bar
Ensign Soil	EC002HP	S/Steel	Mechanical	100mm	>5 bar	>5 bar
Ensign EEZI-FIT	EZ001	Cast Iron	Push-fit	100mm to 150mm	–	Up to 0.5 bar
Ensign Drain	ED001	Ductile Iron	Mechanical	100mm	Up to 1 bar	Up to 5 bar
Ensign Drain	ED001	Ductile Iron	Mechanical	150mm	Up to 0.5 bar	Up to 5 bar
Ensign Drain	ED001	Ductile Iron	Mechanical	200mm to 300mm	Up to 0.3 bar	Up to 3 bar
Ensign Drain	ED004	Cast Iron	Push-fit	100mm to 150mm	Up to 0.5 bar	Up to 5 bar

**Bracketed to prevent movement*

Ensign/Timesaver connecting couplings

To connect Ensign to Timesaver drain systems use Timesaver transitional couplings which are coated in a black water base primer coating. (See table below identifying the coupling required).

Size dia.	Ensign pipe Dia.		Timesaver Pipe Dia. Drain TD00		Coupling required	Product Code
	Max.	Min.	Max.	Min.		
100	112	109	119	116	TD02	02466
150	162	158	173	170	TD02	02467

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Electrical continuity

The Ensign two-piece couplings are supplied with four iron nibs to each half-piece, providing electrical continuity (equipotential bonding) automatically when tightened to the recommended torque.

The installation should be tested in accordance with BS EN 12056-2 for gravity drainage, and BS EN 12056-3 for rainwater, and to IEE regulations on equipotential bonding (earthing).

Provided that the Ensign electrical continuity coupling is assembled and installed as recommended in our instructions *(see page 51)* and the pipework is bonded to the electrical earth or similar earth, it is considered that the Ensign electrical continuity coupling will satisfy the IEE regulations.

It is recommended that the installation is regularly checked for equipotential bonding (earthing) in case of accidental damage, unauthorised pipework, modifications etc.

If an Ensign electrical continuity installation is to be modified for any reason, electrical continuity couplings must be used and the installation re-tested for equipotential bonding (earthing).

The test for electrical continuity on-site should be in accordance with the requirements stipulated within BS EN 877.

Ensign two-piece couplings EC002

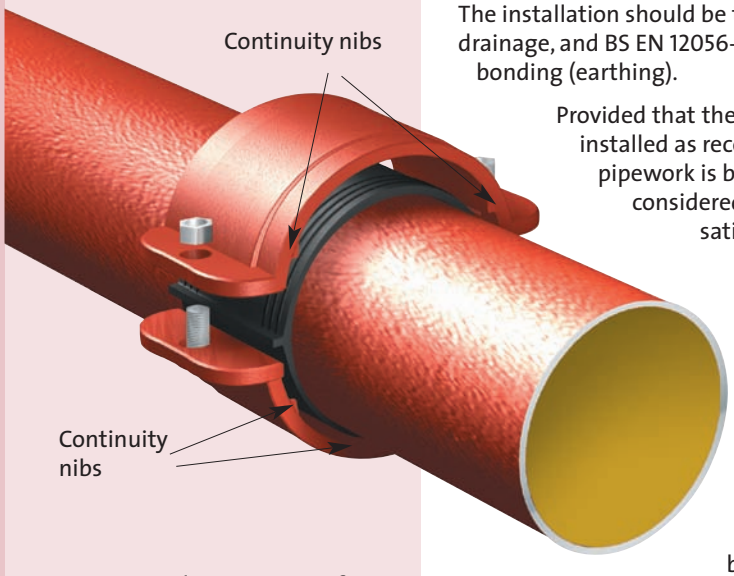
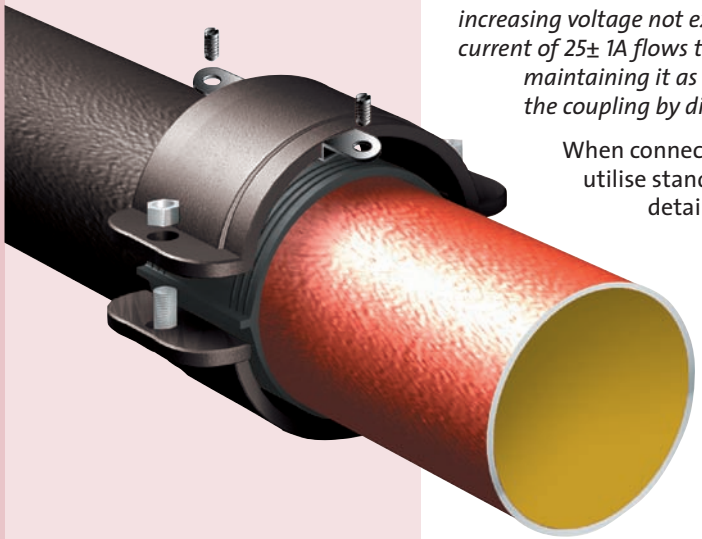


Fig. 1: Typical arrangement for providing continuity from Ensign to Timesaver Soil



If provision is made for electrical continuity the electrical resistance of the coupling shall not exceed 0.3 ohms when tested in accordance with BS EN 877. Apply a steadily increasing voltage not exceeding 50V ac, 50 Hz, across the junction until a steady current of 25± 1A flows through the coupling. Allow the current to flow for 30 s, maintaining it as necessary by adjusting the voltage. Calculate the resistance of the coupling by dividing the observed voltage by the current.

When connecting Ensign to Timesaver Soil or Drain, it will be necessary to utilise standard Timesaver coupling assemblies and continuity clips as detailed in following table.

Ensign to Timesaver soil			
Dia. mm	**Coupling**	**Product Code**	**Cont. Clip**
50	GT01	191691	191198
70-75	GT12	191429	191198
100	GT01	191693	191198
150	GT01	191694	191199

Ensign to Timesaver drain			
Dia. mm	**Coupling**	**Product Code**	**Cont. Clip**
100	TD02	191297	191199
150	TD02	191298	191199

Assemble the transitional coupling as detailed in the typical arrangement shown in Fig. 1.

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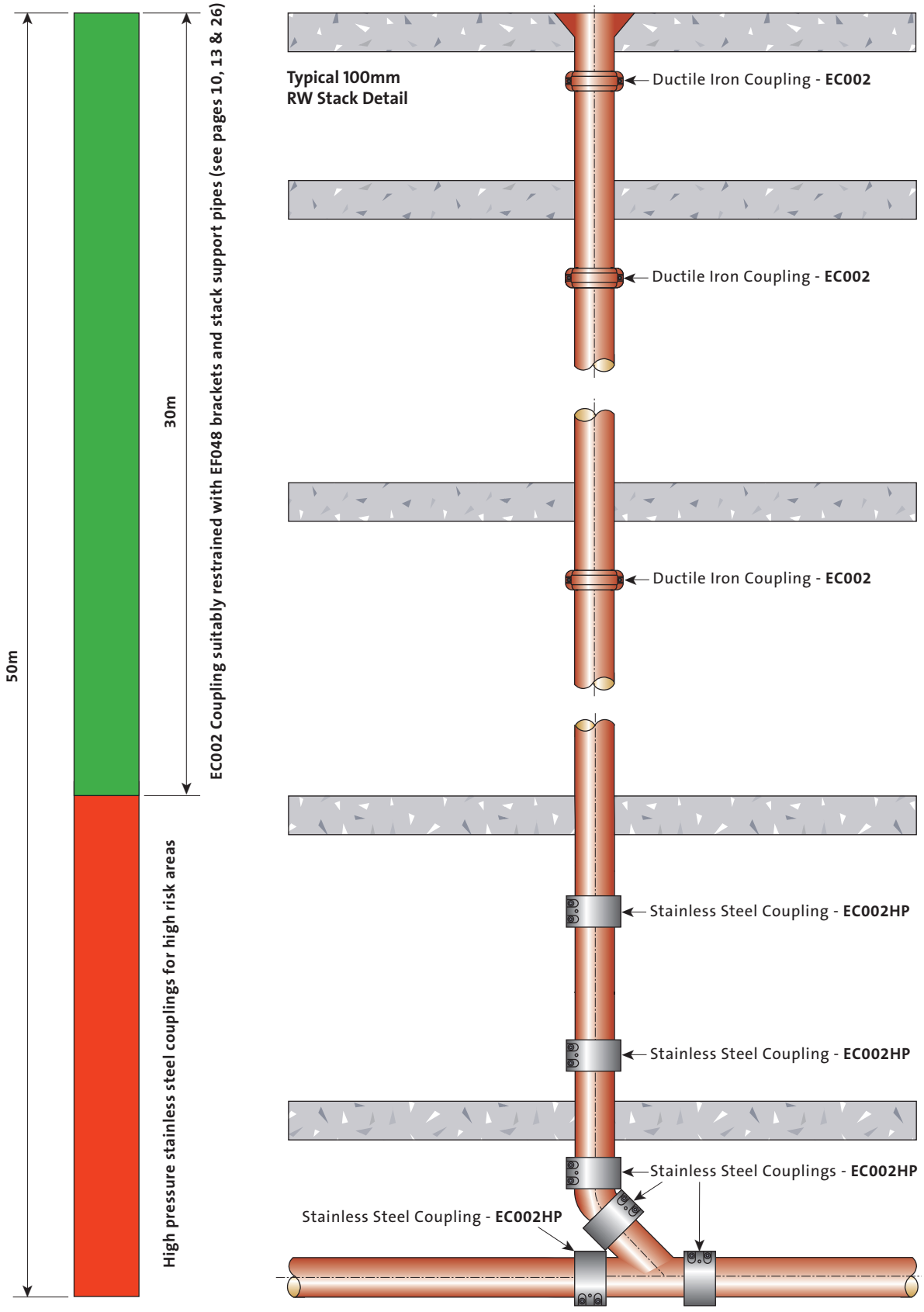
Installation high performance

Typical installation for high performance stainless steel couplings (EC002HP)



NOTE: If access is required at lower level - telephone Technical Helpline: 01952 262529.

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Jointing method

Couplings are supplied pre-assembled.

1. Slacken bolts on coupling to fullest extent, removing the bolt(s) from one side to ease assembly and remove rubber gasket.

2. Place the rubber gasket over the end of the pipe or fitting, ensuring the central register is abutted against the spigot edge.

3. Push the second pipe or fitting into the gasket again ensuring that the spigot is abutted against the central register.

4. Loosely assemble the coupling around the gasket.

5. Check alignment of assembly before tightening the bolts. Coupling bolts on all sizes are M8 and require special Allen socket adaptor (6mm) EF102, together with a ratchet spanner EF100.

Note: Bolts should be tightened until a suitable resistance is achieved if using a torque wrench minimum setting 20Nm.

Tools

	Product Code
A – Ensign EC Lube (1 litre bottle) **EC0931** For use with all push-fit connections	**191171**
B – Lubricant for EEZI-FIT push-fit assembly joints (0.5 litre tub)	**199037**
C – 1/2" Square-drive **EF100** Ratchet Spanner (use with C and E) For use with nuts on fixing brackets and on access door fittings and also with new two-piece coupling	**191201**
D – 13mm A/F 1/2" Square-drive **EF101** Deep Socket (use with ratchet B) For use with nuts on fixing brackets and on access door fittings	**191202**
E – 13mm A/F 'T' Box Spanner **EF098** For use with nuts on fixing brackets and on access door fittings	**191200**
F – 6mm Allen Socket Adaptor (use with ratchet B) **EF102** For use with bolts on all ductile iron couplings	**191753**

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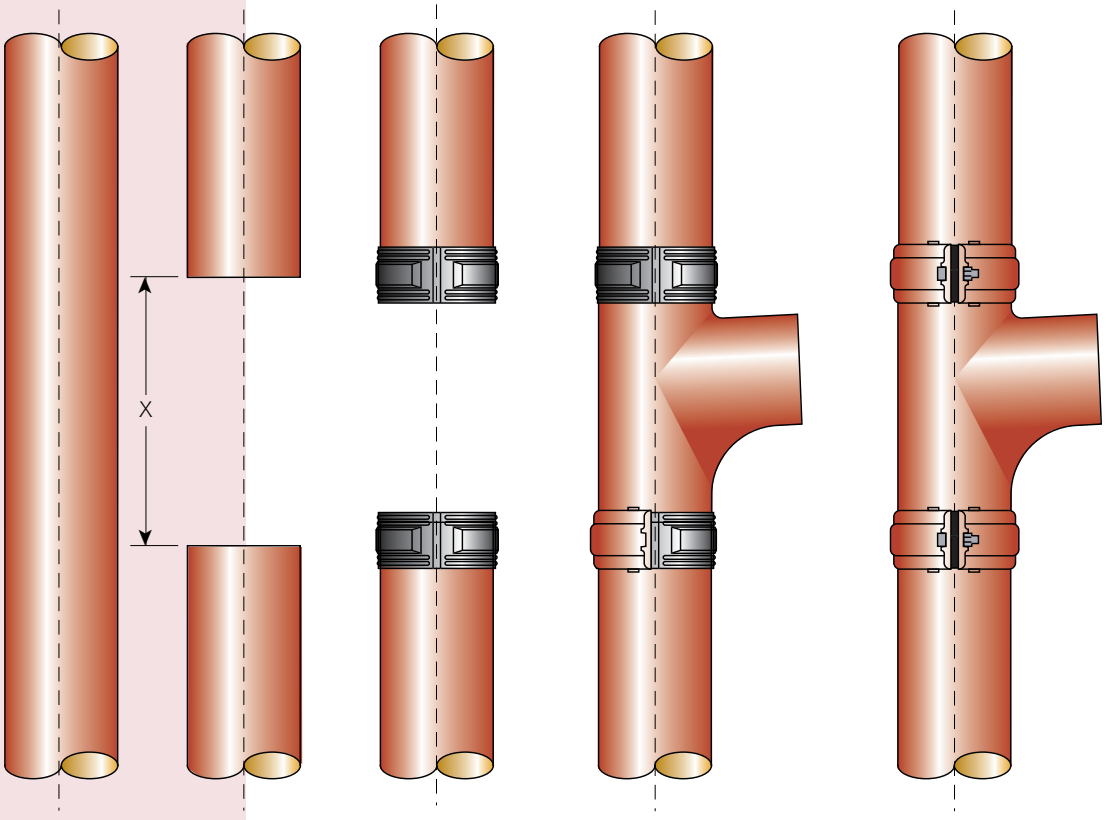
Installation modifications

Modifications to an existing Ensign installation

Typical example

1. Measure length of branch, adding a further 15mm in total to allow for coupling's central register top and bottom.
2. Make sure existing pipework is adequately supported from above.
3. Mark pipe position for cutting.
4. Cut pipe using powered disc cutter or wheel cutter.
5. Coat cut ends with appropriate touch-up (epoxy coating).
6. Lubricate cut spigot end of pipe and the coupling gasket with Ensign EC Lube or similar.
7. Push the rubber gaskets onto the spigot cut ends top and bottom, ensuring the central registers are abutted against each spigot edge.
8. Position fitting in the stack within each rubber gasket abutting against the central registers.
9. Loosely assemble the coupling around each gasket.
10. Check alignment of assembly before tightening the bolts, to recommended level (minimum 20Nm).
11. Test new stack for successful joints.

Typical example



X = fitting + 15mm

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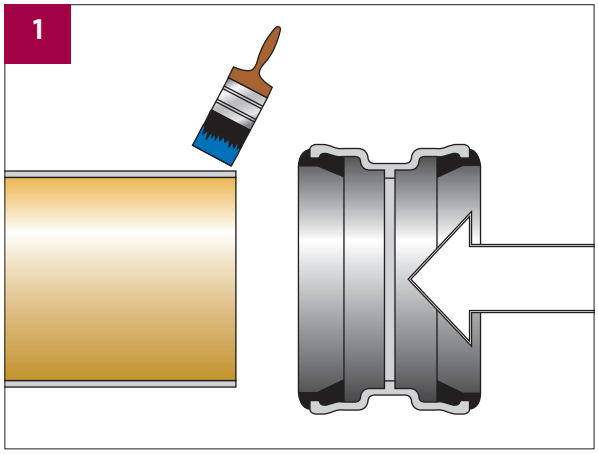
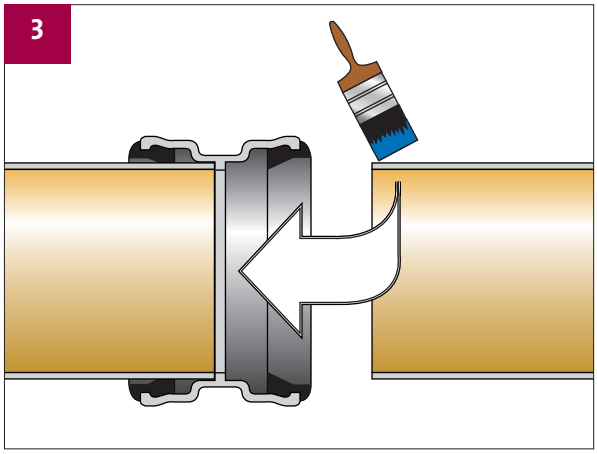
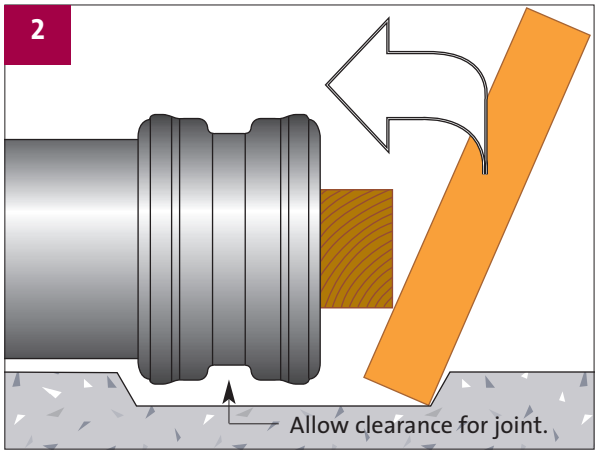
Installation PFJ drain coupling



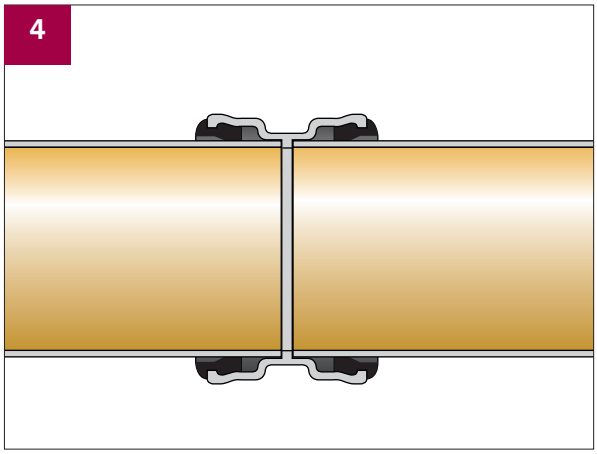
1. Apply lubricant (ie. silicone) to spigot end of drain pipe (remove any burrs etc. if previously cut).



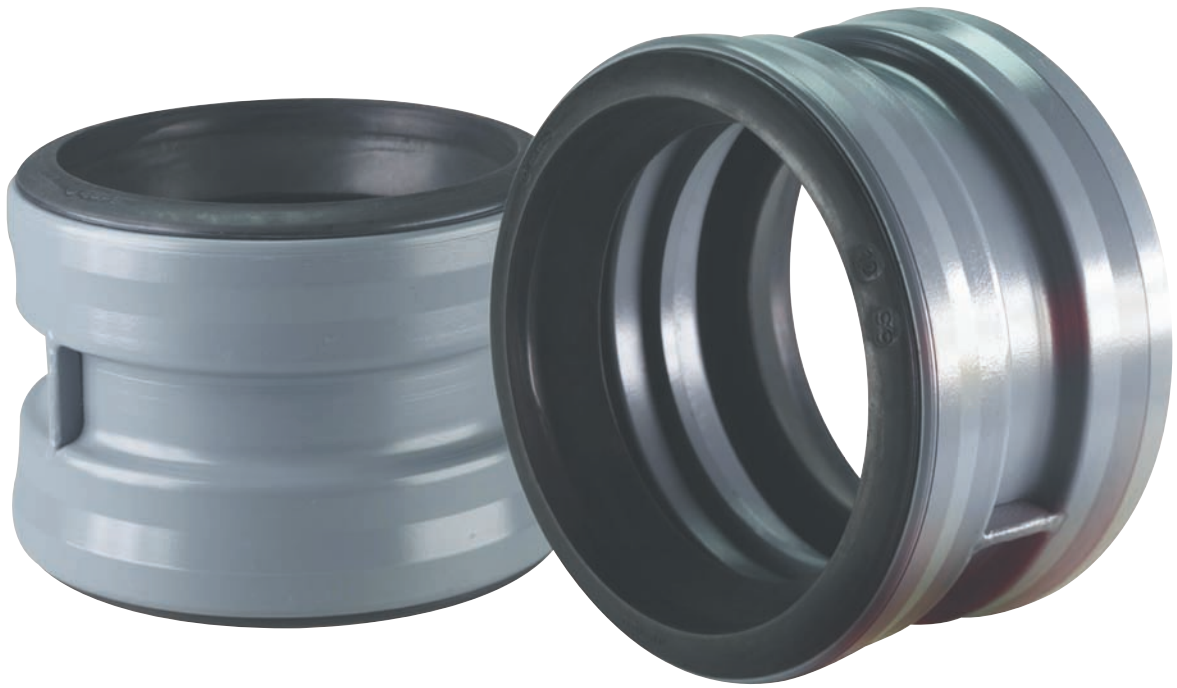
3. Apply lubricant to second pipe align with coupling and push pipe until abuts to central register.



2. Place in position and apply force easing coupling into end of pipe until abuts to the central register.



4. Completed joint.



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Ensign EEZI-FIT jointing method

1. Apply a small amount of jointing lubricant on the lip of the rubber gaskets with a brush, both ends to ease insertion of pipe/fittings.

2. Push joint over the end of pipe, ensuring the central register is abutted against the spigot edge evenly.

3. Push the second pipe or fitting into the gasket again ensuring that the spigot is abutted against the central register.

When jointing to pipe which has been cut, please remove any sharp edges (chamfering is not necessary).
Saint-Gobain PAM UK recommend the use of its own jointing lubricant available in 0.5kg tubs.
Product Code of the lubricant: 199037. (Please read health and safety instructions when using this product).

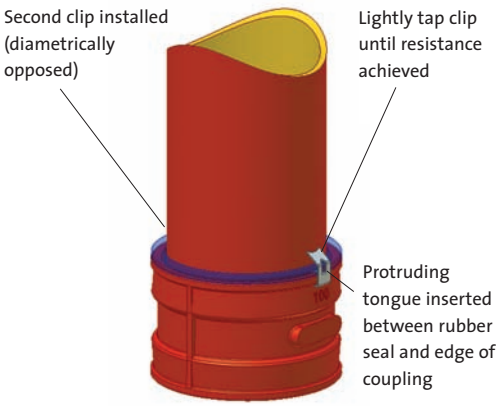
Ensign couplings performance

Accidental static water pressure (bar)

Coupling	Material	Type	Diameter	Restrained
EZ001	Cast iron	Push-fit	100 to 150mm	Up to 0.5 bar

Note:
Ensign EEZI-FIT is designed to meet gravity 0.5 bar performance BS EN 877 although has been successfully tested to 2 bar.

Ensign electrical continuity



In situations where equipotential bonding (earthing) has been specified electrical continuity clips can be fitted to the Ensign EEZI-FIT system, with two continuity clips per joint diametrically opposed.

Fitting instructions – after the joint has been completed

1. Locate clips by inserting the protruding tongue in between the edge of the coupling and the rubber seal.
2. Lightly tap each clip (in line with the pipe/fitting) until resistance is established.

The electrical continuity clips are supplied separately in bags of 30.
Product Code 208462.
Testing should be carried out in accordance with BS 6087 Amendment 2.

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Section 4

Brackets – technical

Ensign cast iron drainage 1st choice for commercial offices

Ensign has the performance to promote a productive and safe environment:

- non-combustible – will not drip as molten, burning globules (unlike HDPE), contributing to spread of fire and threat of injury, and will not emit toxic fumes like UPVC
- silent in operation – staff/ employees will not hear the drainage system in action and therefore will not be distracted in their work – the quietest system on the market
- requires minimal up-keep – helps keep maintenance costs and disruption to an absolute minimum
- durable – systems last in excess of 50 years, reducing any further drain on financial resources

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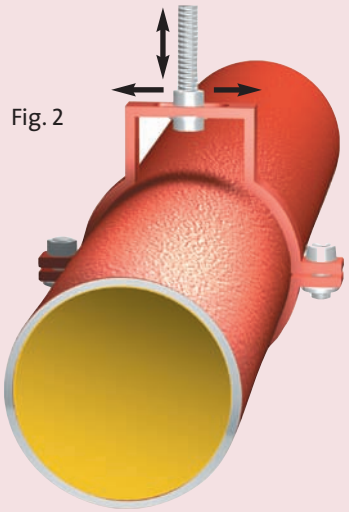
Pipe support brackets

Fig. 2

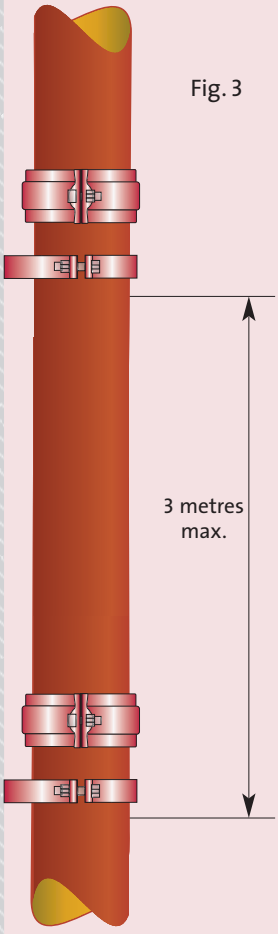


The unique, all-purpose, lightweight, ductile iron bracket incorporates an elongated slot at the fixing point (see Fig. 2).

This allows both vertical and lateral adjustment without dismantling the pipe system.

Support for vertical pipework

Fig. 3



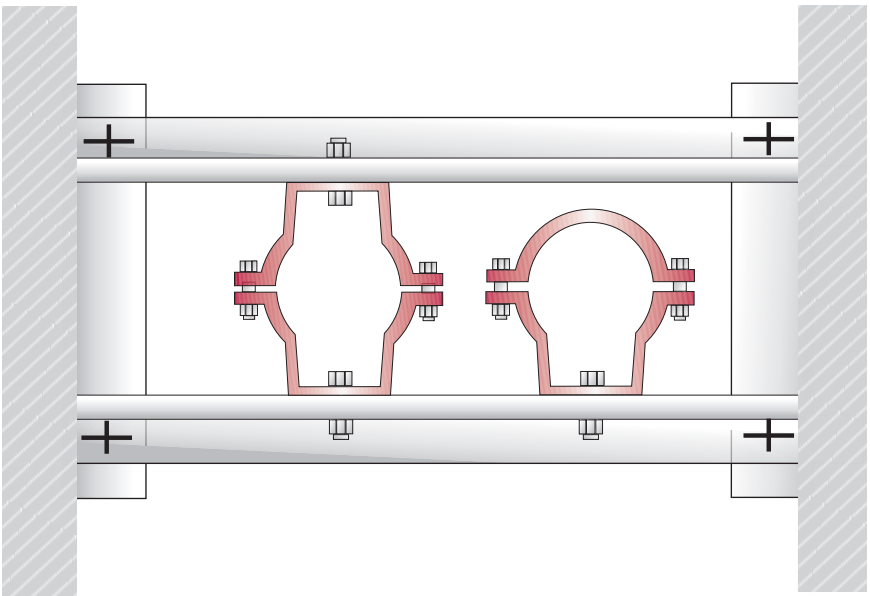
For vertical waste or rainwater stacks, it is recommended that a load-bearing bracket be fitted to each floor level, to carry the weight of the pipe and its contents. This is of particular importance on multi-storey applications.

These brackets should be tightened as the stack is built up, so that each floor height is self-supporting and undue pressure is not imposed upon the base of the stack.

Where rainwater and soil stacks (as Fig. 3) are located at standard distances from wall or column (see table below), one bracket EF048 per length of pipe will be adequate within 600mm of the joint.

Ensign pipe diameters	50, 70	100, 150, 200
Stand distances from back of pipe wall face	32mm	38mm

Additional brackets may be required where fittings are installed within the vertical stack, at the discretion of the designer.



Typical support arrangement for vertical pipework.

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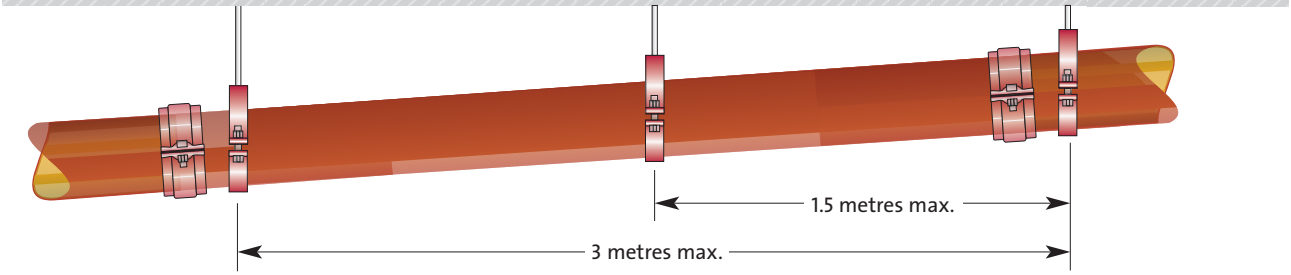
Support for low gradient pipework

Fig. 4



The distance between pipe supports should not exceed 3 metres, as advised in BS EN 12056-2 Code of Practice for Sanitary Pipework.

However, as shown in Fig. 4, to ease installation it is recommended that suspended Ensign pipework should have two bracket supports per 3 metre length.

Positioning of brackets as follows:

One bracket maximum of 300mm from joint. Second bracket positioned approximately centre of 3m length pipe, or as further guidance, 1.5m approx. from first bracket (see diagram).

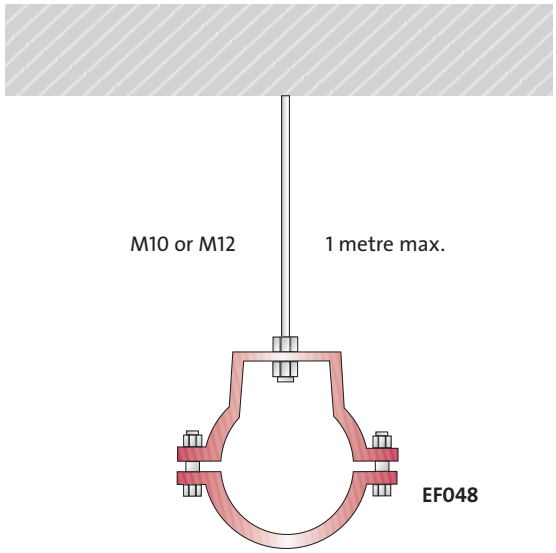
Pipe weights kg per metre

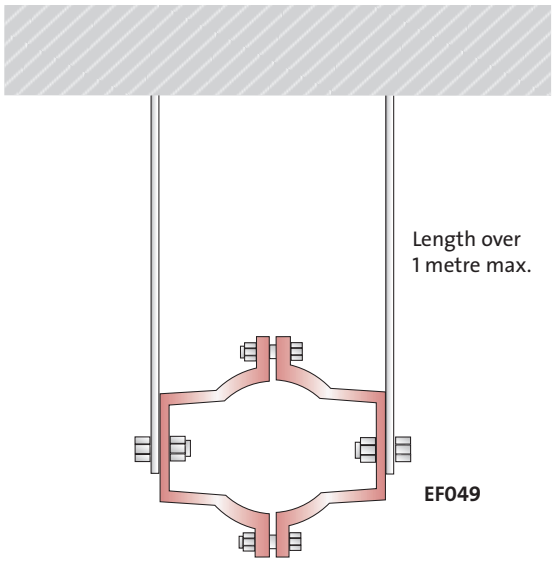
Size	Empty	Full
50	4.4	6.5
70	6.0	10.0
100	8.5	17.8
125	11.9	24.6
150	14.3	32.5
200	23.3	54.8
250	33.5	87.9
300	43.6	121.3
400	59.3	176
500	81.6	278
600	107.3	391

Note: Design details within the catalogue are for gravity systems only or accidental pressure up to 1 bar (for pipe diameters 50-150mm).

For systems which require higher accidental pressure (for pipe diameters >150) please telephone: Technical Helpline 01952 262562.

Typical support arrangement for horizontal pipework





Brackets – components

Bracket diameter	50	70	100	125	150	200	250	300
Threaded rods (recommended)	M10	M10	M10	M10	M12	M12	M12 (x 2)	M12 (x 2)

*Maximum recommended length of threaded rod is 1 metre for single drop EF048, two drops recommended over 1 metre EF049 type bracket. Lateral movement brace **may** be required for horizontal pipework at 6 metre spacing.*

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Stack support pipe

The stack support pipe offers extra support to fittings and brackets.

When to use stack support pipe/brackets	
If using standard ductile iron proprietary brackets EF048/EF049	NO
If using rubber lined steel brackets	YES
If using new acoustic brackets EF048AD	YES
If using mild steel fixing brackets	YES

When stack support pipes/brackets are required, use on any building with an average of 2.5m between floors, positioning stack support pipe at the base of the first floor, and every subsequent fifth floor.

This should be typically fixed to a wall or column, as illustration below. The use of the new cantilever arm/console range EF052 is ideal for support and fixing of bracket.

IMPORTANT! A stack support pipe is not an alternative to bracketing, but an additional support bracket.

Wall bracketing system in mild steel, for use with stack support pipe and brackets are available.

Cantilever Arm **EF052**

Product Code **192329**

Cantilever Arm with support **EF052**

For stack support pipes 200-300mm dia.

Product Code **205016**

Stack Support Console **EF052**

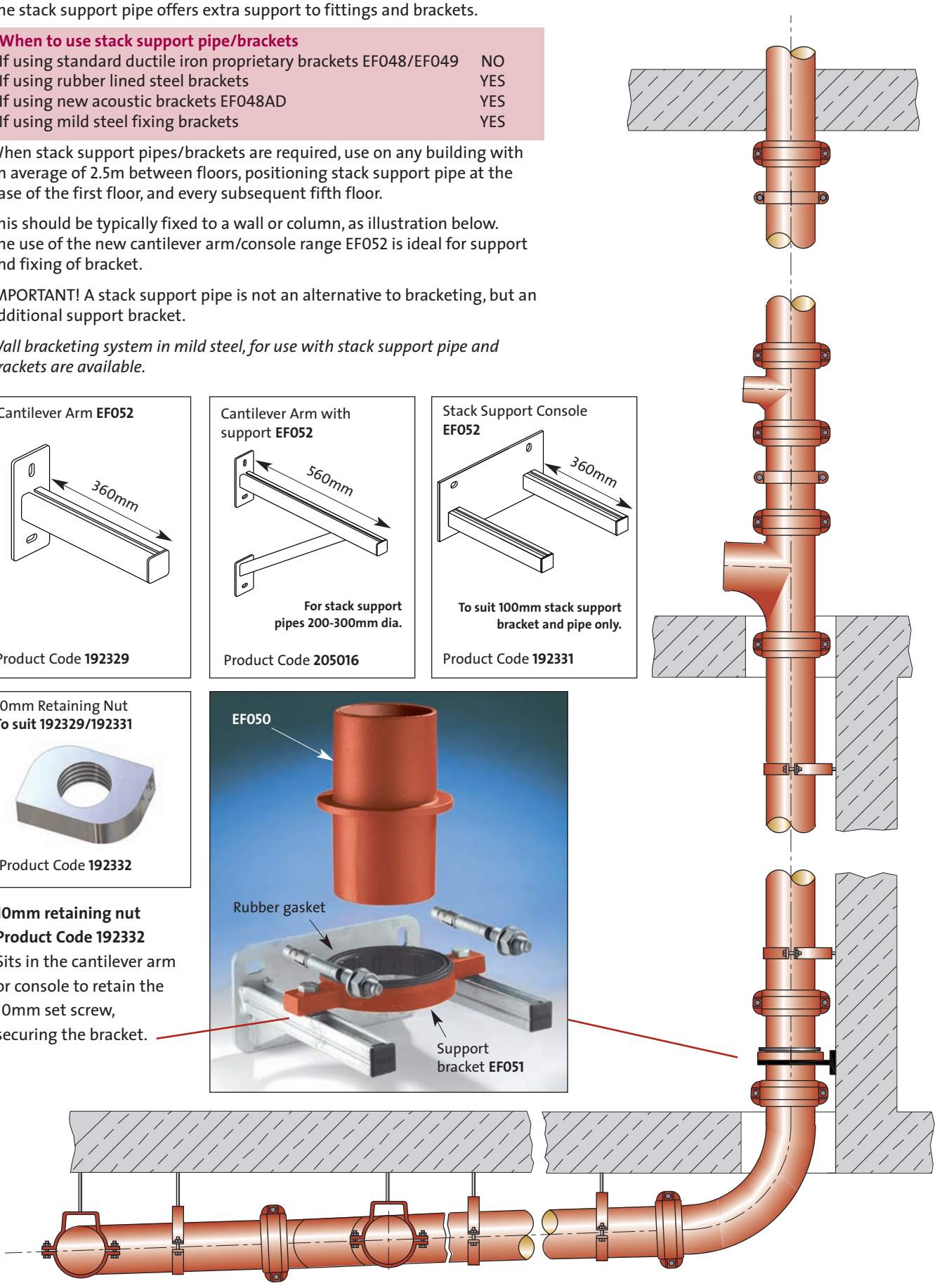
To suit 100mm stack support bracket and pipe only.

Product Code **192331**

10mm Retaining Nut
To suit 192329/192331

Product Code **192332**

10mm retaining nut
Product Code 192332
Sits in the cantilever arm or console to retain the 10mm set screw, securing the bracket.



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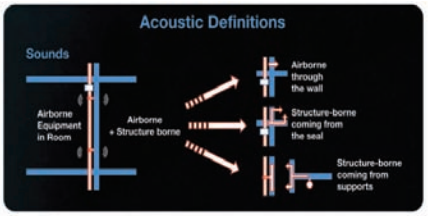
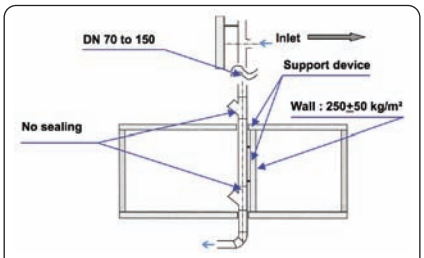
Acoustic brackets





Pipe internal diameter (mm)	70-80	100-125	150
Upper flow rate (l/s)	1	4	8

The evacuation of waste, soil and rainwater generates structure-borne and airborne sound between rooms and usually occurs as the result of a mixed flow, when the pipe is filled with water and air. In such circumstances a pipe will radiate noise outwards and transfer it to any lightweight ceilings, cupboards and similar areas wherever it makes contact.

Relevant regulations

UK building regulations Document 'E' provides guidelines in residential dwelling houses, flats for separating walls, separating floors and stairs with a separating function – stipulating an airborne insulation value of 43-45dB(A).

BS 8233:1999 – Code of practice for governing acoustics within buildings

- Suggests acoustic levels by building type, ie. office, library, bedroom, etc
- Provides details of acoustic insulation and their estimated insulation value

BS EN 14366:2004

A new standard introduced to provide manufacturers of all drainage materials with a simple testing criteria (see diagram). The results recorded should be comparable and allow the specifier to make a more informed choice.

Ensign was the first UK drainage system to be tested to this new European Standard, carried out on the complete range of Ensign bracketry providing independently assessed results. EEZI-FIT has also been tested.

Conclusions of tests

All brackets within the Ensign range meet the requirements of BS 8233.
For exceptionally low levels of acoustic performance, the standard ductile iron bracket fitted with a new acoustic dampener should be used (see table).

Wastewater systems Ensign and EEZI-FIT – (100mm diameter) wall density 220kg/m²

	AIRBORNE SOUND			STRUCTURE BORNE		
Flow rate l/s	**2.0**	**4.0**	**8.0**	**2.0**	**4.0**	**8.0**
Ensign pipework fitted with two brackets – iron bracket EF048	45	**48**	54	27	**32**	34
Iron bracket fitted with acoustic dampener EF048AD	45	**47**	54	5	**11**	19
Ensign EEZI-FIT system fitted with two brackets – iron bracket EF048	45	**48**	51	23	**28**	36
Iron bracket and dampener EF048D	45	**48**	51	4	**9**	17

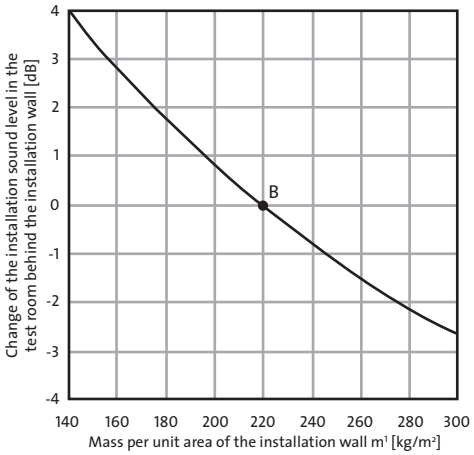
For test results on 150mm Ensign or further details on the tests, please contact 01952 262502, or email mike.rawlings@saint-gobain.com

Please note: When comparing Ensign and EEZI-FIT to alternative systems – ensure comparing the same flow rate, and number of brackets used in the tests (eg. 2). For vertical stacks, Ensign often requires only one bracket per 3 metres, therefore acoustic performance will be even better in this instance.

Effect from changes in wall density

Apart from the acoustical properties of the tested installation the measured sound level also depends on the construction of the test facility. One of the most important parameters in this context is the mass per unit area of the installation wall. For the installation test facility in the Fraunhofer-Institute of Building Physics, the effect of the installation wall on the installation sound level has been investigated by acoustical calculations. The results of the calculations are shown in Diagram A, which approximately shows how much the installation sound level in the test room behind the installation wall will change when the mass of the installation wall is modified.

Diagram A



B = Ensign at 11dB(A).
Example: wall density reduced to 140kg/m² then laboratory acoustic measurement of Ensign increased to 15dB(A) at 4 litres per second.

Diagram A
Change of the installation sound level in the adjacent test room against the mass per unit area of the solid installation wall at constant sound excitation. The figure shows the change of the installation sound level in comparison to an installation wall with a mass per unit area of 220kg/m². The mapped curve originates from acoustical calculations and refers to the conditions in the installation test facility in the Fraunhofer-Institute of Building Physics. Generally they cannot be transferred to other building conditions without restrictions. The calculations were performed on condition that thickness, loss factor and elastic modulus of the installation wall remains constant. Basis of the calculations were measurements of the installation sound level performed on a solid wall with a mass per unit area of 220kg/m².

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Acoustic bracket features

Markings
40-150
ww-yy
DEP

Developed to meet the increasing demand for buildings which require a high level of acoustic performance over and above the guidelines of BS 8233:1999 (UK Code of Practice for governing acoustics within buildings). Tested to BS EN 14366:2004. *Laboratory measurements of noise from waste water installations.*

The EF048 ductile iron bracket fitted with the new acoustic dampener achieved an exceptionally low level of noise transmission.

Material:

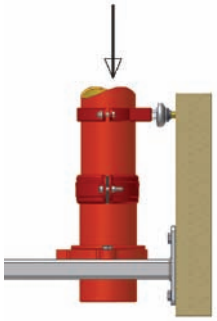
1. Dampener – elastomer EDPM
2. M8-M10 nut – galvanised-bichromated steel (will accept both threaded options)
3. Retainer cup – AISI 304 stainless steel
4. Small dish – AISI 304 stainless steel
5. M8-M10 tapped base – galvanised-bichromated steel

Size	50mm	70mm	100mm	150mm
Product Code	199881	199882	199883	199884

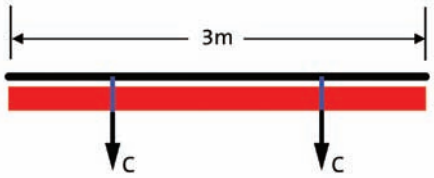
- Supplied fitted to EF048 bracket 50mm to 150mm
- EF048 bracket is manufactured in high strength ductile iron and red epoxy coated
- Dampener is connected to EF048 using M10 x 25 zinc and clear coated steel set screw with 2 x 25mm washers

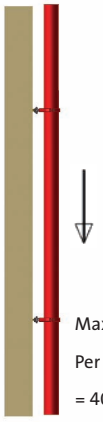
Acoustic bracket installation

Vertical pipe stack – one acoustic bracket minimum per 3 metres. It is also recommended that the EF050/EF051 stack support is used every fifth floor.

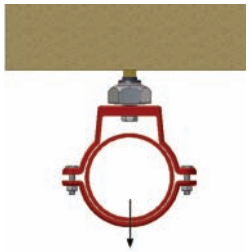


Max Load – C
Per dampener
= 100kg

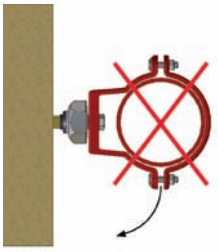




Max Load – P
Per dampener
= 40kg



Horizontal suspended pipework – two acoustic brackets minimum per 3 metres.



Horizontal pipework – fixing brackets on side as per diagram is not recommended, this will lead to product failure.

In every case of fixing – to obtain the best noise reduction, the elastomeric dampener must not be deformed or compressed!

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Section 5

Connections – technical

Ensign cast iron drainage 1st choice for hotels and apartments

Ensign has the quality to maintain a peaceful and safe environment:

- silent in operation – occupants/ residents who demand a level of comfort, will not want to be disturbed by the drainage system in action. Cast iron is the quietest material (twice as quiet as any other material without insulation
- non-combustible – will not drip as molten, burning globules (unlike HDPE), contributing to spread of fire and threat of injury
- quality – quality buildings demand quality specification
- minimal maintenance – keeps maintenance costs to a minimum

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Connection to other systems

Fig. 5

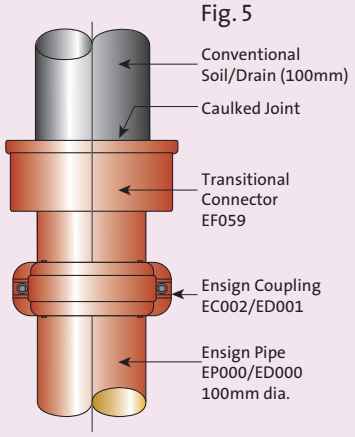


Fig. 6

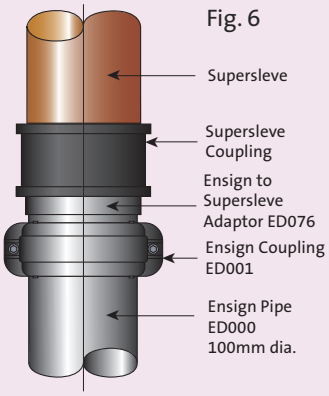


Fig. 7

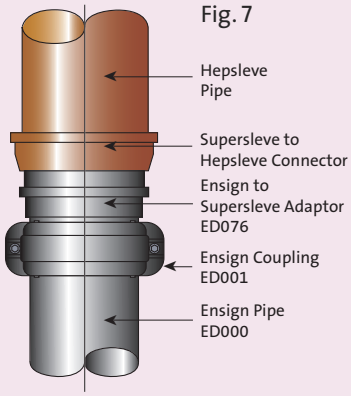
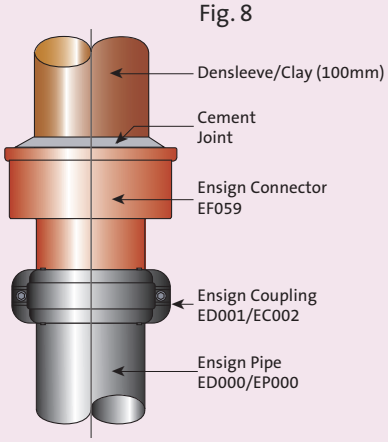


Fig. 8



WC connection

The Ensign range will accommodate 'push-fit' type, flexible connectors (ie. Multikwiks or similar), or using the transitional connector EF059.

Conventional soil/drain

To connect Ensign into a conventional soil/drain socket, use a traditional caulked joint. If connecting to a conventional soil/drain spigot, use an EF059 connector with a caulked joint and an EC002/ED001 coupling to the pipe. (See Fig. 5).

Hepworth clayware

100 and 150 Supersleve can be connected to Ensign by using an ED076 adaptor and an ED001 coupling. (See Fig. 6).

100 and 150 Hepsleve can be connected to Ensign by using an ED076 adaptor and an ED001 coupling in conjunction with Supersleve/Hepsleve transitional coupling manufactured by Hepworth. (See Fig. 7).

Earthenware/clayware

Ensign can be connected to an earthenware socket using a traditional cement joint.

If connecting to an earthenware spigot use an EF059 and an ED001 coupling with a traditional cement joint at the socket of the EF059. (See Fig. 8).

Ensign system dimensions

Other materials can be connected to Ensign by using an EC002 coupling , if their dimensions conform to the following table:

Ensign Nom Dia.	Min. OD	Max. OD
50	57	60
70	77	80
100	109	112
125	133	137
150	158	162
200	208	212
250	271.5	276.5
300	323.5	328.5
400	426	431
500	528.6	534
600	631	637

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Connection to other systems

Waste pipes (copper, plastics etc.)

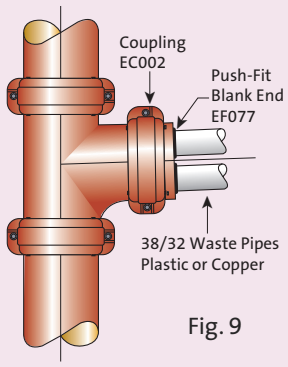


Fig. 9

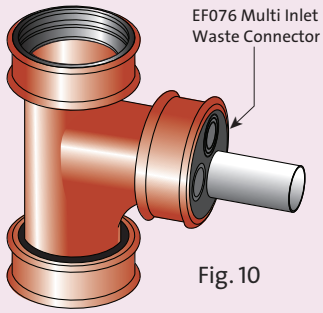


Fig. 10

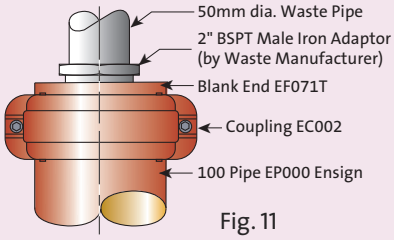


Fig. 11

The Ensign range offers a number of methods to connect to waste pipes:

'Push-fit' blank end EF077
Suitable for push-fit connection to copper/plastic waste, incorporating two rubber plugs accommodating 32/38mm diameter waste (See Fig. 9). Rubber plugs cut to size on site.

Boss pipes
Ensign now offers the choice of boss pipes using either the compression fit method in 50-150 diameter *(see below)* or the traditional drilled and tapped method at 50mm BSPT available in 100mm diameter *(see page 27)*.

PVC to Ensign PFJ
40-56mm PVC can connect directly to 100mm Ensign PFJ system, using a new push-fit gasket which accommodates three inlets.

Remove existing PFJ standard gasket, and replace with EF076 multi-inlet waste connector: Product Code 192322 (See Fig. 10).

Blank ends – push-fit EF071 or drilled/tapped EF071T
A blank end drilled and tapped 50mm BSPT EF071, using a 50mm BSPT male iron adaptor (supplied by waste manufacturer). (See Fig. 11). Or alternatively using blank ends with push-fit rubber grommets *(see page 25)*.

PVC above ground systems
100/150mm Ensign to PVC use standard Ensign coupling EC002. Please Note: Remove the continuity nibs on the standard EC002 coupling before connecting to PVC.

50mm Ensign to 40-56mm PVC use new rubber universal connector EF071R *(see page 24)*.

PVC below ground systems
100/150mm Ensign to PVC use standard Ensign coupling ED001.

Boss pipes compression fit

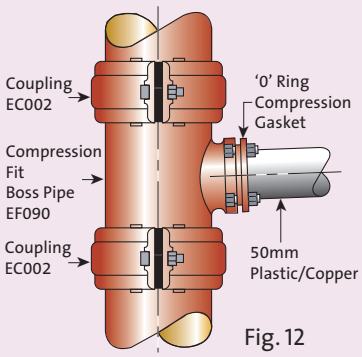
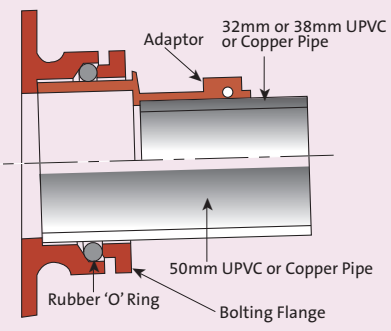


Fig. 12



The boss pipes incorporate 'O' ring compression gaskets that will accept 54-56mm O/D pipe, and is supplied assembled with the following for each boss.

1. 6mm 'O' ring rubber (EPDM)
2. M8 x 30 zinc and clear coated steel screw x 2
3. M8 coated steel nuts x 2

To connect 32mm and 38mm waste pipes fit the appropriate reducing adaptors onto the pipe before inserting through the clamp flange.

The 'compression fit' boss pipes have been introduced to reduce the cost of connecting to waste pipes, eliminating the need for expensive conventional threaded male adaptors, and subsequently reducing the overall installation costs.

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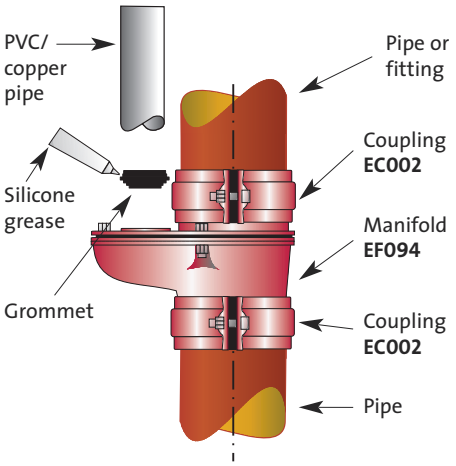
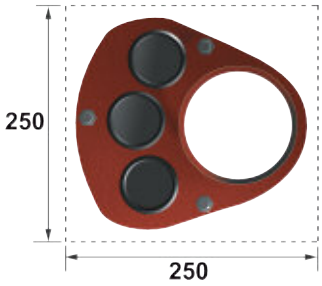
Multi-waste manifold connector





The multi-waste manifold simplifies waste plumbing by grouping all associated pipework from various sources such as sinks, basins, bidets, urinals and showers to one internal point above the finished floor level.

The manifold will permit the connection of three 32/38mm copper/plastic waste inlets to any new or existing 100mm diameter Ensign pipe stack and three 50mm copper/plastic waste inlets to 150mm diameter pipe stack.

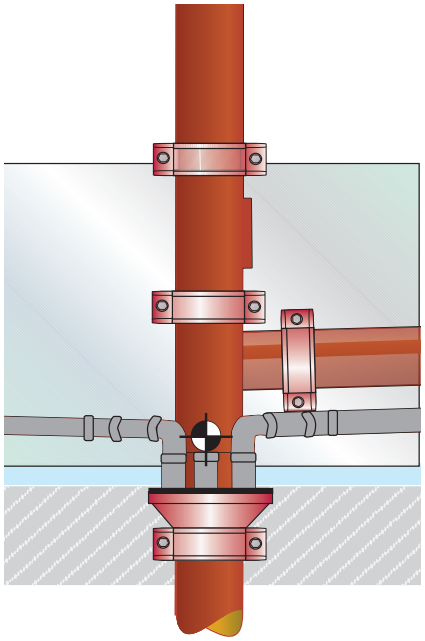
The manifold main body is connected to the stack using standard coupling EC002. On the 100mm manifold to achieve a 32mm waste connection, remove the inner rubber ring, 38mm utilising the outer ring (for waste pipe maximum lengths see BS EN 12056-2).

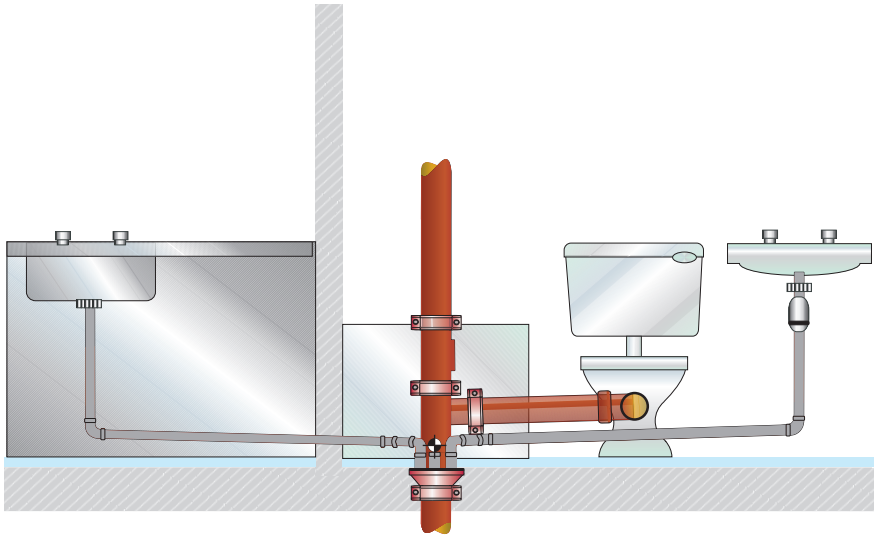
Pipework connecting discharge appliances to SVP manifold, should be designed not to cause self siphonage.

Fixing instructions

1. Remove grommets, pierce the appropriate groove for 32mm or 38mm waste (100mm manifold only) connections and tear out centre disc where required.
2. Apply an appropriate silicone grease (not provided) to the outside of the grommet and re-fit into manifold ensuring that the retaining groove of the grommet is located correctly in the casing.
3. Lubricate pipe ends and insert into grommet with a rotational movement. Pipe ends may be chamfered for ease of insertion.
4. Any grommet not fitted with a waste pipe must also follow instruction 2 above.

Typical manifold application





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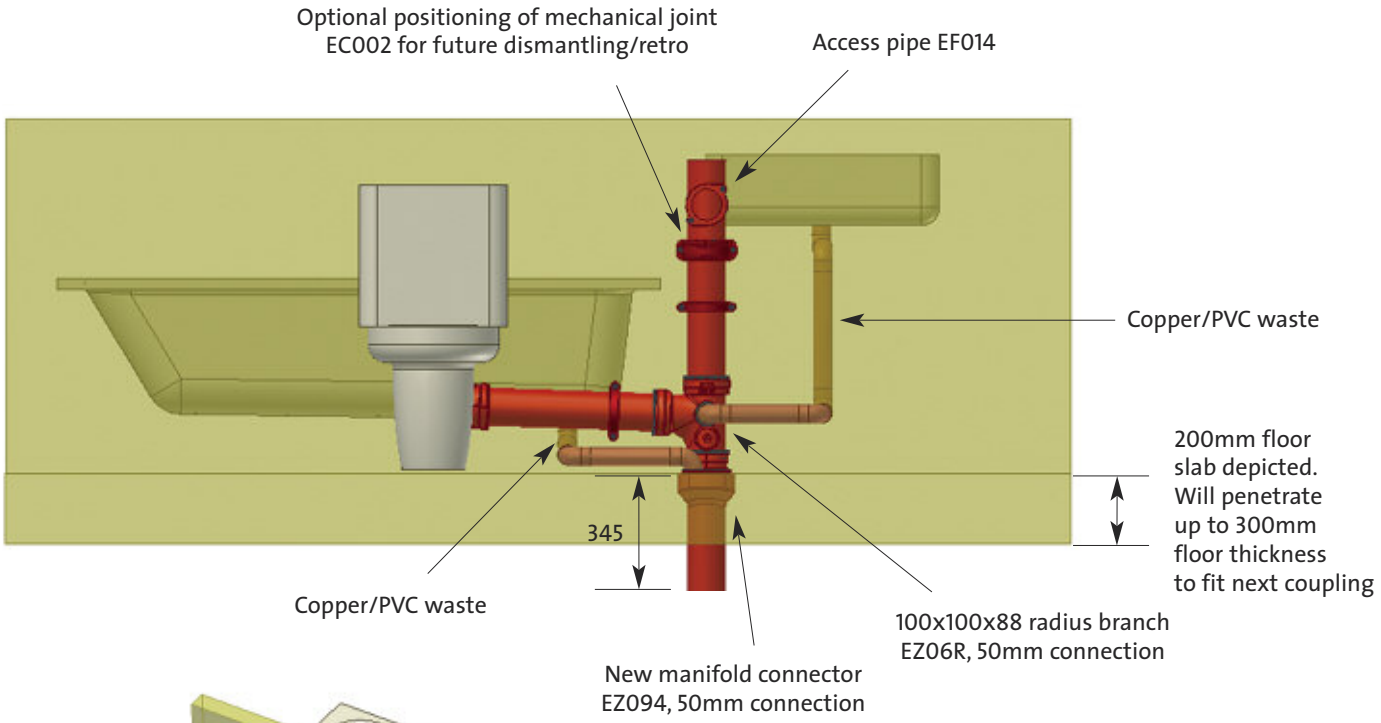
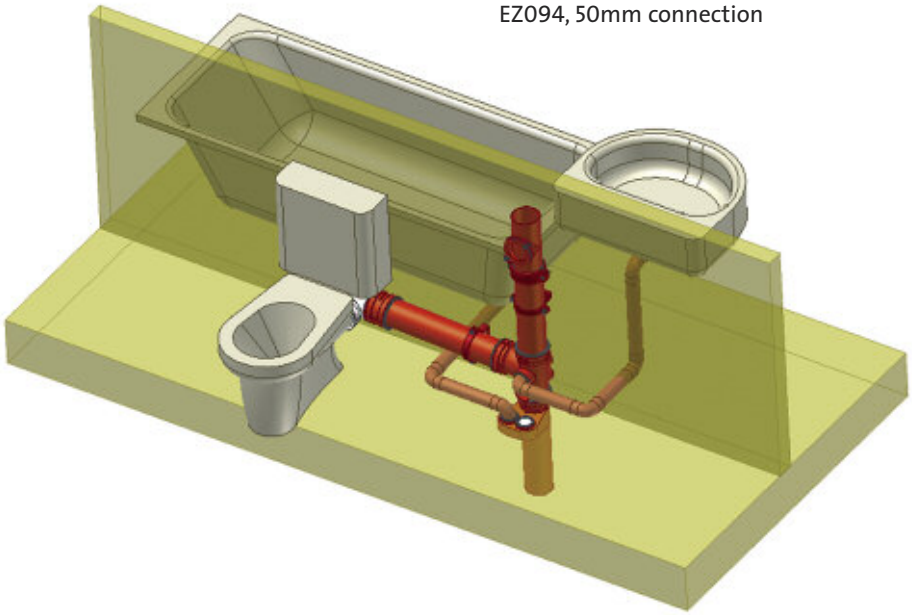
EEZI-FIT manifold application





EEZI-FIT boss pipe connections

Boss pipes and manifold are supplied with rubber grommets for connection to 54mm OD copper and 56mm OD UPVC waste.

To connect to 38/32mm waste simply use a reducer as shown (supplied by waste manufacturers).

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EEZI-FIT boss branches connections

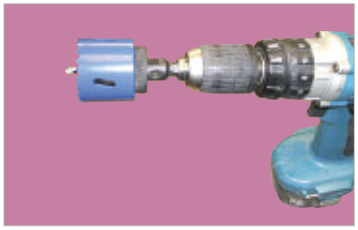
1. Simply determine which boss connection is to be used. If possible drill hole before installation.
2. Using a 51mm hole saw – cut a hole at the bottom of the boss centrally using the dimple provided. Ensure casting is held firm before drilling.
3. De-burr cut ends and make good with appropriate Ensign touch-up paint.
4. Fit rubber grommet (Product Code 208205) in bags of 10 supplied separately.
5. Apply small amount of lubricant to grommet.
6. Insert waste pipe – and push-home until fully located.

Tools Required:

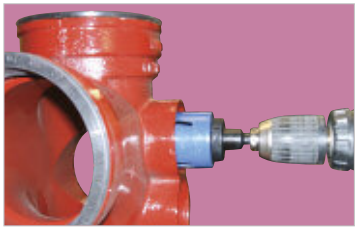
- A 51mm hole saw – Product Code 208206
- Arbour – Product Code 192327
- ¼" pilot drill – Product Code 192328
- Touch-up spray paint: two part red epoxy 0.4 litre – Product Code 216317

EEZI-FIT boss branch

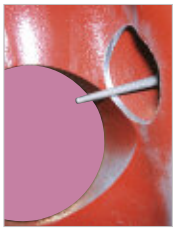
Boss cutting instructions



Step 1. Firstly decide on which boss or bosses are to be used. If possible cut these out before installation of the branch. Fit the drill, arbour and hold cutter (51mm) as shown.



Step 2. Set the drill on fast speed, and drill a pilot hole locating the drill in the dimple provided. When this drill breaks through, set the drill to a slow speed and continue to cut the hole with the hole saw. Ensure that the drill is cutting square to the boss and only apply moderate even pressure on the drill. When the drill breaks through, the waste metal will remain in the hole saw.



Step 3. Use a file to remove any sharp burrs around the cut edge, and touch up with a two part epoxy repair kit or similar to bring back the protection to the original specification.

Step 4. Fit the rubber grommet into the boss, apply lubricant (Code 199037) to the inside of the grommet and to the outside of the waste pipe, rotate the waste pipe and push firmly until full located.

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Typical labour saving devices

Cricket pipe carrier

To assist on site with transporting larger diameter pipes and fittings there is the Cricket pipe carrier:

- Transport 20ft (6.1m) pipe lengths up to 1,000lb (450kg)
- Comes with ratchet hold-down strap and 16" tubed tyres
- Weighs only 80lb (36.0kg)
- Quick handle disconnect for compact storage

Easy use:

Step 1. Use ratchet hold-down strap to secure Cricket to pipe.

Step 2. Use handle to flip Cricket and pipe.

Step 3. Reposition handle. Great for carrying flanges, fittings and valves.

Scorp 220 cutter

- The ultimate and fast solution for cutting of cast iron 50mm up to 200mm
- Easy, secure and effortless cutting during use on construction sites
- Wide range of applications and dimensions
- No rework necessary
- Suitable for clamping joints
- Reduction of tool costs

Hand-held cordless impact driver

Saint-Gobain PAM UK has conducted a number of field trials on handheld cordless drills, with experienced installers of cast iron drainage systems. The purpose was to identify tools which reduce the time taken to install cast iron mechanical couplings, but are also practical and easy to use in site conditions where space can be limited.

Field trials – research findings

- Using a cordless drill reduced the time taken to assemble a ductile iron coupling by up to 50%
- Plumbing installers found saving in time significantly increased on larger diameter couplings which incorporate four fixing bolts (150-300mm)
- Experienced plumbing installers who trialled the hand-held drills reported significant savings in time, and improved productivity on site

A number of cordless drills were trialled on many sites. The best all round performer being:

Cordless impact wrench Bosch GD14.4v (shown)

- High torque and high impact force ensure optimum performance
- New battery technology extends the service life of the batteries by 50%
- ½ hour charger (standard equipment) enables fastest recharging
- High level of comfort
- Compact and ergonomic shape
- Very good power/weight ratio ensures fatigue-free working
- Gear housing made of metal for maximum precision and long service life
- Safe working without recoil
- Three-fold adjustable light ensures optimum visibility, even in dark areas

NOTE: These devices are not manufactured or supplied by Saint-Gobain PAM UK but are available via reputable dealers.

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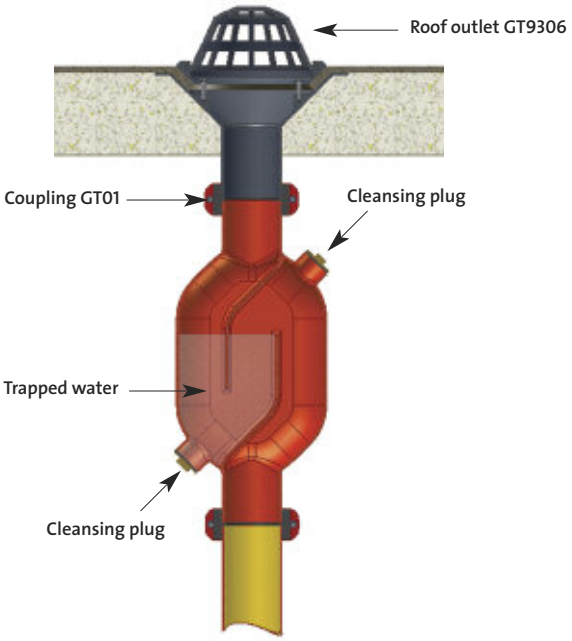
Typical applications – stench trap

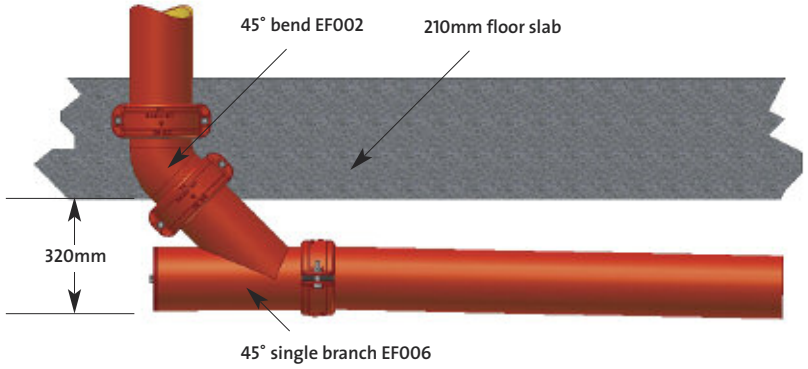
- Installed in a 100mm or 150mm diameter rainwater system.
- Prevents odours eminating on to balconies and flat roofs.



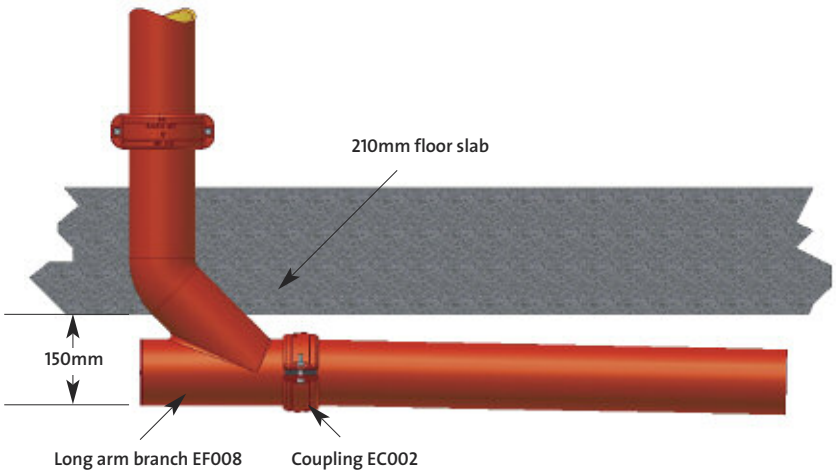
Typical applications – long arm branch

The Ensign long arm branch fitting EF008 is ideal to use if space under the floor slab is limited as shown in the diagrams. The space required by the long arm branch is virtually half that, when using a single branch and bend at 45 degrees.

Standard method 100mm diameter



Method using long arm branch



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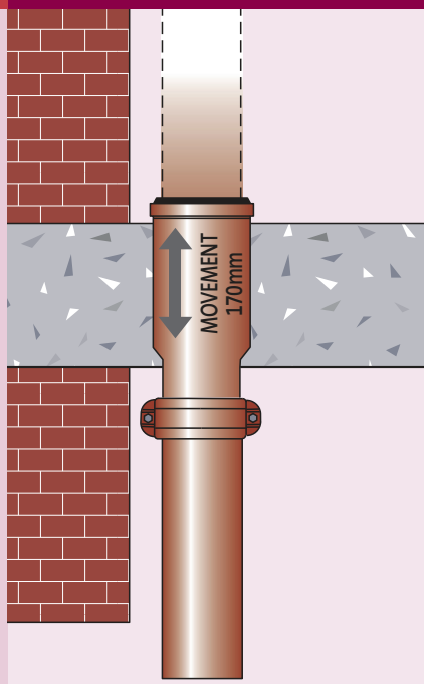
Typical applications – movement connector



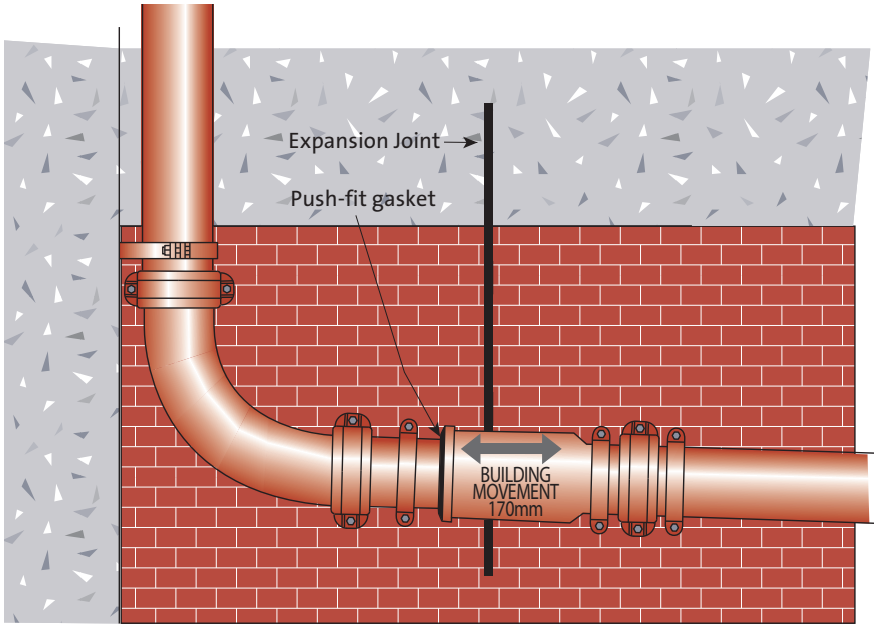
This allows for pipe movement without buckling during limited building settlement or pipework settlement.

Pipe movements of approximately 170mm are allowed for within the EF058.

The gasket within the connector must be lubricated with silicone grease (or similar).

Available in 100mm and 150mm diameter.

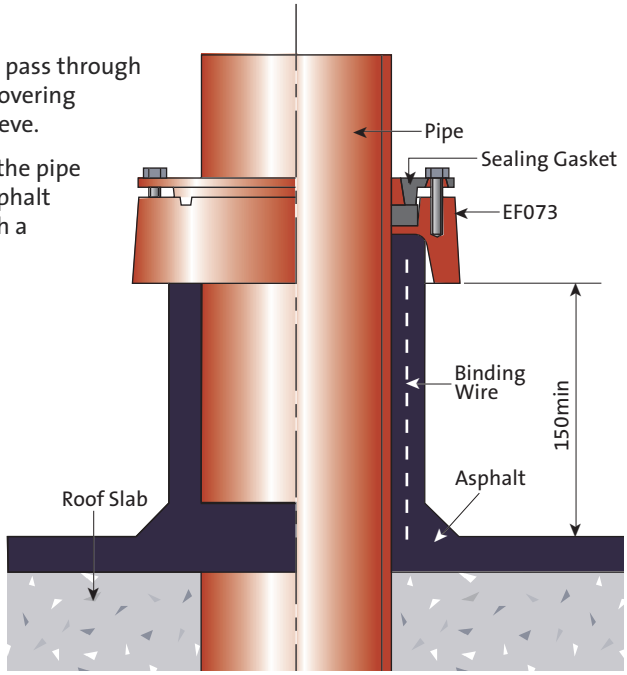
Note: When used horizontally on rainwater installations, it is recommended that an access pipe be positioned adjacent to allow rodding access, should any build-up of silt occur in the movement area.



Typical applications – asphalt roof adaptor

For use where soil pipes pass through a roof with an asphalt covering without the use of a sleeve.

1. Slide the EF073 over the pipe onto the upraised asphalt (support asphalt with a binding wire mesh).
2. Tap gently to seat.
3. Tighten the stainless steel screws.



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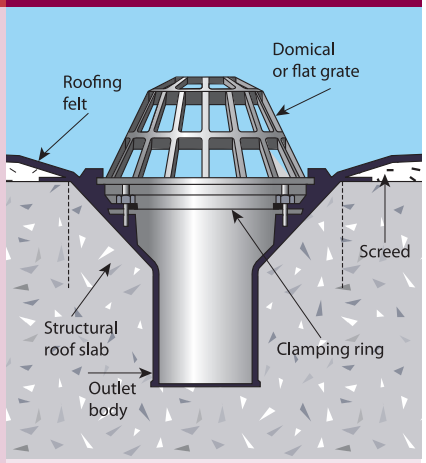
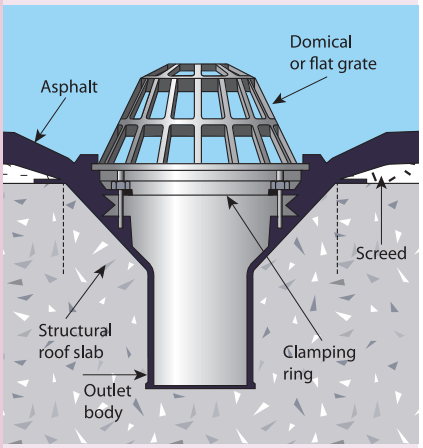
Roof outlets typical installation



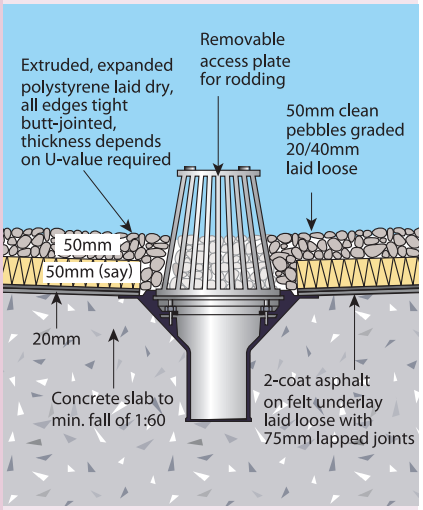
For use with roofing felt

1. The body of the outlet is to be set in the aperture formed in the structural roof slab. The upper flange of the outlet resting on and flush with the structural roof surface.
2. The screed is to be brought down to the outer rim of the flange of the outlet.
3. The first of the three layers of roofing felt is star cut and dressed into the throat of the outlet body. Care should be taken to dress round the two fixing studs. The next two layers of felt are star cut in the same way as the first layer, but care should be taken to avoid cutting in the same points as the other two layers. Upon completion of this operation, ensure that the bore is clear of felt etc. Cut this away, being sure to prevent the offcuts falling down the RW stack if connected. It is advisable to plug the outlet with newspaper in order to prevent this happening.
4. Place the clamping ring in position so that the studs protrude through the holes provided. Tighten the nuts progressively and equally on the studs drawing down the clamping ring, until securely squeezing the felt against the body of the outlet.
5. Fix grating into position.



For use with asphalt

1. The body of the outlet is to be set in the aperture formed in the structural roof slab. The upper flange of the outlet resting on and flush with the structural roof surface.
2. The screed is to be brought down to the outer rim of the flange of the outlet.
3. The asphalt is trowelled down into the throat of the outlet leaving the fixing studs clear. Smooth off to give an even finish to receive the clamping ring. It is advisable to plug the outlet with newspaper in order to prevent surplus asphalt entering the RW stack.
4. Place the clamping ring in position so that the studs protrude through the holes provided. Tighten the nuts progressively and equally on the studs drawing down the clamping ring onto the asphalt.
5. Fix grating into position.



GT9307 grating for 'inside-out' roof

The grating is designed specifically to suit the 'inside-out' roof arrangement and it incorporates the following features:

- The vertical bars of the grating are positioned to allow maximum flow rate without allowing the graded pebbles to enter the stack. This grating is made of cast iron and provides the stability and strength needed in variable weather conditions.
- Access to the stack for rodding or testing purposes is gained by the removal of the access plate on the top of the grating without disturbing the pebbles. The added height of the grating allows for roof design variations. This grating can be used with Roof Outlets GT9306.

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Section 6

Buried drainage – technical

Ensign cast iron drainage 1st choice for shopping centres

Ensign has the strength and versatility vital for large, dynamic commercial developments:

- strong – once installed, Ensign has the strength to withstand the rigours of the construction site
- fit and forget – peace of mind
- versatile – retro-fitting of additions or changes to soil stacks is quick and simple

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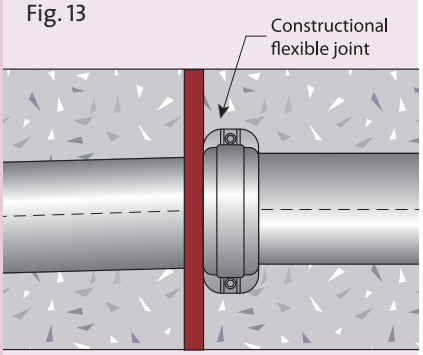
Design recommendations

Fig. 13



Trench preparation
Ensign may be laid directly into a naturally trimmed trench allowing 50mm clearance at each joint between coupling and trench bottom. The trench bottom should be flat to give continuous support to the pipework.

If the subsoil cannot be accurately trimmed with a spade, the trench should be excavated to a depth of 100mm below the pipe invert and a granular bed laid. This also should allow 50mm clearance at each joint between the coupling and the granular bed. Where Ensign is to be set in concrete, the trench should be prepared as above to allow a minimum of 100mm of concrete under the pipe.

The pipe should be supported on a compressible material (eg. expanded polystyrene), either side of each joint. The concrete should have a suitable flexible joint at intervals not greater than 5 metres in order to reduce the natural rigidity of the concrete. This should be made of a compressible material (eg. expanded polystyrene) which should be placed next to a pipe joint, and conform to the full cross section of the concrete. (See Fig. 13).

Haunching and surround should not be carried out until the pipework has been tested and inspected.

Testing

Water test – Gravity drains should be tested to an internal pressure of 1.5 metre head above the invert of the pipe, at the high end of the drain, but not more than 4 metre head at the lower end. If necessary, pipe lines, may be tested in sections.

Air test – Pipework should withstand a pressure of 100mm water gauge and this should not fall by more than 25mm in a 5 minute period. However where traps or gullies are connected they should withstand a pressure of 50mm water gauge and this should not fall by more than 12mm in a 5 minute period.

It is recommended that pipework installations are tested in sections rather than waiting to complete in one operation.

Minimum depth of pipework
Ensign can be installed under most buildings without further protection. Where Ensign is installed under roads and yards subject to normal usage, it is advisable for additional protection to be considered if the cover is less than 1.2m.

However, in areas that are subject to special loadings or abuse, extra protection should be considered.

Falls
Pipework gradients should be chosen to obtain a self-cleaning action under normal discharge conditions. For flows of less than 1 litre/second. a gradient of 1 in 40 for 100mm pipe and 1 in 60 for 150mm pipe are usually sufficient and for practical purposes, the gradients should not be less than 1 in 80 for 100mm pipe and 1 in 150 for 150mm pipe.

Note: See BS EN 752-1 and relevant building regulations for further information.

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Design recommendations

Minium bedding – limits of cover

The choice of bedding and backfilling depends on the depth at which the pipes are to be laid and the size and strength of the pipes. Rigid pipes like cast iron are more robust than flexible plastics pipes and backfilling can therefore be simpler. The Building Regulations specify the limits of cover for rigid pipes as follows:

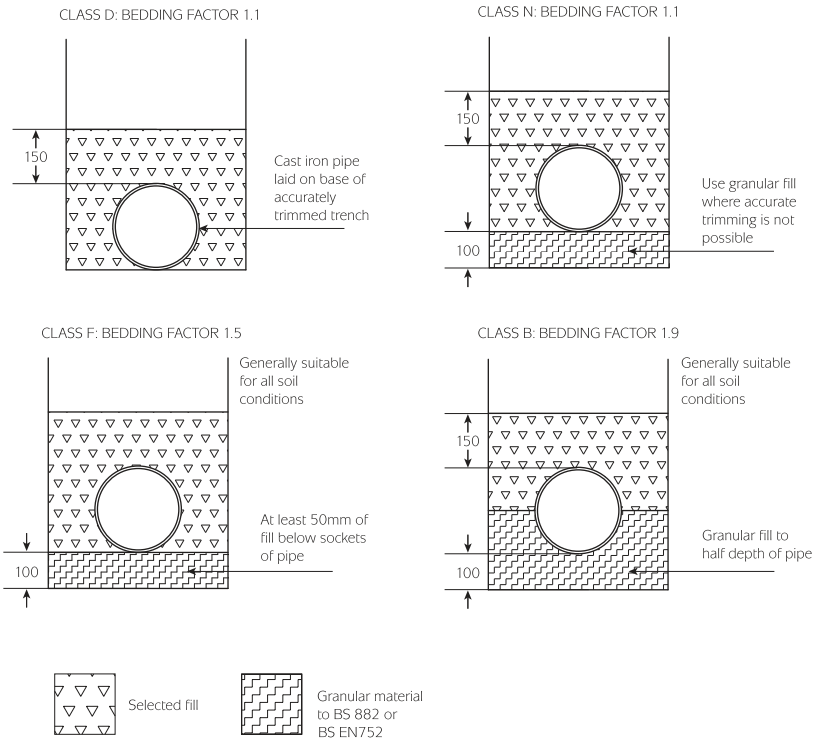
Limits of cover for standard strength rigid pipes in any width of trench (ref BS 8301 now superseded by BS EN 752)

Pipe size	Bedding class	Fields and gardens		Light traffic roads		Heavy traffic roads	
		Min	Max	Min	Max	Min	Max
100	D or N	0.4	4.2	0.7	4.1	0.7	3.7
	F	0.3	5.8	0.5	5.8	0.5	5.5
	B	0.3	7.4	0.4	7.4	0.4	7.2
150	D or N	0.6	2.7	1.1	2.5	–	–
	F	0.6	3.9	0.7	3.8	0.7	3.3
	B	0.6	5.0	0.6	5.0	0.6	4.6

Backfill sequence

Trenches should be backfilled in stages, and at least 150mm of earth free from stones larger than 40mm, lumps of clay over 100mm and vegetable matter should cover the pipe before tamping down. Further 300mm thick layers of selected fill should be tamped down until the trench is full.

Backfilling for rigid pipes



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Design recommendations

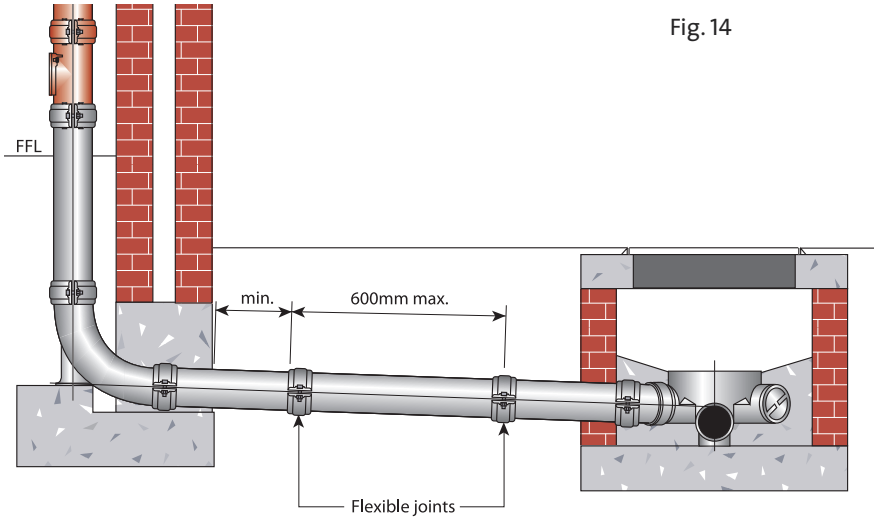

Fig. 14

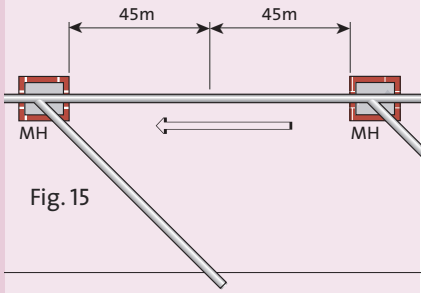

Fig. 15

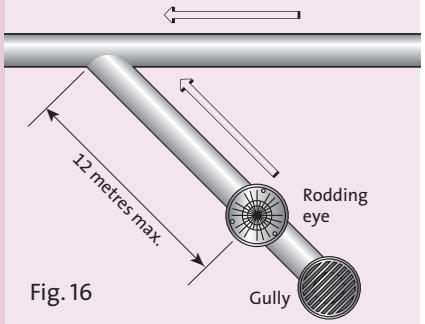

Fig. 16

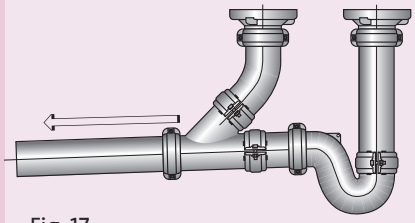

Fig. 17

Differential movement

Ensign couplings allow up to 3° deflection at each joint.

Pipelines leaving buildings, manholes or other structures which are likely to be subject to settlement, should have a minimum of two joints, a maximum of 600mm apart, thereby allowing a short length of pipe to act as a 'rocker pipe'. The joint nearest the structure should be as close to it as possible and, in areas where large settlement is expected, more than one 'rocker pipe' may be required. *(See Fig. 14, page 74).*

Access

Access is required on all pipelines to facilitate the rodding and clearing of debris and can be provided by manholes, chambers, access fitting or rodding eye – the latter allowing downstream access only.

Generally, no part of a drain should be further from a manhole than 45 metres and the distance between manholes should not exceed 90 metres. (See Fig. 15)

Where a drain connects with another drain without the provision of an inspection chamber or manhole, access should be provided on the branch drain within 12 metres of the junction. (See Fig. 16 and Fig. 17).

Below is a table of maximum spacing of drainage access points (in metres). For pipes up to and including 300mm dia.

From	Access-fitting To small	Large	Junction	Inspection Chamber	Manhole
Start of external drain	12	12	–	22	45
Rodding eye	22	22	22	45	45
Access fitting					
Small 150Ø					
150 x 100			12	22	22
Large 225 x 100			22	45	45
Inspection chamber	22	45	22	45	45
Manhole	22	45	45	45	90

Reference the building regulation 1985 (2000) drainage and waste disposal document H. H1 – sanitary pipework and drainage-table 10.

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Design recommendations

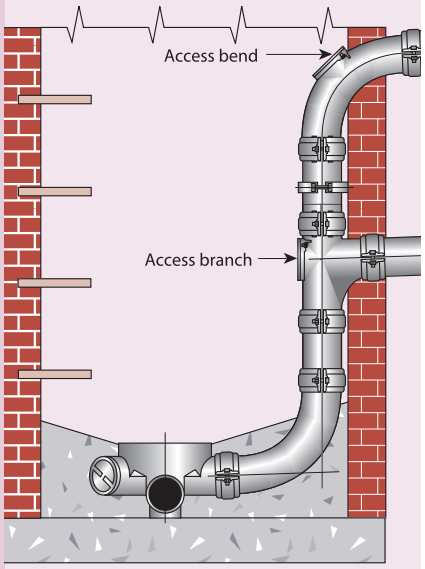

Fig. 18

It is recommended that access to the pipework is installed each time the drain changes direction either horizontally or vertically by the inclusion of an access fitting. (See Fig. 18 and Fig. 19).

Inspection chambers

Inspection chamber branch arm entries are all at 45° to conform with BS EN 12056/4.

Where other angles of entry are necessary these can be achieved by the use of standard bends (See Fig. 20).

Use of bends/branches

Bends in drains should be kept to a minimum. Wherever possible bends should be at or near to manholes or in a position which allow ease of rodding (See Fig. 20).

At the base of soil and rainwater stacks, it is recommended that long radius bends be used (See Fig. 19).

Branches or junctions on drains should be – where possible – at access points, such as manholes, to facilitate rodding.

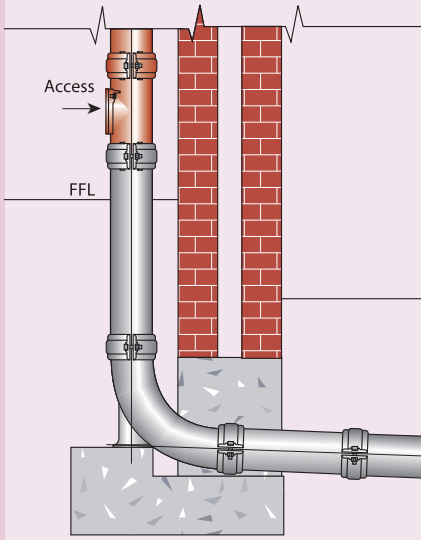

Fig. 19

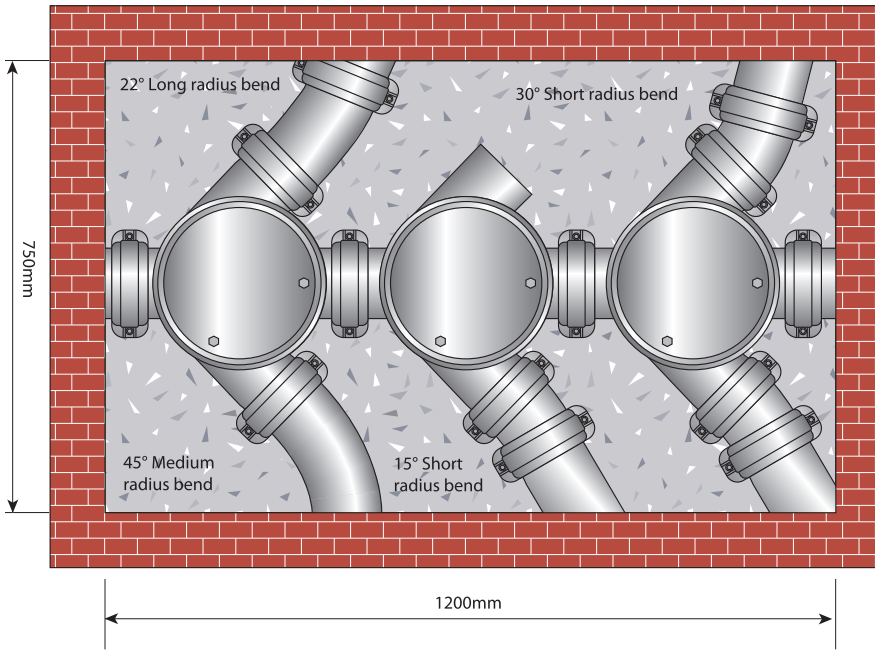

Fig. 20

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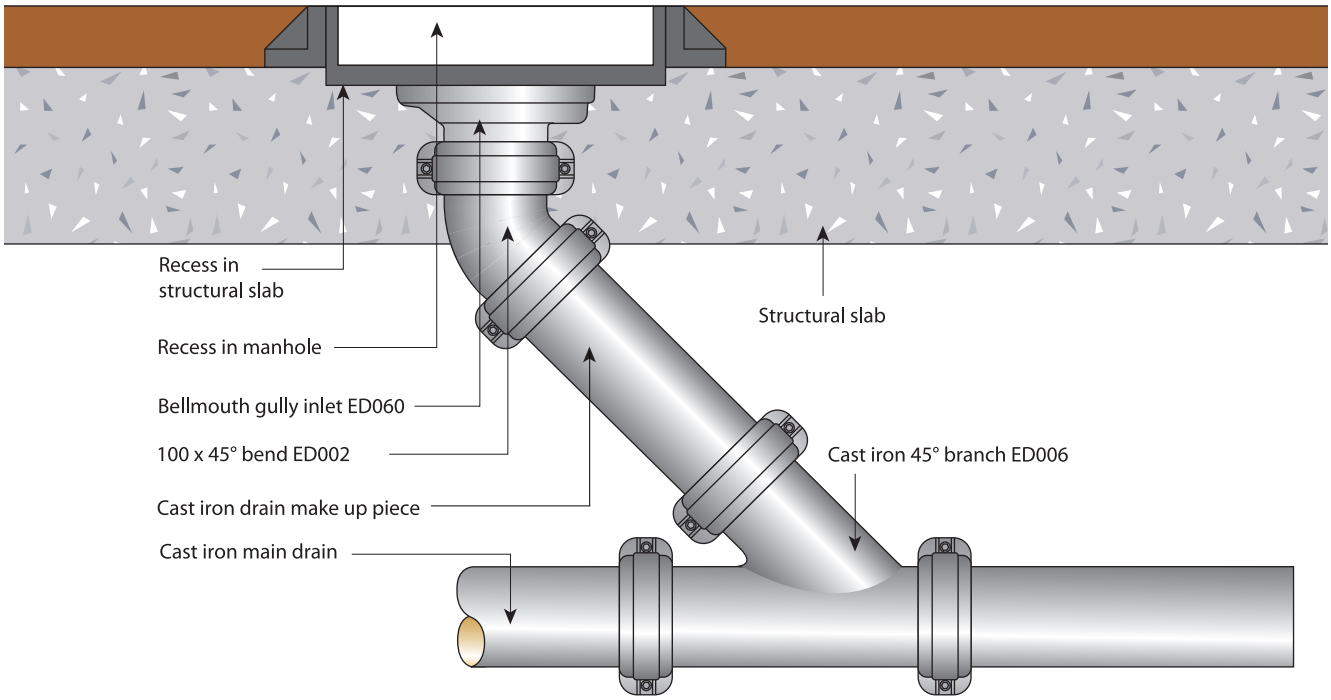
Design recommendations

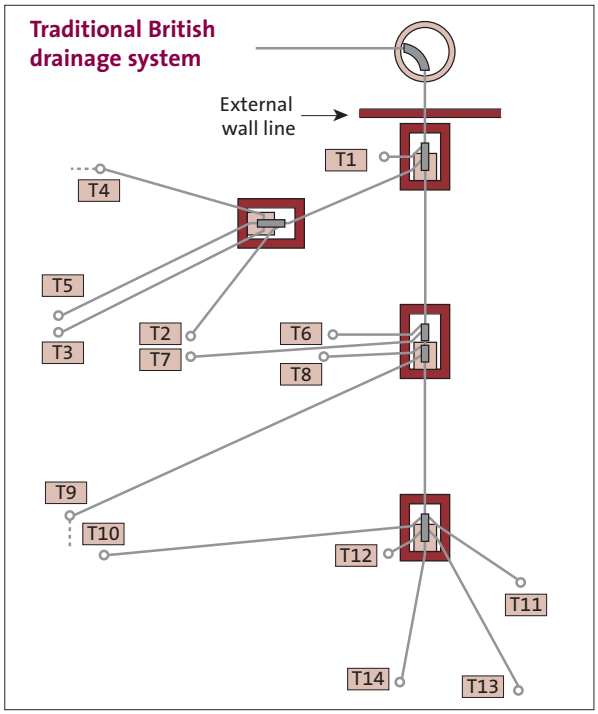
Benefits of rodding point system

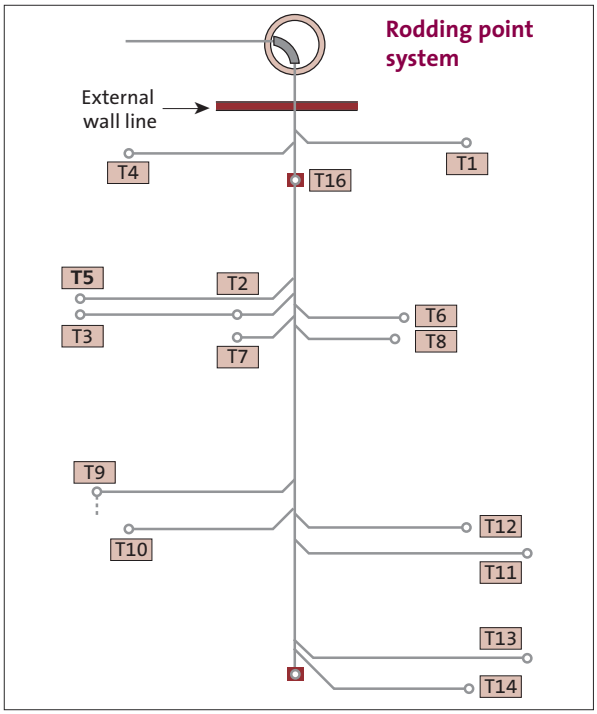
- Rodding blockages to an external manhole for removal is more hygienic
- Quicker to install reducing installation costs
- Construction of manhole brick chambers no longer required
- Allows sectional testing to be carried out during installation
- Removes the problem of running a branch drain between two fixing points reducing the need for many small bends
- Fulfils the requirements of BS EN 12056/4
- Designed to accommodate CCTV surveying

Rodding point with floor cover



A comparison of systems





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Puddle flanges installation details

Where pipes pass through external walls, in basement areas, a puddle flange may be required. Location which may be below the water table or in areas liable to flooding or in areas which may need to be sealed against methane gas coming from made up ground etc.

The puddle flange reduces the risk of water entering the building by capillary action when installed in a water retaining structure. In Figure 21 a typical build in detail is shown. The two-piece loose puddle flange is bolted onto the pipe once it has been bedded on Denso tape or similar.

Figure 22 shows a pipe passing through a sleeve. This would be used where pipe work is installed after walls have been constructed. The areas between the pipe and sleeve is sealed using a mastic type sealant.

In Figure 23 we see how the puddle flange is fixed and sealed onto the pipe. With Ensign this type of puddle flange is available as ED078 in 100mm, 150mm, 250mm and 300mm diameters.

Figure 24 shows the build in type again, this time one piece (four set screws) for use with a 200mm pipe. The ED078 is a compression puddle flange which needs to be slipped over the end of the pipe and put into position. Then it can be tightened up with the ratchet wrench. The gasket within the unit is compressed on to the pipe, therefore no Denso tape is required.

Figure 25 you can see that four bolts need to be tightened up equally.

Fig. 21

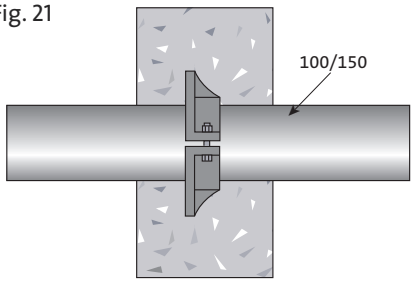
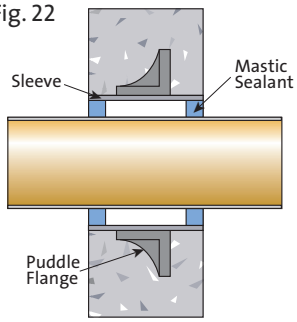


Fig. 22



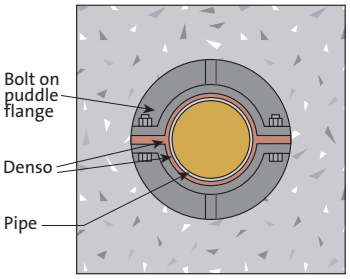
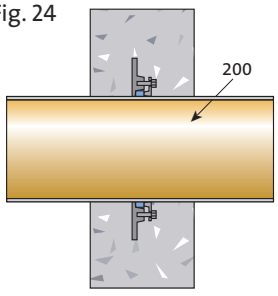


Fig. 23

Fig. 24



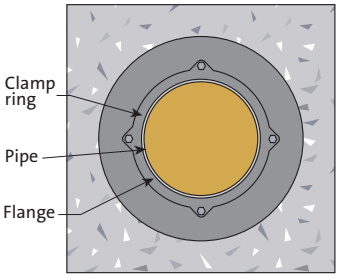


Fig. 25

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Timesaver British Standard fittings

The Timesaver drain range to BS 437 contains many British Standard design fittings – please consult latest Timesaver catalogue for full range:

- Garage gullys
- Bellmouth gully inlets
- Raising pieces
- Running traps

These fittings can be connected to the Ensign drain system using a transitional coupling TD02 *(see page 34)*.

Transitional coupling TD02

BS 437 anti-flooding traps

Saint-Gobain PAM UK manufacture a range of traditional BS 437 fittings – please consult latest Timesaver catalogue for full range:

- Anti-flooding trunks and valves (150mm shown left)
- Anti-flooding ball valves
- Fresh-air inlets
- Intercepting traps
- Petrol interceptive traps

These fittings can be connected to the Ensign drain system using a transitional coupling TD02 (for 150mm eureka anti-flooding trunk valves), or by using a transitional pipe TD47 and with a transitional coupling TD02.

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Section 7

Technical Specifications

Ensign cast iron drainage 1st choice for public buildings

Ensign has the performance characteristics required to serve our public buildings effectively:

- non-combustible – will not drip as molten, burning globules (unlike HDPE, UPVC), contributing to spread of fire and threat of injury to the public, staff and firefighters alike
- silent in operation – public will not hear the drainage system in action and therefore will not be distracted or disturbed – in particular libraries/gallery-theatres etc.
- requires minimal up-keep – helps keep maintenance costs and disruption to an absolute minimum
- durable – systems last in excess of 50 years, reducing any further drain on public resources

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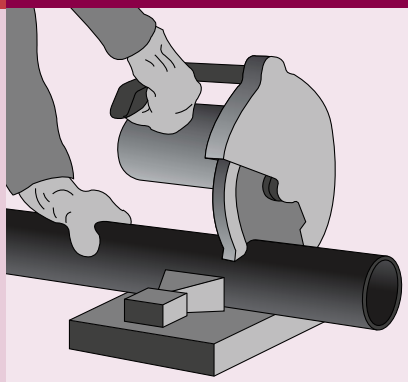
Technical specifications



Cutting pipes

Ensign pipe can be readily cut by the use of a powered disc-cutter *(see labour saving devices page 67)*, or with wheel cutters. (Ensure correct grade of disc appropriate to cast iron is used for disc-cutter). Coat cut ends with appropriate touch-up (see table page 83).

A chain cutter/snap cutter is not recommended to adequately serve this purpose.

If using powered disc-cutters, observe the Health and Safety guidelines from the cutting tool manufacturer's operation manual.

Flow capacities of Ensign pipework

Maximum flow capacity of Ensign pipes, flowing in a vertical installation, and at various gradients. (Litres/second).

	1/4 full	Running full			
Size	**Vertical**	**1:40**	**1:60**	**1:80**	**1:100**
50	1.2	1.46	1.19	1.03	0.92
70	2.7	4.29	3.5	3.03	2.71
100	7.2	9.24	7.55	6.54	5.55
125	12.5	16.8	13.7	11.9	10.6
150	21.7	27.3	22.3	19.3	17.2
200	43.7	58.7	47.9	41.5	37.1
250	79.3	106	86.9	75.2	76.3
300	129*	173	141	122	109
400	270*	373	304	264	236
500	500*	667	552	478	427
600	800*	1099	897	777	695

**Estimated for guidance only*

(*For 400-600mm pipe capacities telephone 01952 262529*).

It is normally recommended that 100mm pipes have a minimum fall of 1:40 and 150mm pipes have a minimum fall of 1:60.

Material

Pipes and fittings are manufactured in grey iron which exceeds the requirements of BS EN 1561 Grade EN-JL 1020, ISO 185 Grade 15.

The ductile iron couplings and brackets are manufactured in accordance with BS EN 1563 and ISO 1083 with minimum tensile strength of 420N/mm^2.

Weights/masses

European Standard BS EN 877 stipulates: "The nominal masses of finished products (pipes, fittings and accessories) shall be given in the manufacturer's catalogues. When measured in accordance with Table 5.3 of the Standard, the mass shall be within a tolerance of -15% of the nominal mass."

The masses of the finished products shall be checked by weighing to an accuracy within:

0.01kg	**for**			**masses**	**≤**	**1kg**
0.1kg	**for**	**1kg**	**<**	**masses**	**≤**	**20kg**
0.5kg	**for**	**20kg**	**<**	**masses**	**≤**	**100kg**
1.0kg	**for**			**masses**	**>**	**100kg**

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Technical specifications

Cast iron remains one of the best materials when it comes to fire safety.
The Euroclasses are based on test methods and establish a reaction to fire classification that are harmonised throughout Europe. This means that they can be used to compare materials and product performances.

Saint-Gobain PAM UK cast iron systems are among the safest materials on the market in terms of reaction to fire and all its drainage systems have been tested independently at Warrington Fire Research to the testing criteria stipulated.

Euroclasses		
A1	–	–
A2	s1	d0
A2	s1	d1
A2	s2 s3	
B	s1 s2 s3	d0 d1
C	s1 s2 s3	d0 d1
D	s1 s2 s3	d0 d1
Classes other than E-d2 and F		

Sub-Class SMOKE production
s1 : Low smoke production
s2 : Medium smoke production
s3 : High smoke production

FLAMING DROPLETS sub-classification
d0 : No flaming droplets
d1 : Flaming droplets that persist for less than 10 seconds
d2 : Flaming droplets

Safety

The Euroclass classification ranges from A1 to F, with A1 and A2 being reserved for products that are not, or only slightly, combustible. **The indices s and d refer respectively to smoke emission and the production of burning droplets. For both of these criteria the Saint-Gobain PAM UK Ensign and EEZI-FIT ranges achieved the highest possible scores: s1, d0.**

Scope

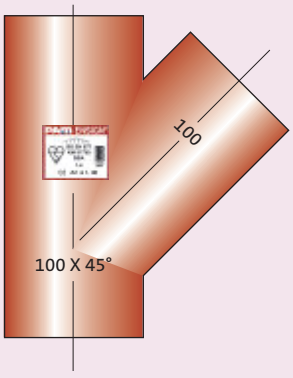
The CE marking for cast iron wastewater systems is based on the harmonised standard EN 877, which applies to a system including pipes, fittings, couplings and accessories – and is used to test all of the components of the ranges. The cast iron material alone is classified A1 in the Euroclass classification of reaction to fire, without prior tests.

The classification obtained by Saint-Gobain PAM UK covers complete ranges – pipes, fittings, couplings and accessories, components of a wastewater pipe system. A first for a manufacturer to date.

The tests carried out to determine the ranking for 'burning droplets' and 'smokes' included in the assembly elastomer gaskets and coatings. The excellent ranking was obtained: **A2-s1, d0**.

Check the reaction to fire classification of the products you specify, and be sure that the tests were undertaken by an accredited testing centre.

Product identification



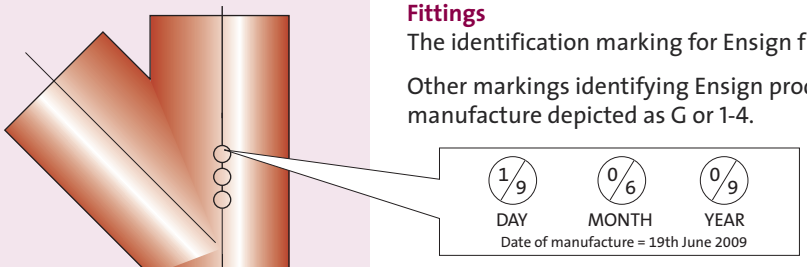
Ensign above ground

Ensign below ground

Fittings

The identification marking for Ensign fittings is a label.

Other markings identifying Ensign product is the site of manufacture depicted as G or 1-4.



Example: Soil fittings

The date/period of manufacture is also defined on the casting (see example above).

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Product identification

CE Marking applying to cast iron wastewater systems
BS EN 877 cast iron products Ensign and EEZI-FIT from Saint-Gobain PAM UK bear a new marking:

CE + A2-s1, d0

This new marking will only become mandatory on cast iron products complying with **EN 877** from **September 1st 2009**, when leaving the factory.

CE Marking: why is it required?
Made compulsory by the European Directive for Construction products, marking is a **minimum precondition to place the product on the market.**

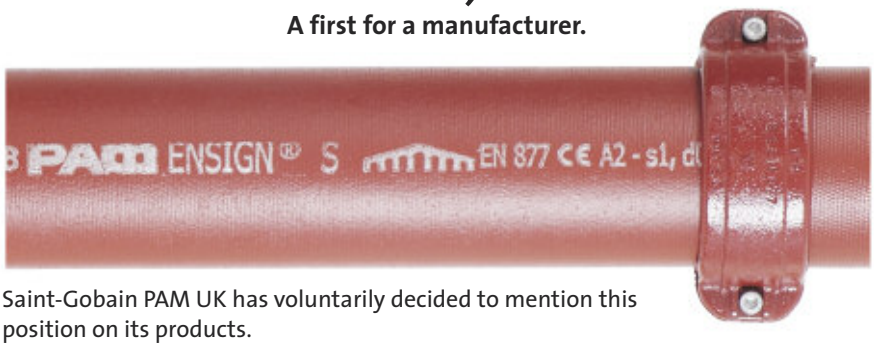
- to **allow for free circulation** of industrial products within the European Union and the European Economic Space.
- to guarantee that these products are not dangerous for the European consumers and users.
- to have the same safety criteria shared all over Europe.

Fire safety has been selected as the only essential requirement for the CE marking on wastewater products and has led to a classification in the Euroclass system of 'Reaction to fire'.

Saint-Gobain PAM UK has obtained the excellent ranking **for its complete ranges – pipes, fittings, couplings and accessories, components of a wastewater pipe system in tests conducted by the Warrington Fire Research Laboratory.**

A2-s1, d0

A first for a manufacturer.



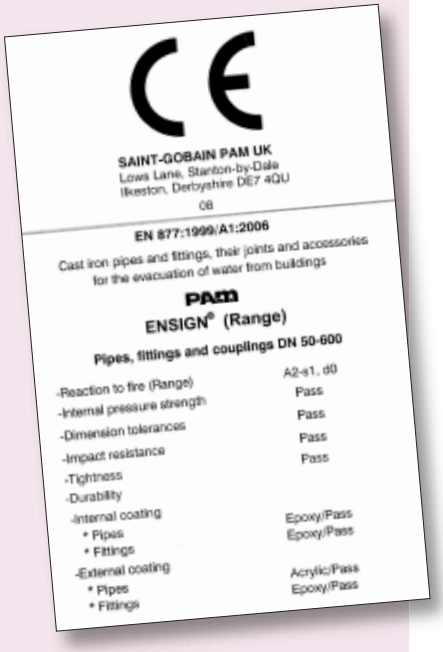
Saint-Gobain PAM UK has voluntarily decided to mention this position on its products.

CE marking is not a Quality mark or label – it is something very different
Voluntary markings: they add value to the product in terms of customer-supplier relationships. Their scope mainly aims at fitness for purpose.
CE marking: it is intended mainly for the authorities in charge of market control. Its scope is limited to health and operation safety.
The CE marking on a product certifies that said product complies with the harmonised part of the reference Standards and is a minimum precondition to be able to place the product on the market

Scope	EN 877 harmonised	
Tests	CE marking	Quality mark
Reaction to fire (Range)	A2-s1, d0	●
Internal pressure strength	●	●
Dimension tolerances	●	●
Mechanical resistance	●	●
Tightness	●	●
Durability (internal coating)	●	●
Durability (external coating)	●	●

● *Third party certification not made compulsory by EN 877*
● *Third party certified*

Making a choice of a complete and consistent range of cast iron products, whose assembly has been performance tested against regulatory requirements, provides you with a peace of mind that few other materials can guarantee.


CE
SAINT-GOBAIN PAM UK
Lows Lane, Stanton-by-Dale
Ilkeston, Derbyshire DE7 4QU
06
EN 877:1999/A1:2006
Cast iron pipes and fittings, their joints and accessories for the evacuation of water from buildings
PAM
ENSIGN® (Range)
Pipes, fittings and couplings DN 50-600
-Reaction to fire (Range) A2-s1, d0
-Internal pressure strength Pass
-Dimension tolerances Pass
-Impact resistance Pass
-Tightness
-Durability
-Internal coating Epoxy/Pass
* Pipes Epoxy/Pass
* Fittings
-External coating Acrylic/Pass
* Pipes Epoxy/Pass
* Fittings

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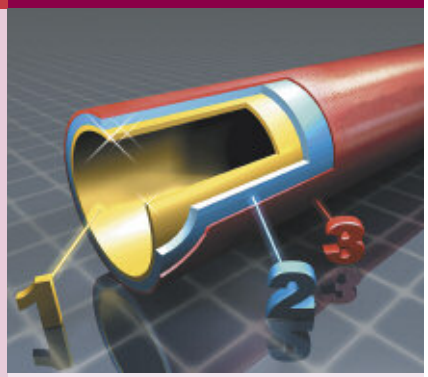
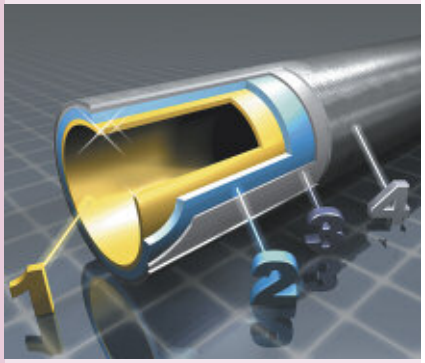
Coating specification



Above ground pipe

1	2 part epoxy
2	Cast iron
3	Anti-rust primer



Below ground pipe

1	2 part epoxy
2	Cast iron
3	Metallic zinc
4	Grey primer

Above ground soil, vent and rainwater pipework
PIPES
Externally – acrylic, anti-corrosive primer coating, red-brown colour, average dry thickness 40 microns.
Internally – two-part epoxy coating, ochre colour, with an average thickness of 130 microns.

Fittings – shall be protected internally with a red powder epoxy resin electrostatically applied to a average thickness of 150 microns. Externally coated to an average thickness of 70 microns.

Couplings/brackets
Protected with a red powder epoxy resin to an average thickness of 70 microns.

Below ground drain pipework
PIPES
Externally – initial flame applied anti-corrosive zinc coating at 130gr/m^2, then painted using a grey acrylic primer with an average dry thickness of 40 microns.

Internally – two-part epoxy coating, ochre colour, with an average thickness of 250 microns.

Fittings/couplings/brackets shall normally be protected internally and externally with a single coat of grey powder epoxy resin electrostatically applied, giving an average thickness of 150 microns.

Ensign touch-up paint
Where pipes are cut on site, ends shall be cut clean and square with burrs removed. In most cases it is not necessary to re-coat the pipe ends with touch-up paint. However, where there may be more aggressive materials passing through the iron drainage system (ie. Coca Cola; acid rain; acids or strong alkaline or similar substances), it is necessary to protect the cut ends of pipework to the same standard as the internal coating of the pipe.

Ensign red epoxy touch-up spray paint		Product Code	
0.4 litre spray tin two part epoxy		216317	
Ensign grey epoxy touch-up		**Product Code**	
0.4 litre spray tin two part epoxy		216318	
Ensign paint for hazardous/ aggressive environment (external coating) ie. chlorine		**Product Code**	
1 Litre	Paint	192320	Mixed equal parts
1 Litre	Hardener	192321	

Overpainting – external rainwater, soil and vent systems
The coating for Ensign is regarded as a primer, therefore for exposed, external installations should be overpainted. The system should be gently rubbed down with suitable abrasive paper, in order to provide a good adhesion key for the finish coating.

We recommend the application of a quality undercoat, and final top coat suitable for the requirements of the local environment.

Aggressive soil conditions
According to Annex C of BS EN 877, pipes buried in contact with soils with a lower pH than 6 it is recommended be additionally protected with polythene sleeving or other type of external coating as appropriate.

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Chemical resistance

Chemical resistance of the ochre pipe coating

The new generation of Ensign pipes, internally lined with a two-part epoxy (ochre in colour) provide greater chemical resistance which exceed the requirements stipulated in the new European standard BS EN 877 which includes pH2 – pH12 (with exception of some organic acids).

The epoxy coating on the fittings – match the performance of the pipes.

✔	conform
✖	not conform
▲	no use

		pH	20°C	60°C	80°C
Mineral acid	Sulphuric acid	0.4	✖	✖	✖
Mineral acid	Hydrochloric acid	0.7	✖	✖	✖
Mineral acid	Sulphuric acid	1.0	✔	✖	✖
Mineral acid	Hydrochloric acid	1.0	✔	✖	✖
Organic acid	Lactic acid	1.1	✔	✖	✖
Descaler	Commercial brand	1.2	✔	✔	✔
Mineral acid	Phosphoric acid	1.3	✔	✖	✖
Soft drink	Coca Cola	1.6	✔	✔	✔
Mineral acid	Phosphoric acid	1.8	✔	✔	✖
Mineral acid	Phosphoric acid	2.0	✔	✔	✔
Mineral acid	Chlorhydric acid	2.0	✔	✔	✔
Mineral acid	Sulphuric acid	2.0	✔	✔	✔
Mineral acid	Nitric acid	2.0	✔	✔	✔
Organic acid	Citric acid	2.0	✔	✔	✔
Descaler	Commercial brand	2.0	✔	✔	✖
Organic acid	Lactic acid	2.2	✔	✖	✖
Organic acid	Lactic acid	2.3	✔	✖	✖
Organic acid	Acetic acid	2.3	✖	✖	✖
Soft drink	Coca Cola	1.6	✔	✔	▲
Organic acid	Acetic acid	2.9	✔	✖	✖
Disinfectant product	Commercial brand	3.1	✔	✔	✔
Organic acid	Acetic acid	3.2	✔	✖	✖
Softener	Commercial brand	3.5	✔	✔	✔
Salts	Potassium chloride	4.2	✔	✔	✔
Salts	Natrium phosphate	4.2	✔	✔	✔
Stain remover	Commercial brand	4.2	✔	✔	✔
Salt	Natrium chloride	5.6	✔	✔	✔
Detergent	Commercial brand (dish)	5.8	✔	✔	✔
Descaler	Commercial brand (dish machine)	6.4	✔	✔	✔
Water	Demineralised water	6.6	✔	✔	✔
Salt	Natrium hydrogenated sulphate	6.7	✔	✔	✔
Detergent	Commercial brand (bath)	6.9	✔	✔	✔
Water	Waste water (EN877)	6.9	✔	✔	✔
Detergent	Commercial brand (floor wash)	7.4	✔	✔	✔
Detergent	Commercial brand (wool wash)	7.7	✔	✔	✔
Detergent	Commercial brand	7.9	✔	✔	✔
Descaler	Commercial brand	8.9	✔	✔	✔
Detergent	Commercial brand	9.0	✔	✔	✔
Stain remover	Commercial brand	9.3	✔	✔	✔
Detergent	Commercial brand	9.5	✔	✔	✔
Detergent	Commercial brand	10.0	✔	✔	✔
Stain remover	Commercial brand	10.3	✔	✔	✔
Detergent	Commercial brand	10.3	✔	✔	✔
Detergent	Commercial brand	10.8	✔	✔	✔
Cleaning product	Commercial brand	11.8	✔	✔	✔
Base	Natrium hydroxide	12.0	✔	✔	✔
Miscellaneous	Natrium hypochloride (bleach)	12.0	✔	✔	✔
Base	Ammonia	12.1	✔	✔	✔
Miscellaneous	Natrium hypochloride (bleach)	12.5	✔	✔	✔
Detergent	Commercial brand (industrial kitchen)	12.9	✔	✔	✔
Base	Potassium hydroxide	13.6	✔	✔	✔
Base	Natrium hydroxide	13.6	✔	✖	✖
Water	Oxygenated water		✔	▲	▲
Solvent	Ethanol		✔	▲	▲
Solvent	Xylène		✔	▲	▲
Solvent	Motor oil		✔	▲	▲
Solvent	Turpentine		✔	▲	▲
Solvent	White spirit		✔	▲	▲
Solvent	Petrol		✔	▲	▲
Solvent	Cyclohexanone		✔	▲	▲

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Section 8

Computer Aided Design (CAD)

Ensign cast iron drainage 1st choice for car parks

Ensign has the strength vital in areas where soil stacks are vulnerable to impact:

- secure – strong enough to withstand the knocks from manoeuvring motor vehicles
- tough – also strong enough to withstand vandalism and wanton attack
- non-combustible – will not drip as molten, burning globules (unlike HDPE, UPVC), contributing to spread of fire and threat of injury to the public, staff and firefighters alike
- requires minimal up-keep – helps keep maintenance costs and disruption to an absolute minimum
- durable – systems last in excess of 50 years

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Computer aided design

We are confident the Ensign CAD drawings will be of benefit in drainage design for all forthcoming projects, but should you experience problems with the CD, in the form of either damage or compatibility, please contact us for further assistance.

Ensign CAD is available on CD-ROM and via our website in AutoCAD and DXF formats.

Any comments or observations concerning Ensign CAD which you might care to make would be most helpful and favourably received.

Introduction to FastrackCAD

The FastrackCAD Database allows INSTANT access to Building Components 'at the touch of a button'. The FastrackCAD Database give architects and specifiers using Computer Aided Design the ability to produce accurate, detailed and quality drawings with the minimum of time and effort.

The FastrackCAD Database utilises the new CAD previewer menu, quite simply it allows users the freedom to browse on screen, pick the components required and place them directly into project drawings.

The majority of the files remain stored on the CD-ROM diskette leaving the hard disk free of unnecessary data.

To load the FastrackCAD Database on to your AutoCAD system, simply follow the brief instructions below.

ENSIGN (FastrackCAD) Database supplied by:
Saint-Gobain PAM UK, Lows Lane, Stanton-by-Dale, Ilkeston, Derbyshire DE7 4QU.
Tel: 0115 930 5000. Fax: 0115 932 9513.

FastrackCAD Database prepared by:
Technical Graphics Ltd, Ullswater Business Park, Coulsdon, Surrey CR5 2XX.

FastrackCAD Database User helpline:
Tel: 020 8668 4646
Email: fastrackcad-help@techgraf.co.uk

Instructions For Use

You must have the CD-ROM in your CD drive to use the database, which is compatible with all supported versions of AutoCAD. However, you do not need AutoCAD to preview and print the drawings.

Insert the CD-ROM into your drive. The set-up should run automatically. If the CD does not autorun, select START then RUN and key in <CDdrive> : GO.EXE eg. D:GO.EXE. Choose from the options available.

FastrackCAD Database AutoCAD users
Identify the drawing file that you require from the product listing or product catalogue. To insert the CAD drawing in AutoCAD use the drag and drop facility as follows.

Place the cursor over the drawing preview, then hold down the control key and the left mouse button. You can now drag the CAD drawing into your working drawing before releasing the control key and the left mouse button. Alternatively use the Insert into AutoCAD button. AutoCAD LT users must use the drag and drop facility to insert the CAD drawings.

The Previewer has a useful file search facility. Simply type the filename you are searching for in the field next to *Find* then hit the *Find* button, the file will be displayed in the window below. To return to product headings hit the close *Find* button. If you wish to close the viewer rather than minimise it, click on *Close* at the bottom of the viewer.

Non AutoCAD users
Identify the drawing file that you require from the product listing or product catalogue. Select *Copy drawing to my PC* then select *Dwg* or *Dxf* file format. Alternatively select *Copy to clipboard* button. Your CAD manual should explain DXF translation in detail.

For Web users
The AutoCAD DWG drawing files can be downloaded directly from the Saint-Gobain PAM UK website **www.saint-gobain-pam.co.uk**

If you need further assistance, please do not hesitate to contact the FastrackCAD Helpline on 020 8668 4646 or email fastrackcad-help@techgraf.co.uk.

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Ensign standard specification

1.1 Above ground soil, waste, vent and rainwater pipework.

1.2 Cast iron pipes and fittings

a) The systems shall be designed and installed in accordance with BS EN 12056 code of practice for gravity drainage systems inside buildings and the relevant sections of the Building Regulations.

b) Soil, vent and rainwater pipework of nominal diameters, 50mm to 600mm shall be installed using lightweight cast iron socketless pipe and fittings which fully comply with all requirements (27 clauses) of product standard BS EN 877:1999 with kitemark third party approval.

c) Soil, vent and rainwater pipework shall have been tested to BS EN 14366:2004 (Laboratory measurement of noise of waste water installations) by a recognised certified laboratory. The results to be made available for review if required.

d) Soil, vent and rainwater pipework shall have a fire rating A2, s1,d0**

Brackets

e) Pipework shall be supported true to line by methods strictly in accordance with the manufacturer's recommendations. Proprietary adjustable ductile iron hanging brackets such as EF048 or EF049 or EF048AD shall be used or brackets as recommended by the manufacturer's standard guidelines.

f) Soil, vent and rainwater pipework shall be supported by acoustic brackets that ensure the pipework will not exceed 47dB (A) airborne noise and 11dB (A) structure-borne noise at 4 l/s (litres per second), without insulation as recommended by the manufacturer's standard guidelines.

Jointing

Standard Couplings

g) Pipes and fittings up to 150mm diameter shall be jointed by couplings capable of withstanding up to 5bar (accidental static water pressure) when suitably restrained with support brackets. Pipes and fittings 200mm to 300mm diameter jointed by couplings capable of withstanding up to 3bar (accidental static water pressure) when suitably restrained with support brackets. Couplings shall have integral electrical continuity nibs. Coupling colour shall match the pipes and fittings.

Push-fit Couplings

h) Pipes and fittings shall be jointed by push-fit couplings incorporating 2 EPDM gaskets. Meeting requirements of BS EN 877:1999. Coupling colour shall match the pipes and fittings.

High Pressure Couplings with Integral Grip

i) Unrestrained Pipes and fittings shall be jointed by couplings capable of withstanding 5bar (accidental static water pressure) as supplied by the manufacturer (these do not require restraining brackets).

Fittings

j) Where required to connect to low level soil pipework passing through the floor slab, use long tail radius curve branches at 88 degrees (conforming to BS EN 12056-2:2000) to connect to 100mm soil and waste pipes where applicable, thereby avoiding a joint in the floor slab.

k) Where possible all 88 degree branches shall be radius curve entry (conforming to BS EN 12056-2:2000).

l) Small diameter waste pipes in plastic or copper to be connected to the main soil pipework using either mechanical compression-fit or BSP threaded boss pipes, or push-fit manifolds with grommets or blank ends.

Cutting Pipes

m) Where pipes are cut on site, ends shall be cut clean and square with all burrs removed. In most cases it is not necessary to re-coat the pipe ends with "touch-up paint". **However, where there may be aggressive materials passing through the drainage system (i.e. Coca-Cola; acid rain; acids or strong alkaline or similar substances), it is necessary to protect the cut ends of the pipework to the same standard as the internal coating of the pipe (as recommended by the manufacturer).**

Coating

n) Pipes shall be externally coated with an acrylic, anti-corrosion primer coating, red-brown in colour, average dry thickness of 40 microns. Internally coated with a two-part epoxy coating, ochre colour, with an average thickness of 130 microns.

o) Fittings shall be protected internally with a red powder epoxy resin electrostatically applied to an average thickness of 150 microns. Externally coated to an average thickness of 70 microns.

p) Couplings/brackets shall be protected with a red powder epoxy resin applied to an average thickness of 70 microns.

References:-

**EN 13501-1 November 2002 Fire classification of construction products and building elements.

1.1 Below ground buried foul and stormwater pipework.

1.2 Cast iron pipes and fittings

a) The systems shall be designed and installed in accordance with BS EN 12056 code of practice for gravity drainage systems inside buildings, BS EN 752-1 for drain and sewer systems outside buildings and the relevant sections of the Building Regulations.

b) Foul and stormwater pipework of nominal diameters, 100, 150 to 600mm shall be installed using lightweight cast iron socketless pipe and fittings which fully comply with all relevant requirements of product standard BS EN 877:1999 with kitemark third party approval.

Brackets

c) Pipework shall be supported true to line by methods strictly in accordance with the manufacturer's recommendations. Proprietary adjustable ductile iron hanging brackets as ED048 shall be used or brackets as recommended by the manufacturer's standard guidelines.

Jointing

Standard Couplings

d) Pipes and fittings up to 150mm diameter shall be jointed by couplings capable of withstanding up to bar (accidental static water pressure) when suitably restrained with support brackets. Pipes and fittings 200mm to 300mm diameter jointed by couplings capable of withstanding up to 3bar (accidental static water pressure) when suitably restrained with support brackets. Coupling colour shall match the pipes and fittings, and incorporate stainless steel socket cap screws and nuts wax coated.

Push-fit Couplings

e) Pipes and fittings 100 and 150mm diameter shall be jointed by push-fit couplings incorporating 2 EPDM gaskets. Meeting requirements of BS EN 877:1999. Coupling colour shall match the pipes and fittings.

High Pressure Couplings with Integral Grip

f) Unrestrained pipes and fittings shall be jointed by couplings capable of withstanding 5bar (accidental static water pressure) as supplied by the manufacturer (these do not require restraining brackets).

Fittings

g) Connection to small diameter waste and ventilating pipework or other materials shall be made using blank ends using push-fit connection or proprietary fittings.

h) Junctions between pipes should use the proprietary cast iron chamber, or standard branch type fittings as recommended by the manufacturer

Cutting Pipes

i) Where pipes are cut on site, ends shall be cut clean and square with all burrs removed. In most cases it is not necessary to re-coat the pipe ends with "touch-up paint". **However, where there may be aggressive materials passing through the drainage system (i.e. Coca-Cola; acid rain; acids or strong alkaline or similar substances), it is necessary to protect the cut ends of the pipework to the same standard as the internal coating of the pipe (as recommended by the manufacturer).**

Coating

j) Pipes shall be externally coated with an initial flame applied anti-corrosive zinc coating at 130gr/m² then painted using a grey acrylic primer with an average thickness of 40 microns. Internally coated with a two-part epoxy coating, ochre in colour, with an average thickness of 250 microns.

k) Fittings/ couplings/ brackets shall be protected internally and externally with a single coat of grey powder epoxy resin electrostatically applied to an average thickness of 150 microns.

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Ensign EEZI-FIT specification

1.1 Above ground soil and vent pipework.

1.2 Cast iron pipes and fittings

a) The systems shall be designed and installed in accordance with BS EN 12056 code of practice for gravity drainage systems inside buildings and the relevant sections of the Building Regulations.

b) Soil and vent pipework of nominal diameters, 100mm to 150mm shall be installed using lightweight cast iron socketless pipe and fittings which fully comply with all requirements (27 clauses) of product standard BS EN 877:1999 with Kitemark third party approval.

c) Soil and vent pipework shall have been tested to BS EN 14366:2004 (Laboratory measurement of noise of waste water installations) by a recognised certified laboratory.

d) Soil and vent pipework shall have a fire rating A2, s1, d0**

Brackets

e) Soil and vent pipework shall be supported by acoustic brackets that ensure the pipework will not exceed 47dB (A) airborne noise and 11dB (A) structure-borne noise at 4 l/s (litres per second), without insulation as recommended by the manufacturer's standard guidelines.

f) Pipework shall be supported true to line by methods strictly in accordance with the manufacturer's recommendations. Proprietary adjustable ductile iron hanging brackets such as EF048 or EF049 or EF048AD shall be used or brackets as recommended by the manufacturer's standard guidelines.

Jointing

Push-fit Couplings

g) Pipes and fittings shall be jointed by EEZI-FIT couplings incorporating 2 EPDM push-fit gaskets using suitable lubricant as recommended by the manufacturer. The couplings shall meet with the requirements of BS EN 877:1999. Coupling colour shall match the pipes and fittings.

Mechanical Couplings

h) Pipes and fittings up to 100mm diameter shall be jointed by couplings capable of withstanding up to 1.0bar when suitably supported. Couplings shall have integral electrical continuity nibs. Coupling colour shall match the pipes and fittings. (These couplings can be used in areas where future dismantling may be required).

Fittings

i) EEZI-FIT soil pipework shall be installed using fittings that incorporate the jointing socket with integral EPDM push-fit gasket using suitable lubricant as recommended by the manufacturer.

j) Where possible all 88 degree branches shall be radius curve entry.

k) Small diameter waste pipes in plastic or copper to be connected to the main soil pipework using fittings which have integral bosses that can be cut out to suit the installation (with 51mm hole saw), push-fit boss pipes, or push-fit manifolds with grommets or blank ends.

Electrical Continuity

l) On pipework installations where electrical conductivity (equipotential bonding) is required, continuity clips shall be installed.

Cutting Pipes

m) Where pipes are cut on site, ends shall be cut clean and square with all burrs removed. In most cases it is not necessary to re-coat the pipe ends with "touch-up paint". **However, where there may be aggressive materials passing through the drainage system (i.e. Coca-Cola; acid rain; acids or strong alkaline or similar substances), it is necessary to protect the cut ends of the pipework to the same standard as the internal coating of the pipe (as recommended by the manufacturer).**

Coating

n) Pipes shall be externally coated with an acrylic, anti-corrosion primer coating, red-brown in colour, average dry thickness of 40 microns. Internally coated with a two-part epoxy coating, ochre colour, with an average thickness of 130 microns.

o) Fittings shall be protected internally with a red powder epoxy resin electrostatically applied to an average thickness of 150 microns. Externally coated to an average thickness of 70 microns.

p) Couplings/brackets shall be protected with a red powder epoxy resin applied to an average thickness of 70 microns

References:-

**EN 13501-1 November 2002 Fire classification of construction products and building elements.

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