SGN
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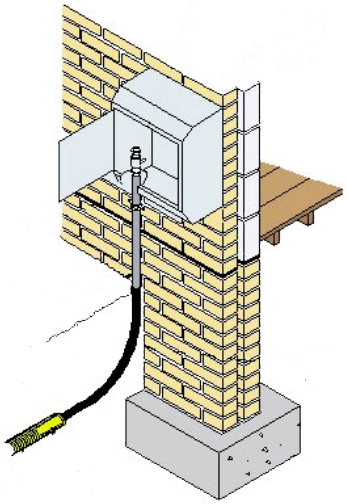
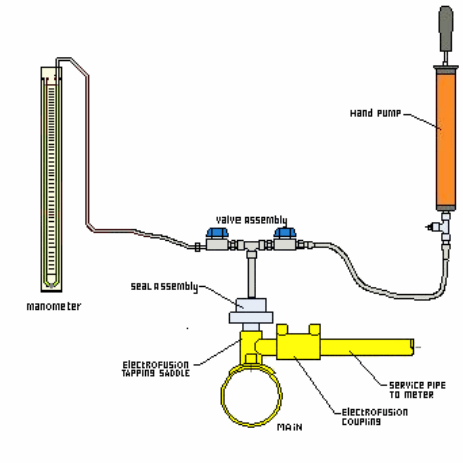
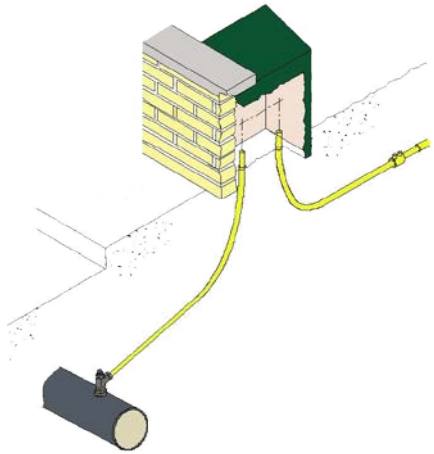
SGN/WI/SL/1

SAFETY MANAGEMENT FRAMEWORK

Work Instruction for Servicelaying at Pressures up to and Including 7bar.







Work Instruction for Servicelaying up to and Including 7 bar. SGN/WI/SL/1

Document Owner: Bob Hipkiss

Context

Who is this Work Instruction for?

This work instruction is for operatives qualified to GNO Level2 minimum and managers who are involved in the construction, testing, commissioning and decommissioning of services operating at pressures up to and including 7 bar, who have received training and been assessed competent.

What does this Work Instruction do?

This work instruction provides instruction on how to install services operating up to and including 7 bar.

Note: The definition of a service is stated in SGN/SP/NP/10.

Scope

This work instruction covers all service work up to and including 7 bar operating pressure.

Note:

- ***For service pipe laying activities on pipes greater than 63mm diameter, the Mainlaying work instruction SGN/WI/ML/2 should be followed for construction works.***
- ***For services to multi occupancy buildings, flats and multi-storey building reference should be made to SGN/PR/RL/2.***
- ***Services to timber framed building require a specialist design.***
- ***For the connection of a catheter to a Low-Pressure (LP) service for pressure monitoring activities reference should be made to SGN/PR/DIS/5.100.3.***

Why do we need this Work Instruction?

To support the safe and consistent installation of gas services.

Using links in this document

This document uses links (Hot Links) to Figures, Tables, other parts of the document and links to other SGN documents. These links can be identified within the text by text shown "example", to use the link place the cursor over the blue underlined text and left click, you will then be sent to either the Figure, Table, other part of this document or other documents selected. Returning to your place in the original document is achieved by clicking on an icon in the toolbar at the top of the document. (see below).

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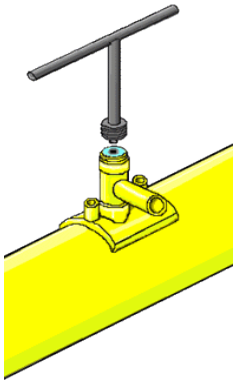
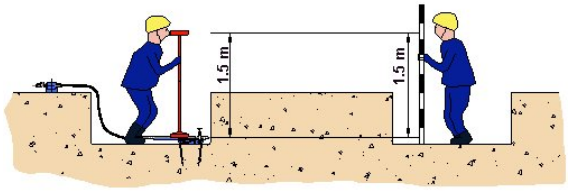
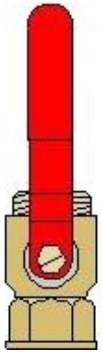
If you need these icons added to your device contact your manager.

Work Instruction for Servicelaying - Overview

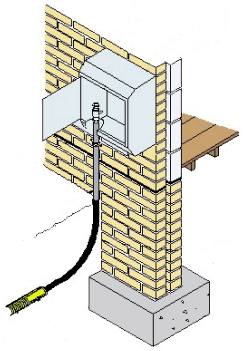


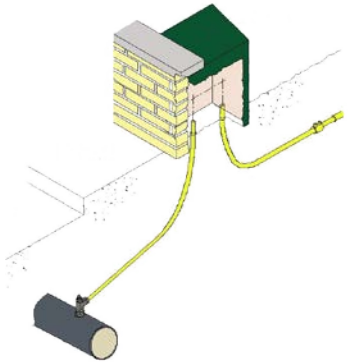
General Arrangements		Service Connections			
A1	Site Setup	B1	Polyethylene (PE) Service Connections	B9	Two-Part Top Tee
A2	Excavations	B2	PE 63mm Outlet Tapping Tee	B10	Encirclement Fittings
A3	Live Gas Working	B3	Inserted PE in Metallic main	B11	Service Transfers
A4	Dual Services	B4	Connections to metallic mains	B12	Service Alterations
A5	Pipe selection and Design	B5	Ductile & Steel mains	B13	Service Alterations Steel
		B6	Drilling and Tapping Operations	B14	Service Cut offs
		B7	Top Entry Tee	B15	Removing an Emid plug
		B8	Side Entry Tee		

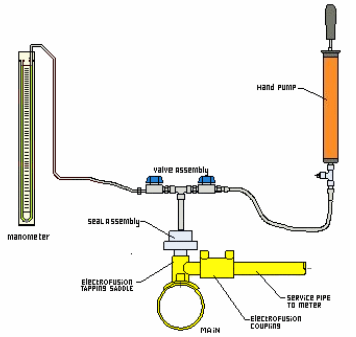




Service Pipe Construction		Valves	
C1	Open Trench (Trench provided by Others)	D1	Valves General
C2	Ducted services	D2	Emergency Control Valve
C3	Inserting Pipe – General	D3	Service Isolation Valve
C4	Dead Insertion	D4	Medium Presssure Service Excess Flow Valve (SEFV)
C5	Dead Insertion using Serviflex		
C6	Live insertion garden to main		
C7	Impact moling		
C8	Open cut		







Meter positions				Service testing	
E1	Service Entries - General	E10	Service to Below ground entry solid floor	F1	Service testing - General
E2	Low Pressure service to Inset meter box	E11	Low Pressure PE service protection from vandalism	F2	Testing Procedure
E3	Low Pressure service to surface mounted meter box	E12	Medium Pressure PE service to surface mounted meter box	F3	Purging and commissioning
E4	Low Pressure service to Unibox	E13	Medium Pressure PE service to inset meter box	F4	Decommissioning
E5	Low Pressure service to semi-concealed meter box	E14	Medium Pressure PE service to Unibox	F5	Recommissioning
E6	Low Pressure service replacement	E15	Medium Pressure PE service to semi-concealed meter box	F6	Service Live/Dead checks
E7	Low Pressure PE service terminating in Basement cellar	E16	Medium Pressure Boundary Service Regulator		
E8	Low Pressure PE service to above ground entry (including 63mm)	E17	Intermediate Pressure services		
E9	Meter in Garage	E18	Service information labels		

APPENDIX					
A	References & Definitions	B	Minimum distances between fused fittings	C	Preparation for Electrofusion
D	Electrofusion of PE Pipe and Fittings	E	Butt Fusion of PE Pipe	F	Other Jointing Techniques
G	Service Fittings	H	Meter boxes	I	Mains Breakout Tool
J	PE Fittings & Pipe Faults – Reporting Arrangements	K	Metric / Imperial conversion tables	L	Definitions of Servicelaying terms
M	Abreviations used in Servicelaying	N	Steel pipes	O	Disconnection of meters
P	Service Test certificate and Recording	Q	SGN Replacement Service Card		
Approval		Disclaimer		END NOTE	

Pre-requisites

All work carried out in relation to Servicelaying operations are managed under SGN/PM/MSL/1 Part 1 "Management Procedure for Mains and Servicelaying". You should also refer to SGN/WI/ML/1 for guidance on excavation, reinstatement, temporary bridging of excavations and other general safety requirements. For pipework, greater than 63mm you should follow the guidance in SGN/WI/ML/2 for pipe laying activities. Guidance on the signing of road works is to be found in D4.

You must be in possession of a set of documents specifically describing the full range of the activities being undertaken, associated permits and SCO documentation, which you must adhere to.

It is vital to make sure that all components used in a pressure system are suitable for the pressure range of that system.

Remember:

- Class B fittings are only suitable for use up to 5.5 bar. See GIS/PL2: Part 4
- Class C fittings are only suitable for use up to 7 bar. See GIS/PL2: Part 4
- All Butt and Electrofusion operations must be undertaken when ambient temperature is warmer than minus five degrees centigrade (-5^{o}C).
- All butt and Electrofusion jointing operations must be protected from rain and wind chill which will affect jointing performance and integrity.
- Inspect all pipes and fittings for cuts, scratches or other damage before use. Pipe or fittings with damage greater than 10% of wall thickness must not be used.
- Squeeze off operations should not be carried out when pipe temperature is below 0oC, the pipe should be protected against the cold. HDPE pipes and fittings must conform to GIS/PL2: Part 8.
- PE pipes must not be installed in locations where the temperature of the ground surrounding the pipe is expected to exceed 20oC.
- For pressures more than 2 bar, the details of the Pipe, fittings, under pressure tees and valve and other items must be recorded in the SGN/PM/PS/5 paperwork.

Competency

Servicelaying Operatives must be trained to GNO Level 2 minimum or to a recognised equivalent level. All personnel must be reviewed and assessed using SGN's CAS system as competent for the tasks to be undertaken.

Materials

All pipe and fittings used for Servicelaying operations must be approved by SGN or to the appropriate Gas Industry Standard. See Appendix A for the appropriate standards.

HDPE pipes must meet the requirements of GIS/PL2: Part 8, Polyethylene (PE) fittings may be either medium density polyethylene (MDPE) or HDPE meeting the 7 bar requirements of GIS/PL2: Part 4 and GIS/PL2: Part 6 depending on the pressure rating of the system. Further details can be obtained from Engineering Policy.

Communication

You must make sure that adequate arrangements are in place on site for the communications with Team members, consumers, the public, third parties and your Operational Manager. Refer to SGN/WI/ML/1 Appendix D for details.

PPE	Tools and Equipment	Tools and Equipment -cont'd	Specialist equipment
Operatives must make sure they wear or have available (as appropriate) all necessary PPE. This includes: • hard hats • gloves • boots • eye protection • Fire resistant workwear • reflective waistcoats and jackets • ear defenders • dust masks • Minimum of 2 x 9 kg dry powder fire extinguishers although the site risk assessment may require more • breathing apparatus X 1 per operative • Personal Air Monitor (PAM) In addition task specific items such as • welding visors • task specific gloves • full face visor • Voltstick • fire suit, balacalva and gauntlet gloves Further guidance on PPE requirements can be referenced in Safety Handbook and the PPE selection Task Card– PPE.	Tooling and equipment used on the network must be approved. It must be fit for purpose, visually inspect prior to use and maintained in accordance with the manufacturers instructions • Bypass hoses – Infinity type • clean, damp, non-synthetic cloth or paper towelling • continuity bond • cup drills with pilot • DI/CI/ST pipe cutters • electro fusion control unit & power source • end seal kit • flow stopping equipment • gas detector • leakage Detection Fluid • mains break out tools • metallic pipe cutter • PE Coupler clamp • pipe exposure tool (PET) • PE Pipe bead gauge • PE pipe cutter/saw • PE pipe squeeze offs • PE scraper & marker pen • PE squeeze off applied tape • pipe alignment/restraining clamp • pipe expanding stoppers • pipe Support or rollers	• pressure gaugespressure testing and purging equipment. • Re-rounding tool • spanners & torque wrench • tent or cover test ends for pressure testing with restraint devices • test standpipe (certified) • test warning sign • top loading clamp for PE connections • trench guide (goal post) • timber support and wedges • universal de-beading gauge • vent pipes (mettalic) • Wask tee set • wire brushes Note: This list is not exhaustive and reference should be made to manufacturer's instructons for any additonal specialist tooling requirements. Further guidance on checks and maintainance of Tooling and equipment can be found in SGNs Operator Plant maintenance Handbook.	• air compressor • alignment and re-rounding clamps • butt fusion machine – fully automatic • butt fusion control unit • bypass or • bypass with integral pressure sensor • callipers • earthing strap • electronic test equipment • foam off isolation equipment • hand and/or air driven under pressure branch drilling machine • pipe coil trailer • print control unit or electronic data store

Excavations

Before undertaking any excavation work on site, the work area must have traced using the Cat and Genny in accordance with SGN/WI/EL/15005
Plans must be available on-site detailing utilities plant, local authority structures, private land owner's utility and third-party pipelines owners of above and below ground plant and structures that may be in the vicinity.
Trial holes must be hand dug to confirm the location, depth and route of the apparatus/structures.
Where work is located within shaded area on SGN mapping system, information on the hazardous plant and/or plant owner and contact numbers can be assessed through the Dig Query button.
Guidance on safe digging techniques is found in SGN/PR/SW/1 and the Safety Hand Book.
Guidance on using PVC shoring is to be found in SGN/SEI/557.
When working on or near high pressure gas apparatus reference must be made to SGN/WI/SW/2.
If mechanical excavators are used, guidance can be found in SGN/PM/SW/3 and Safety Handbook.

Valves

Valves should be installed on services as detailed in Section D3.

Risk Assessment

Prior to undertaking any work activity you must undertake a risk assessment. SGN has developed an index of reviewed, rebranded risk assessments. These can be viewed on SGNnet Risk Assessment Page, and provide you with best practice and up to date templates.

Connections & Flow stopping

All connections must be made in accordance with this work instruction.

The following documentation must be available on site:

- Job instruction
- Routine/non routine operation procedure
- Permits to work.
- Site specific risk assessment

Branch saddle connections may be undertaken by Specialist Drilling contractors, depending on the size of the main.
Where squeeze-off is to be undertaken on PE80 SDR17.6 pipe, the maximum operational pressure of the pipe must be no greater than 3.0 bar.

Testing

Pressure testing of pipe is potentially hazardous due to stored energy in test medium.
Testing must be suitably recorded.
Testing equipment must be within calibration date and stored and labelled correctly.
Pipe under test must be suitably restrained.
Testing must be carried out on in accordance with Section F1Testing.

Emergency Situations

In the event of an incident occuring on site, if you are trained Emergency Leak Repair (ELR) operative and can deal with emergency situation, follow the requirements in SGN/PR/EM/72 and undertake repairs in SGN/PR/EM/74A/ SGN/PR/EM/74B.

If you are NOT ELR trained, then:

- Stop work
- Remove all personnel from danger
- Secure the area
- call 0800 111999 or 0800 002011 in Northern Ireland and request assistance
- monitor the situation and inform your Team Manager.

Purge & Commission	Permitry	Manufacturer's Instructions	Lifting & Handling
Prior to commencing the Operational Manager should confirm whether direct purging is to be used, and approximate duration of purge. Purging and commission must be completed in accordance with Section F3	A system of document control to manage operations. The need for a Permit to Work (PTW) will be determined by the Site specific Risk assessment (SSRA) or when required by procedures. Permits must be issued in accordance with GDN/PM/SCO/2. Lifting operations on, over or near live mains must be subject to a SSRA, and must have lifting PTW's in place. Guidance on lifting can be found in SGN/PM/DIS/3.6. All Connection and flow stopping operations must have an approved written procedures (RO/NRO) in accordance with GDN/PM/SCO/4 and GDN/PM/SCO/5.	Follow the manufacturers' instructions or related SGN work Instructions when setting up and fitting special equipment, for example: • pushing machines. • moling equipment • special fittings • service isolation equipment A full set of manufacturer's instructions or appropriate work instructions must be available on site.	Guidance on manual handling can be found in SGN/WI/ML/1 and SGN/PM/SHE/15. When carrying out Lifting Operations reference must be made to SGN/PM/DIS/3.6.
Anchorage			**Site Records**
Any anchorage requirements must be completed in accordance with SGN/WI/DIS/4.2.2.			As built records, must be captured in accordance with SGN/PM/DR/2. This includes details of the pipe construction including: • Test certificates (the test certificate must be completed and passed to the Operational Manager), • Mains/service/valve capture cards, • Potential hazards, for example asbestos, • Error reporting • SGN/PM/PS/5 requirements

A1 Work Instruction Servicelaying – General Requirements and Site setup

GENERAL REQUIREMENTS

1. Complete a Site-Specific Risk Assessment (SSRA) to identify any hazards so that they can be either removed or controlled by appropriate means.
2. Eliminate sources of ignition.
3. Consider the positioning of vehicles on site.
   NoteReference must also be made to the Hazards and Precautions book, which covers manual handling.
   You should be aware of the hazards associated with the equipment you are to use. Hazards associated with the increased energy in the pipe pushing systems and the problems that could arise.
4. Inform residents at the property where you are working, the nature of the work being carried out, and the expected duration.
5. Maintain a safe access to and from the property.
6. Minimise any hazards to persons entering or leaving the property. Where hazards are present, inform persons entering or leaving the property to be mindful.
7. Visually inspect tooling, ensuring they are fit for purpose, and use them correctly in accordance with the manufacturer's instructions.

1.1 The Site Survey

1. You must wear PPE appropriate to the task being undertaken.
2. Make sure all tools and equipment to complete the task are available on site.
3. Set up the correct signing, lighting and guarding in accordance with the D4 booklet - Safety at Street Works and Road Works - A Code of Practice (Department of Transport handbook).
4. If electronic plans are not available, then printed underground apparatus plans must be on site. These must less than 3 months old.
5. Use SGN approved plant location equipment over marked route in accordance with SGN/WI/EL/15005.
   Note: All available modes should be used; sole use of the CAT is not acceptable). Guidance on the location of underground utilities can be found in the HSE publication "HSG47 - Avoiding danger from underground utilities".

6. Survey these locations and mark all utility plant on the ground.
   Note: All plant must be located, marked and labelled with type, depth and ratings on the ground surface (this can be done using either water based spray paint or chalk).
7. Check for existing street furniture and recent signs of excavation work such as maker posts, BT covers, cable boxes, street lighting, and new reinstatement patches.
8. Check the depth and route of drainage systems by lifting drainage covers.
9. Replace covers immediately after inspection.
10. Check for overhead lines.
11. Map depths of other utilities within the vicinity of the main.
12. You must hand excavate trial holes to establish the depth and location of plant before starting where the depth of utility plant cannot be verified from drawings or using the location equipment.
    Note: The trial holes should be dug so that they are aligned to the service trench and can be utilised for the service pipe.
13. Check that any pipe insertion will not be obstructed by valves, syphons and bends.
14. Where electric cables are located crossing the path of the route of the impact mole, the cables must be exposed to establish depth and exact location.
15. Identify the route of the new service and where excavations are to be made.
    Note: Consider the minimum bend radius for the pipe being laid. See Figure 57 and Table 29.

1.2 Other Plant

1. Before using mechanical excavators or road breaking powered surfaces breakers, locate SGN and all other underground plant correctly. Use pipe and cable locators (on all modes). Where cables are located, hand dig trial holes to confirm depth and location in advance of the equipment being used.

2. You may encounter other utility equipment when excavating. When this occurs, you should keep 250mm away from underground apparatus, but where possible at least 300mm away from electrical cables.

   Note: Where the minimum distances cannot be achieved, you must contact your Manager.

1.3 Identifying Services

1. Where underground plant is encountered, the following points should be followed:
   a) Assume that any black plastic services are live electricity cable.
   b) Iron and steel water pipes and gas pipes look very similar, and where uncovered they must be treated as gas pipes.
   c) Continuously welded steel pipe must be treated as containing a hazardous or high-pressure gas or liquid.
   d) At collieries or mines, some electricity cables are coloured yellow, and must be assumed to be live electricity cables.
   e) When working on building sites, ensure that correct ducting has been used.

UTILITY	COLOUR OF DUCT/PIPE/CABLE BURIED IN GROUND			Marker Systems	Recommended Minimum Depths	
	Duct	Pipe	Cable		Footway/Verge	Carriageway
Gas	Yellow	** See row below	n/a	Black legend on PE pips every linear metre	600mm footway 750mm verge	750mm
	** up to 2bar – yellow or yellow with brown stripes (removable skin revealing white or black core pipe). Between 2 to 7bar –orange Steel pipes may have yellow wrap or black tar coating or no coating Ductile iron may have plastic wrapping Asbestos & Pit /Spun Cast Iron – No distinguishing colour					
Water non-potable & grey water	n/a	Black with green stripes	n/a	n/a	600-750mm	600-750mm
Water - Firefighting	n/a	Black with red stripes or bands	n/a	n/a	600-750mm	600-750mm
Electricity HV High Voltage	Black or Red duct or tile	n/a	Red or Black	Yellow with black and red legend or concrete tiles	450-1200mm	750-1200mm
Electricity LV Low Voltage			Black or red)		450mm	600mm
Communications	Grey, white, green, Black, purple	n/a	Black or Light grey	Various	250-350mm	450-600mm
Water	Blue or Grey	Blue polymer or blue or uncoated Iron/GRP. Blue polymer with brown stripe (removable skin revealing white or black pipe)	n/a	Blue or Blue/black	750mm	750mm minimum

Table 1 part 1- Utility Identification

UTILITY	COLOUR OF DUCT/PIPE/CABLE BURIED IN GROUND			Marker Systems	Recommended Minimum Depths	
	Duct	Pipe	Cable		Footway/Verge	Carriageway
Water pipes for special purposes (e.g. contaminated ground)	n/a	Blue polymer with brown stripes (non-removable skin)	n/a	Blue or blue/black	750mm	750mm minimum
Oil /fuel pipelines	n/a	Black	n/a	Various surface markers Marker tape or tiles or tiles above red concrete	900mm All work within 3 metres of oil fuel pipelines must receive prior approval	900mm All work within 3 metres of oil fuel pipelines must receive prior approval
Sewerage	n/a	No distinguishing colour/ material (e.g. Ductile iron may be red; PVC may be brown	n/a	n/a	Variable	Variable

Table 1 part 2- Utility Identification

HIGHWAY AUTHORITY SERVICES	DUCT	CABLE	Marker Systems	Recommended Minimum Depths	
				Footway	Carriageway
Street Lighting					
England and Wales	Orange		Yellow with black legend	450mm	600mm
Scotland	Purple	Purple	Yellow with black legend	450mm	450mm
Northern Ireland	Orange	Black or orange	Various	450mm	450mm
Other					
Traffic Control	Orange	Orange	Yellow with black legend		
Street Furniture	Black or orange	Orange	Yellow with black legend	450mm	600mm
Telecommunications	Light grey	Light grey (or black)	Yellow with black legend		
CCTV	Purple				
MOTORWAYS, TRUNK ROADS - ENGLAND AND WALES					
Communications	Purple	Grey	Yellow with black legend	450mm	
Communications power	Purple	Black	Yellow with black legend		
Road lighting	Orange	Black	Yellow with black legend		
MOTORWAYS, TRUNK ROADS - Scotland					
Communications	Black or grey	Black	Yellow with black legend		
Road lighting	Purple	Purple	Yellow with black legend		

Table 2 - Highway Services Identification NJUG recommended colour coding

1.4 Shaded Bands / HP Pipelines

1.4.1. SGN mapping Systems (GeoField)

1. Third party hazardous plant can be found in both rural and urban locations, within the public highway or in private land.
2. They are usually shown within SGN mapping systems (GeoField) as a shaded band (see Figure 1).
3. You can access information on the hazardous plant and/or plant owner/contact numbers by placing your mouse arrow onto the shaded band.
4. You can also view plans of high voltage (HV) and extra high voltage (EHV) cables as a layer within GeoField by pressing the select map icon.
5. SGN HP pipelines are shown within SGN mapping systems as a broken orange line.
6. Shaded band information is provided by external agencies and therefore our systems may not contain the most up to date information.
7. You must make further enquiries with the relevant agency, before excavation work starts, where any doubt exists regarding the accuracy of the information.
8. Hazardous plant and pipelines may exist in SGN's geographical areas which are not shown on SGN mapping systems.
9. You must check GeoField for any recorded utility plant prior to undertaking any excavation.
10. You must check for the presence of any Shaded Bands or HP pipelines.
11. You must inform your Manager immediately when you identify any Shaded Bands or HP pipelines.
12. Agreed control measures for working near the identified hazardous plant must be followed.

1.4.2. On Site Information

1. The presence of a third party hazardous pipeline may be identified by a warning marker post.
2. These will vary in size and shape depending on the pipeline owner.
3. They will generally hold key information to the type of pipeline and owner contact details.
4. The route of the pipeline may also be indicated by an aerial marker or by studs in the surface of the highway or car parks.
5. Marker posts may also show the presence of an H P gas pipeline.
6. You must inform your Manager when HP gas pipelines are encountered on site and follow the procedures in SGN/WI/SW/2.

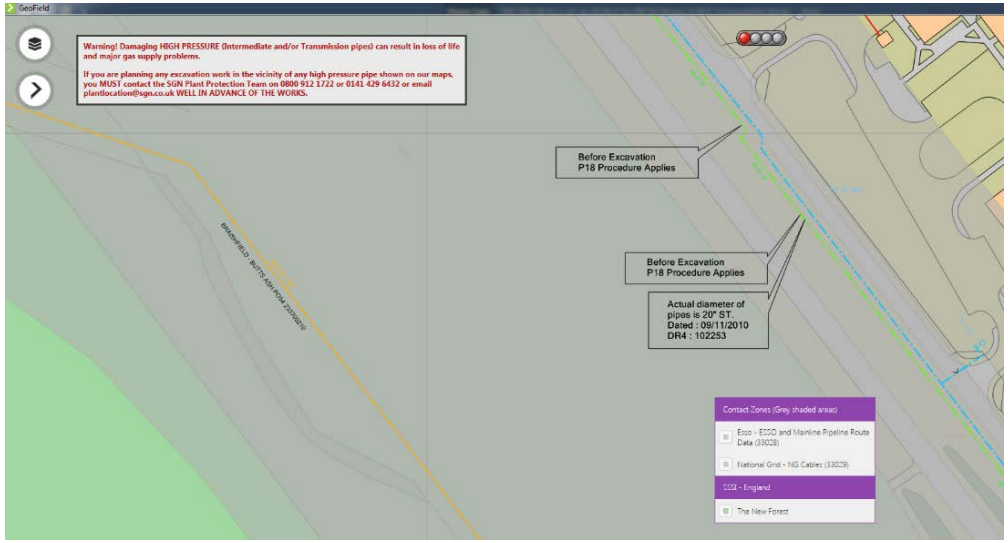


Figure 1- Shaded Bands on GeoField

2 EXCAVATION

All excavation work must be carried out following the guidance in SGN/PR/SW/1 and SGN/PM/SW/3.

When working on or near to AVK Donkin MK2 & MK3 valves follow the guidance in SGN/WI/ML/1 Section B4.

1. Excavate enough trial holes to confirm a proposed route for the new service.
2. Excavate carefully onto the main.
3. For insertion operations, you need to make several excavations for:
   - Launch pit
   - Receive pits
   - Obstructions such as bends, syphon's and valves
   - The service connection
4. Table 6 provides guidance on sizes of excavations for launch pits but these may need to be changed because of site conditions.
   Note: Intermediate excavations at bends (refer to SGN/WI/ML/2 Tables 4 & 5), syphons, valves or other intermediate points must be long enough to enable the fitting to be cut out and for the insertion pipe to go through.
5. For impact moling operations you need to make excavations for:
   - Launch pit
   - Receive pits

2.1 When preparing to start work on site you should follow the requirements below:

1. Contact your Manager to agree the use of mechanical plant.
2. Before using mechanical plant, you must complete your Safe Person Risk Assessment: Mechanical Plant. If any hazards have been identified that require a safe system of work/PTW, you must contact your Manager/Authorising Engineer who must visit site so that a safe system of work/PTW can be put in place.
   Note: There may be a need to contact the utility plant owner to obtain detailed drawings and /or agree safe working methods.
3. When laying a new supply which will pass another building the proximity distances stated in SGN/WI/ML/1 must be used.
4. Where you cannot maintain the minimum proximity distance, you must alter the planned route, but agree the new route with your manager.
5. You must keep all excavations to minimum and always protected.
6. It is important that prior to excavation in public or private land, all reinstatement/property defects are noted by you and brought to the attention of the occupier or owner. Where there are any distinctive features or surfaces, contact your Manager.
7. Locate all plant using approved detection equipment (on all modes) and marked on the surface prior to excavation in accordance with safe digging practices. Make sure that these markings extend beyond the area to be excavated so that they remain visible during the work.
8. Mechanical excavation must not be undertaken directly over the line of buried plant, with the exception of pneumatic breaker or breaker attachments to break the top surface only.
9. Use hand-held power tools with care as they can damage underground gas plant. They should not be used within 500 mm of underground plant unless the precise location of the plant has been identified, and a risk assessment is completed to develop a safe system of work which has been agreed with your manager.
10. If you encounter a dual service as part of replacement Servicelaying check Section A4 to confirm that this is acceptable, otherwise the services must be re-laid as a single service.
11. You should wherever practicable construct the service on a predictable route by making the line of the service at right angles to the main, and to the front aspect of the building. The line should take the shortest possible, but may divert around any obstructions.

2.2 Asbestos mains

1. If you find an Asbestos main at the connection point you require, seek and alternative location whenever possible.

2. Contact you Operational Manager and inform them of your discovery.
3. Refer to SGN/WI/SHE/81.

2.3 Minimum Depths of cover

1. Excavation depths of cover for services less or equal 63 mm diameter are stated in Table 3.
   Where exposed steel services are to be used for insertion reference must be made to Table 4.
   When laying a service and you cannot achieve the minimum depths of cover contact your Manager for advice.

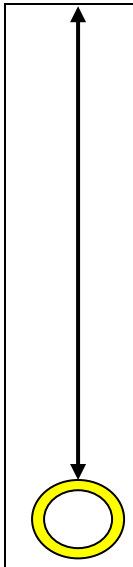
	Up to 2bar		Greater than 2bar
Type of cover	32mm or below	63mm diameter	All sizes
Open fields & Agricultural land	1100mm	1100mm	1100mm
Roadway & Verges	450mm	750mm	750mm
Surfaced Footpaths	450mm	600mm	600mm
Garden (private)	375mm	600mm	600mm
Other private ground	450mm	600mm	600mm

Table 3- Recommended Minimum depths of cover

2.4 SIZE OF EXCAVATONS

2.4.1. Live and dead insertion using pushing machine

1. Excavations for mechanical and air driven “in trench” pushing machines will require widening to accommodate the size of the equipment.
2. The excavation dimensions shown in Table 5 are for machine attached pushing machine.
   Note: The launch/reception excavations should be kept to a minimum.
3. Excavations, greater than 1m depth of cover the bend radius of the main must be considered.
   Note 1: It may not be necessary for the full length of the excavation to be the same width.
   Note 2: refer to manufacturer’s instructions.
4. Once the connection excavation has been completed, survey the exposed pipe for joint and repair clamps.



LOCATION / DEPTH OF COVER	EXISTING STEEL	EXISTING PE
GARDEN <= 300 mm	Do not use existing steel as a carrier pipe	Lower the PE service to correct depth
GARDEN > 300 mm	Acceptable to use existing steel as a carrier pipe	
DRIVEWAY < 200 mm	Do not use existing steel as a carrier pipe	
DRIVEWAY >200 mm	Acceptable to use existing steel as a carrier pipe	
WALKWAY/SIDE ENTRANCE <200 mm	Do not use existing steel as a carrier pipe	
WALKWAY/SIDE ENTRANCE >200 mm	Acceptable to use existing steel as a carrier pipe	

Table 4- Recommended minimum depths of cover for steel services when exposed that may be considered if used for insertion.

PE Pipe diameter (mm)	Size of Excavation required				Excavator Size Tonnes
	Minimum total length (m)				
	Up to 1 m cover	1m to 2m cover	2m to 3 m cover	Width*1 (mm)	
55-90	4	5	N/A	700	1.5-2.5

Table 5 - Excavation sizes for dead insertion

2.4.2. Dead Insertion using Serviflex

1. An excavation should be prepared in the outside location. For 2” Serviflex 1200mm long by 600mm wide.

2. The excavation should be completed with the ground removed below the pipe to allow the exposed pipe to be cleaned and cut when the pipe has been decommissioned (for 2" pipes 150mm should be allowed).

2.4.3. Impact moling

1. The launch and receive pits to suitable depth, the minimum the depth is 10 times the diameter of the impact mole.
   Note: This is to reduce the surface heave along the line of the mole. See Table 6.
2. Check the proposed launch excavation to be certain that there is no apparatus present which could be damaged by the securing spikes.
3. The reception pit should be excavated to the minimum size, depending upon the boring technique used, and provision should be made for:
   - Retrieval of the impact mole at the reception pit.
   - Reversal of the impact mole, pulling PE pipe behind it, (in which case a smaller pit can be used).

Impact mole size (mm)	Recommended bore length (m)	Launch/receive pit Dimensions D x W x L (m)
45	10 - 12	1.2 x 0.5 x 0.5
55	15 - 20	1.5 x 0.5 x 0.6
65	20 - 25	1.5 x 0.5 x 0.7

Table 6- Impact mole launch and receive pit dimensions

2.4.4. Open cut

1. Where required excavate trials holes to confirm the line and level underground plant.
2. Consider the maximum bend radius for the pipe being laid.
3. Determine the route of the proposed main.

2.4.5. Steel pipe laying

1. Where required excavate trials holes to confirm the line and level underground plant.
2. Consider the number and location of any bends which may have to be installed.
3. Confirm the route of the proposed main.

2.4.6. PE Branch Saddle Connections

1. Check that a minimum of 250mm clearance from other utilities plant but at where possible at least 300mm away from electrical cables.
   Note: Depending on the orientation of the branch saddle (horizontal or vertical) sufficient clearance around the pipe and for the drilling machine must be made, refer to Figure 2 for dimensions.
2. Where the branch saddle is to be installed in the vertical plane, there must be sufficient cover to protect the proposed new main or branch outlet.
3. If this is not possible, the Operational Manager must be informed before continuing with the operation to be sure that appropriate measures are provided to protect the pipe.

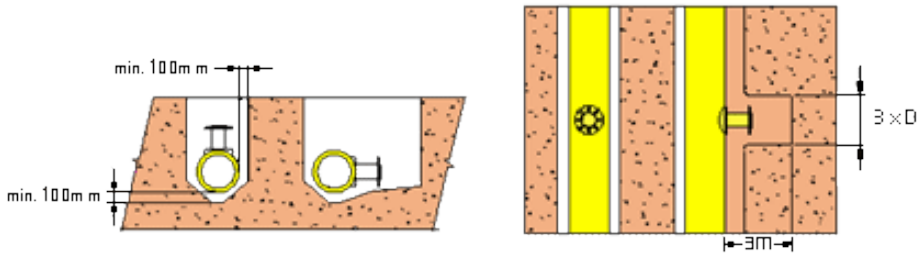


Figure 2- Recommended excavation dimension

2.5 Reinstatement

1. Cover the pipes with suitable fine fill material or sand to a depth of 250mm above crown of the pipe.
2. Lay gas marker tape on top of fine fill.
3. The remainder of the reinstatement must follow the requirements of the Road or Highway Authorities.

3 LIVE GAS WORKING

3.1 Purging and Venting

The potential risks on site from purging and venting gas can be minimised by using no-gas working techniques. Always consider the risk of ignition or asphyxiation when planning or completing any gas operation.

3.2 Drilling equipment

You must check that the drilling equipment is suitable for the maximum pressure of the main to be drilled, for example Wask drilling equipment is only suitable up to 2bar.

When making live gas connections, full use should be made of equipment designed to reduce the amount of gas discharged to the absolute minimum during drilling, tapping and other operations.

Although this equipment should be checked and proved to be safe before use, it is always necessary to be prepared for mechanical or other failure.

Fire extinguishers and Breathing Apparatus (BA) must be assembled, ready for use and easily accessible, alongside the excavation.
Electrofusion control boxes must not be used in gaseous or potentially gaseous atmospheres, and must be positioned 5 Metres from any detected gas readings.

A4 Work Instruction Servicelaying – Dual Services

The purpose of this section is to provide instruction on situations where it is acceptable for dual services to be installed.

New service pipes must be designed in accordance with SGN/SP/NP/14. The following definitions of mains and services are provided in SGN/SP/NP/10: -

Note: "A service pipe is a connection from a main to supply a maximum of two supply meter installations with no other potential connections"

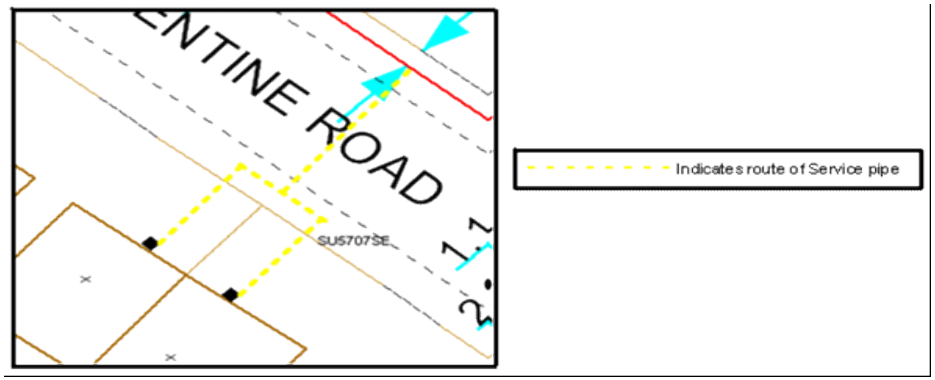


Figure 3 - A typical design of a dual service.

1. Although it is a preference to lay individual services, dual services (see Figure 3) are now permitted subject to the following criteria being met: -
   - The maximum operating pressure of the service pipe <75 mbar (LP).
   - For supplies to maisonette or flatted type property, dual services can be laid to the property where the service pipe is within land which is in shared ownership.
   - The dual or shared section of pipe must only be laid in public ground, after which an individual service must be laid to each service termination point. If this is not practicable then you must ensure that suitable consent has been obtained from the landowner or parties involved.
   - A dual service is only permitted to supply a maximum of two supply meter installations with no other potential connections.
   - Where a dual service pipe is serving more than one meter in the same building a means of external isolation using a Service Isolation Valve/s (SIV) must be installed. Emergency Control Valves (ECV) in external meter boxes and integral stoppers in service entry tees may be used as Service Isolation Valves (SIV's) or a below ground valve installed in an accessible position upstream of the branch in the service pipe, as near as possible to the property boundary within a surface box marked with either G or Gas.
   - Where practicable, the service pipe to each individual dwelling should be installed on a predictable route, for example perpendicular to the main.
   - The pressure drop over the combined sections of service pipe to each supply meter point must not exceed the maximum design loss in accordance with SGN/SP/NP/14.

     Note: Any service pipe <63mm laid in public property should have a minimum cover of 450mm, where practicable.

2. Following the installation of the service pipe, the successful completion of a B608 Service Information Label indicating the presence of a dual service and the properties to which it supplies. See Figure 4 below.

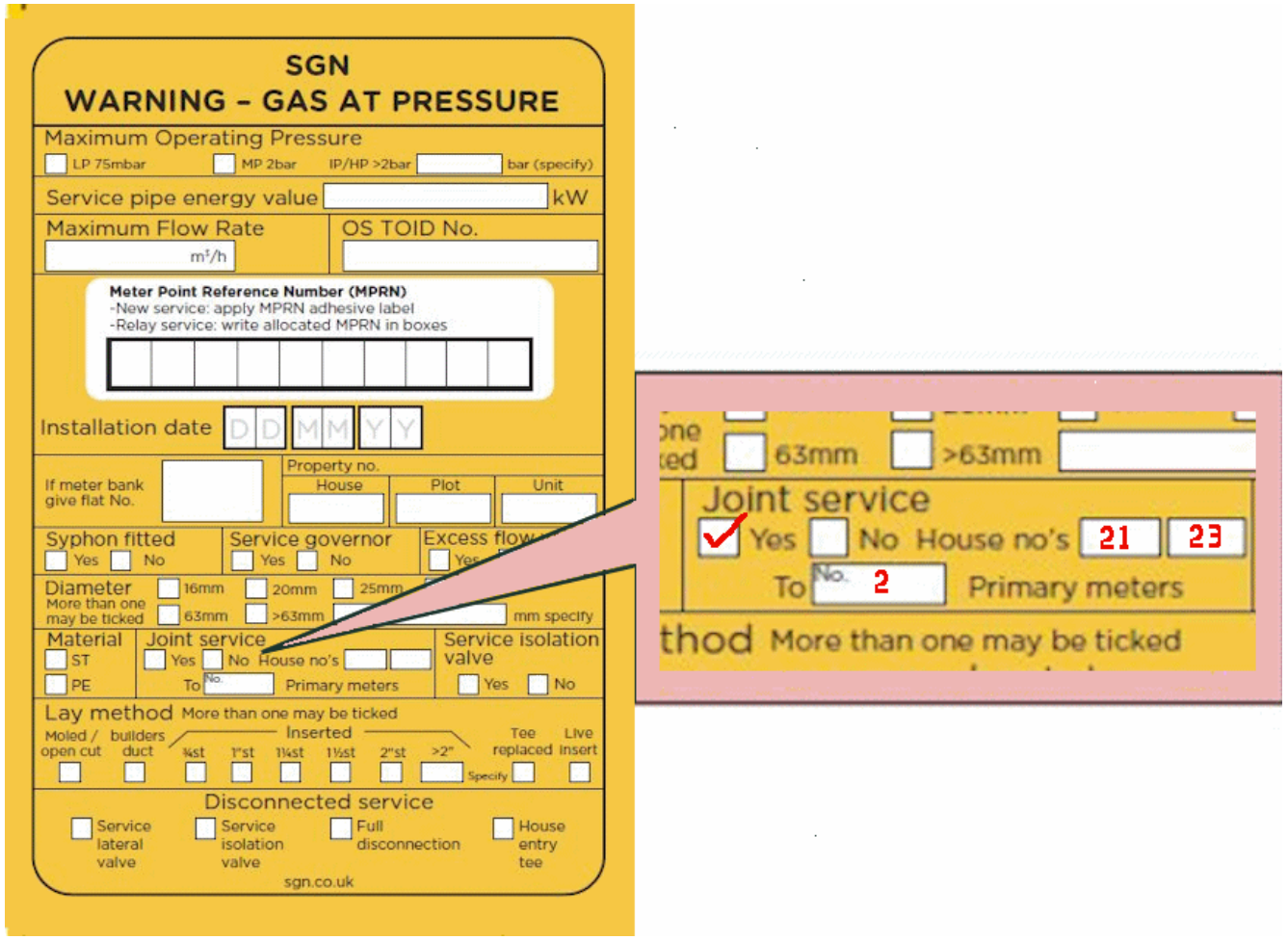


Figure 4 - B608 Service Information Label indicating presence of a dual service.

A5 Work Instruction Servicelaying – Pipe Selection and Design

*The following requirements stated in this Section apply when laying a new or replacement service. It covers the installation of the pipe from the point of connection at the main (**Section B**) to the consumers' premises by a variety of techniques. For detailed guidance see **SGN/SP/NP/14**.*

4 PIPE SELECTION AND DESIGN

4.1 Service Pipe Diameters

4.1.1. Low pressure new services

For new services, the minimum pipe diameter must be 32mm. The maximum allowable pressure drop is 2 mbar across the service.

4.1.2. Low pressure replacement and transferred services

The standard PE pipe diameters for use for replacement service installations are stated in Table 7 - Standard PE diameters for replacement services.
Where the service is not laid by insertion the minimum diameter must be 32mm.

Dia (mm)	16	17.5	20	25	32	40	63
Restrictions	Insertion only and limited length	Insertion only and limited length	Serviflex equivalent pipe size	none	none	Serviflex equivalent pipe size	none
Pressure Restrictions	See Table 8		Low Pressure only	See Table 8		Low Pressure only	See Table 8

Table 7 - Standard PE diameters for replacement services

4.1.3. Medium and intermediate pressure services

When selecting the pipe diameter for these services reference must be made to SGN/SP/NP/14.

4.2 Pressure Requirements

Services are designed so that the pressure at the end of the network (at the ECV) is maintained above the system design minimum. For LP services this is 19 mbar, but MP and IP services the specific pressure depends upon the operational requirements.
For maximum operating pressures of PE pipes refer to SGN/WI/ML/1 Section D2.

4.3 Construction Methods

You should construct a service from a single piece of pipe with the minimum number of joints possible. However, in some circumstances it may be necessary to install services made up of pipes of different diameters to minimise installation costs.

4.3.1. For new services

1. The method you select should be in order of preference as follows:
   - Open trench prepared by others (Section C1)
   - Approved service pipe ducting (Section C2)
   - Earth displacement (impact moling) (Section C7)
   - Open cut trench technique (Section C8)
2. New services must be designed for a maximum pressure loss of 2mbar.
3. The diameter of the pipe will be calculated at the design stage and will be provided on the work documentation. For service designs above 2bar reference must be made to the SGN/PM/PS/5 documentation.
4. The minimum diameter must be 32mm
5. Where services are to be laid to existing properties, you must check to ensure that no existing service pipe exists.
6. If any other gas service is identified, it should be checked for gas and confirmed to be dead or live see Section F6 Live Dead Check.

Where services need to be cut off, this should be carried out in accordance with Section B14 Service Cut Offs.

4.3.2. For bulk and single replacement of services

1. The method you select should be in order of preference as follows:
   - Insertion (Section C3)
   - Impact Moling (Section C7)
   - Open Cut (Section C8)
2. When constructing a replacement service using the insertion or moling techniques you should choose the maximum replacement diameter pipe possible; refer to Table 9 for dead insertion and Table 27 for impact moling.
3. When replacing a service, you should always give preference to using the host pipe as a carrier, inserted with a new pipe.
4. The route of the existing pipe, together with its diameter and condition will determine its suitability for insertion.
5. The source pressure should be provided on the work documentation.
6. The system design minimum pressure at the ECV (19 mbar), must be subtracted from the source pressure available at the main to determine the acceptable pressure loss on the proposed replacement service.
7. The maximum permissible pressure loss for a replacement low pressure service is up to 5 mbar subject to adequate mains pressure over peak demand periods.
8. Use Table 8 to calculate the size of the individual services to ensure the permitted maximum pressure loss is not exceeded.

   Note: Where large buildings are involved and/or large boilers and other loads are identified then contact your Manager or Network Planning for further advice regarding specific calculations. A site load survey is usually required.

Length (m)	Pressure loss (mbar)						
	16mm	17.5mm	20mm	25mm	32mm	40mm	63mm
0.5	0.43	0.03	0.10	0.03	0.01	0.007	0.005
1.0	0.86	0.05	0.20	0.05	0.02	0.015	0.010
1.5	1.28	0.10	0.30	0.08	0.03	0.023	0.015
2.0	1.71	0.16	0.40	0.11	0.03	0.03	0.020
2.5	2.14	0.24	0.50	0.13	0.04	0.038	0.025
3.0	2.57	0.31	0.61	016	0.05	0.045	0.030
3.5	3.00	0.41	0.71	0.18	0.06	0.053	0.035
4.0	3.43	0.50	0.81	0.21	0.07	0.06	0.040
4.5	n/a	0.63	0.91	0.24	0.08	0.068	0.045
5.0	n/a	0.75	1.01	0.26	0.08	0.075	0.050
5.5	n/a	0.90	1.11	0.29	0.09	0.083	0.055
6.0	n/a	1.04	1.21	0.32	0.10	0.09	0.06
6.5	n/a	n/a	1.31	0.34	0.11	0.098	0.065
7.0	n/a	n/a	1.41	0.37	0.12	0.105	0.07
8.0	n/a	n/a	1.62	0.42	0.13	0.12	0.08
9.0	n/a	n/a	1.82	0.48	0.15	0.135	0.09
10.0	n/a	n/a	2.02	0.53	0.17	0.15	0.10
12.0	n/a	n/a	2.42	0.63	0.20	0.18	0.12
14.0	n/a	n/a	2.83	0.74	0.23	0.21	0.14
16.0	n/a	n/a	3.23	0.85	0.27	0.24	0.16
18.0	n/a	n/a	3.64	0.95	0.30	0.27	0.18
20.0	n/a	n/a	4.04	1.06	0.33	0.30	0.20
22.0	n/a	n/a	4.45	1.16	0.37	0.33	0.22
24.0	n/a	n/a	4.86	1.27	0.40	0.36	0.24
26.0	n/a	n/a	n/a	1.37	0.44	0.39	0.26
27.0	n/a	n/a	n/a	1.43	0.45	0.405	0.27

Table 8 - Pressure Loss over Given Length and Diameter (Based on 32 kWh/^{3} scmh for existing Supplies)

9. Example of service calculation to determine pressure loss requirements.
10. When a 1" or 1 ¼" steel service, up to 20m in length, is being replaced back to the internal meter location in the premises, the source pressure must be established to determine the minimum design pressure on a LP service at the ECV of 19 mbar over peak demand periods.

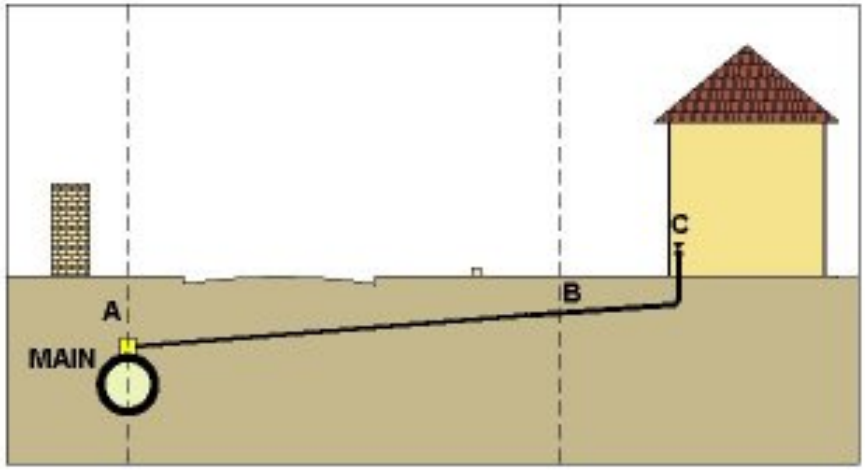


Figure 5 - Designing services

11. Distance: A - B = 16 m B - C = 4 m = Total length of 20m
    Determine Maximum pressure loss on service:

12. Confirm maximum pressure loss on total length of service (A – C) dependant on source pressure available (23mbar) and system design minimum pressure at the ECV (19mbar). Therefore, 23 – 19 = 4mbar is maximum pressure loss permitted.

4.4 First Option – Insertion

1. Determine largest diameter PE pipe available for insertion into 1" steel. This is 20mm.
2. Determine pressure loss for 20 m of 20mm PE pipe. Refer to Table 8, this is shown as 4.04mbar.
3. This is more than 4 mbar; therefore, an alternative lay technique must be used.

4.5 Second Option – Part impact moling /part insertion

1. With the main being in the opposite footpath, the second option technique, the impact mole is to be used, from the main to the garden and use insertion from the garden to the internal meter position.
   Note: For the purposes of the example, it has been decided to mole The service. Moling distances should be kept to the minimum to eliminate the risk of interference damage and maintain accuracy of the bore path. Refer to Section C7 – Impact moling.

4.6 Impact Moling

1. Determine suitable diameter PE pipe for moling, the minimum size is 32mm to meet the requirements of SGN/PM/NP/14.
2. Identify the length of service to be moled. Distance A – B = 16m.
3. Determine pressure loss for 16 m of 32mm PE pipe. Refer to Table 8, this is shown as 0.27mbar.

4.7 Insertion

1. The pipe size for insertion into 1" steel has been determined as 20mm.
2. Identify the length of service to be inserted. Distance B – C = 4m.
3. Determine pressure loss for 4m of 20mm PE pipe.
   Note: Refer to Table 8, this is shown as 0.81mbar
4. Calculate the Total Pressure loss over length of service = 0.27 + 0.81 = 1.08mbar.
5. The calculated maximum pressure loss was 4 mbar therefore the service can be replaced using second option which is less than this figure.
6. If you are in doubt with the pressure loss calculation, then contact your Manager.
7. For single replacement of service pipes, the same design principles as above must be applied.
   Note: Table 8 provides guidance information for single supply replacements e.g. following a PRE-on a service pipe.

Existing Steel pipe carrier (in)	PE Pipe (mm)
¾ "(0.75)	16 / 17.5
1"	20
1¼" (1.25)	20/25
1½" (1.5)	32
2"	32

Table 9 - Steel pipe carriers

1 PE SERVICE CONNECTIONS

1.1 General Requirements

1. Check identification markings on the PE main (size and SDR rating) and the colour and size of the electrofusion saddle to ensure compatibility.
2. Check the pressure rating of the pipe and the fittings are compatible.
3. Always store fittings and equipment in a clean dry place which is not subjected to extremes of temperature.
4. Do not drop or throw fittings and equipment.
5. Electrofusion fittings must be stored in their plastic bags until they are ready for use.
6. All pipes and fittings must be inspected for cuts, deep scratches or other damage before use.

   Note: Pipe or fittings with damage greater than 10% of wall thickness must not be used.
7. Care must always be taken not to damage or remove the protective covering and contaminate the electrical filament wires.

   Note: Electrofusion fittings must not be re-heated under any circumstance.
8. Electrofusion process must not be used if the gas in atmosphere reading is greater than 20% LEL in the working environment.
9. You should not take or operate the electrofusion control box in the trench.

   Note: Where it is not physically possible to avoid taking an electrofusion the trench atmospheric reading <20% LEL and a sufficient risk assessment undertaken.
10. Minimum distances between fittings and other joints must be maintained (Appendix B).
11. Alignment/restraining clamps must be used on all occasions.
12. A Pipe Exposure Tool (PET) must be used for removing the skin from multi-layer pipe.
13. Pipe ends must be kept clean and dry once scraped/prepared.
14. The fusion process must be undertaken without delay once preparation of pipe, fittings and equipment has been completed.
15. Ensure the generator has sufficient fuel to complete the electrofusion cycle.
16. Precautions such as the provision of jointing tents and temporary sealing of ends must be taken when undertaking PE jointing during adverse weather conditions, including severe wind chill effects, rain and when the air temperature is below -5^{O} C.
17. Only use the correct hexagonal key (T bar) to drill the main.
18. Manifold type connections must not be installed.

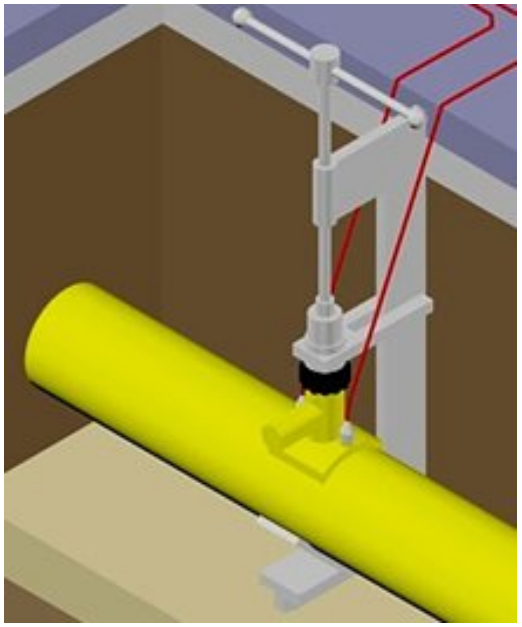


Figure 6 - Electrofusion Tapping Tee

1.2 Fusion Process

Follow the guidance in Appendix C and Appendix D.

2 63MM OUTLET TAPPING TEE

1. Read the supplied manufacturers fitting instructions to identify if specialised tooling is required.
   Note: Some top tee manufacturers may specify specialised tooling for 63 mm outlet tees to ensure that the correct loading is applied during the fusion process.
2. Use either the strap or pedestal type stack loading tools with PE tapping tees.
   Note: Loading tools must be used in accordance with the manufacturers' instructions. Both tools perform the same function of clamping the tapping tee to the pipe with a predetermined force.
3. When cutting through the wall of large diameter SDR11, the torque required will be higher than a 32mm outlet-tapping tee.
   Note: Air driven tools must not be used to drive the top tee cutter through the pipe wall.
4. Check that the tapping tee thread followers are present and follow the manufacturer's instructions (Figure 7) this will minimise the risk of stripping the moulded thread inside the stack section.
5. Only use SGN approved tooling to cut the tapping tee.
6. Care must be taken when removing the tapping tee thread followers to ensure you do not remove the cutter as well.

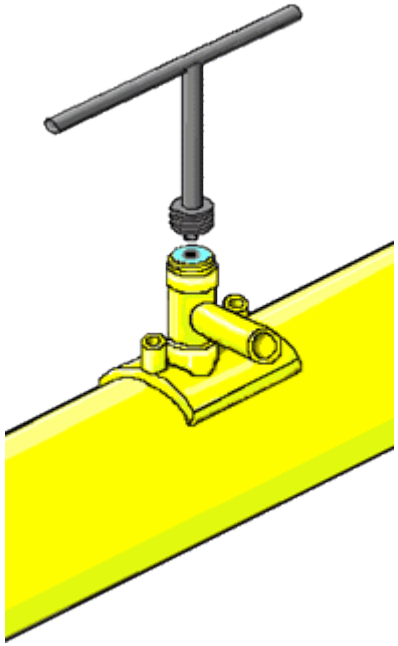


Figure 7 - 63 mm Top tees with Drill Guide Follower

3 MAKING SERVICE CONNECTIONS TO PE INSERTED METALLIC MAINS

3.1 General

1. When you have exposed a metallic main you must investigate the surrounding area for evidence that the pipe is on the expected line of the gas main.
2. It is possible that the exposed pipe is an unrecorded gas main of unknown pressure or a pipeline belonging to another utility.
3. It may also be a hazardous pipeline which is not recorded on GeoField.
4. Not all hazardous pipelines are shown on GeoField. If you are in doubt as to the ownership of the pipeline, contact your Operational Manager.
5. Before making connections to a PE main which has been inserted in a metallic main, a section of the old metallic carrier must be removed.
6. When making connections to swage lined mains reference should be made to SGN/PM/MSL/1 Part 2 which provides instructions.
   Note: This procedure will apply to several techniques such as dead/ live insertion and loose-fit/ close-fit lining.
7. It applies to both cutting out short sections of carrier pipe or cutting windows in the carrier pipe to allow for straight/angled connections, service tapping's or branch tees.
8. Service connections to the exposed PE mains must be undertaken in accordance with Section B1.

3.2 Positive Evidence

1. To confirm that the main is inserted and not a live main you must drill the main before breaking out.
2. You must use an approved drilling machine which can be closed off if the main is found to be a live gas main or pipeline belonging to another utility.
3. You should use a blind drill, where possible, to minimise the possibility of damage to the inserted PE.
4. You must contact your manager if the main is found to be a live gas main or a pipe belonging to another utility.
5. You must not drill the main with any form of hand held drill. This may result in an escape of gas or other liquid which cannot be controlled.

3.3 Procedure for the transfer of service connections – live inserted mains

1. Identify number of services to be transferred and excavate on the main at these locations.
2. The number of services to be transferred in one transaction will be dependent upon site conditions and available resources.
3. Begin the transfer of services from the gland box towards the live head.
4. In Figure 8 - Mains foam off allowing service transfer the foam off position is nearest the live head of group of services to be transferred
   Note: The section isolated will be between the foam off position and the live head position (or previous section foam off position). You must use an inspection hood to inspect the liner pipe to ensure that your operation will not affect the inserted live head.
5. See SGN/WI/ML/2 Section B3 for the procedure to abandon the section of host main.
6. Before removing the section of main around the service connections, carry out an atmosphere check using an approved gas detection instrument ensuring there is no more than 20% LEL near the proposed breakout.
7. When breaking out the main nearest the foam off position, the cut nearest the foam off you must use rotation wheel cutters in three places to prevent longitudinal cracks and ease of removal.

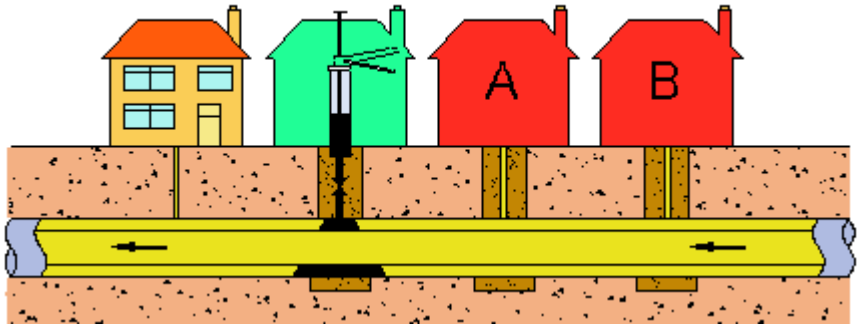


Figure 8 - Mains foam off allowing service transfer

8. You must always fit an end seal kit nearest the foam off position.
9. Always follow the manufacturer's instruction.
10. Follow the procedures in Appendix I for mains breakout upstream of the end seal.
11. Main breakouts up-stream of the foam off position should be sealed with an approved material, for example denso-mastic putty/tape to ensure correct compaction of the backfill material, and to prevent the tracking of gas and water in the carrier pipe.
12. Complete the service connection and connect to the recently laid service.
13. Test the full length of the service following the instructions in Section F1 and Section F2 for the testing procedure.
14. If the test is satisfactory purge and commission the service following Section F3.

4 MAKING SERVICE CONNECTIONS TO METALLIC MAINS

4.1 General Requirements

1. Where applicable make sure that the requirements of SGN/PM/PS/5 are met.
2. Threaded fittings are not permitted at pressures above 2bar.
3. If the main has a Cathodic Protection system in place it must be isolated before work starts.
4. Prior to starting work use a volt stick to check the metallic pipe for stray voltage (see SGN/PR/EL/15003). If an indication is present, stop work and inform your Operational Manager immediately.
5. Assemble BA's ready for use, complete checks on fire extinguishers and position within easy reach of the excavation.
6. If the main is operating above 75 mbar, or greater than 12" diameter, attach the drilling machine using double chains.
7. Fit an Anti-shear sleeves on all service tapping tee outlets up to and including 63 mm diameter.
8. Use any internal stiffener supplied with compression fittings to ensure the integrity of the joint is maintained.
9. Whenever the site is to be left unattended,
   - the drilling assembly must be removed.
   - Night caps must be fitted onto the machine saddle with the gate valve in the closed position, or
   - mains sealing plugs installed into the tapping and checked for leakage.
10. Always follow the manufacturer's instructions when installing the service tee.
11. After commissioning of the service, any metallic joints and fittings must be cleaned and primed, have profiling putty applied (if irregular shaped), carefully wrapped with an approved mastic tape (with a 50% overlap), have PVC tape applied to prevent mastic tape drying or approved brush applied mastic coating.
    Note: Discuss with your manager what field applied coating is required to meet the requirements of SGN/SP/CW/5.
12. Details of commonly available steel pipe are stated in Appendix N.
13. Any reduced depth of cover must be authorised by the Operational Manager, recorded on drawings and protected by means of caution tape and PE tiles or a concrete slab.
    Note: Details must be recorded on drawings and protected by means of caution tape and PE tiles or a concrete slab.

4.2 Welded connections

4.2.1. Size

1. The nominal diameter of the service must not exceed the mains pipe diameter.
2. Refer to Table 10 for the maximum connection and drilling size.
3. The connection may be made by using a Weldolet, Sockolet or Nipolet type fitting installed on the side of the main, in accordance with the approved design.
4. Where a connection more than the maximum sizes given in Table 10, a full encirclement fitting must be used.
   Note: Welded tee Fittings must meet the specification SGN/SP/F/4 and flanges to GIS/F7.

Fitting Type	Size Limitation
Weldolet	$d/D \leq 0.4$
Sockolet	≤ 40mm and $d/D \leq 0.4$
Nipolet	≤ 25mm and $d/D \leq 0.4$
Note: d = nominal diameter of branch D = nominal diameter of header	

Table 10 - Small diameter steel welded connections

4.2.2. Site Operations – welded connections

1. Confirm that laboratory analysis of the carbon scrapings has been completed prior to any work commencing.
2. Establish the type of cathodic protection present on the existing system. If impressed current, then this must be switched off before any work is undertaken.
3. Test for stray voltage with a volt stick (see SGN/PR/EL/15003). If an indication is present inform your Manager immediately and work must not commence.
4. Check the gas atmosphere around the works & follow outputs from risk assessment in accordance with SGN/PM/SHE/76.
5. Ensure fire extinguishers and BA's (assembled and ready for use) are within reach by operatives within the excavation.
6. Use callipers to check the diameter to ensure that the correct size pipe is present and the degree of any ovality is acceptable.
7. Confirm pipe material.
8. Select a position on the main for the connection and carefully remove the wrapping.
9. Prepare the surface by power brushing.
10. Arrange for the inspection of the area where the fitting is to be installed ultrasonically to ensure that:
    i. Wall thickness not less than 5mm
    ii. No laminations are found
11. If there are no existing suitable pressure points installed on the parent main, install a Weldolet/Sockolet pressure point using competent and certified SGN/SP/P/9 welder in the presence of an approved welding inspector.

4.2.3. Welding of Weldolet, Sockolet or Nipolet connections.

1. Position the fitting so that the seam weld does not occur at the point of pilot cutter penetration and the position is at least 200mm away from any joint or existing fitting.
2. Commence welding operations to install Weldolet/

Note: All welding must be undertaken using an approved welding procedure, SGN/SP/P/9 for attachments and SGN/SP/P/1 for welding of the service pipe.
An approved competent welder must carry out this work.
An approved welding inspector must inspect the welding process.

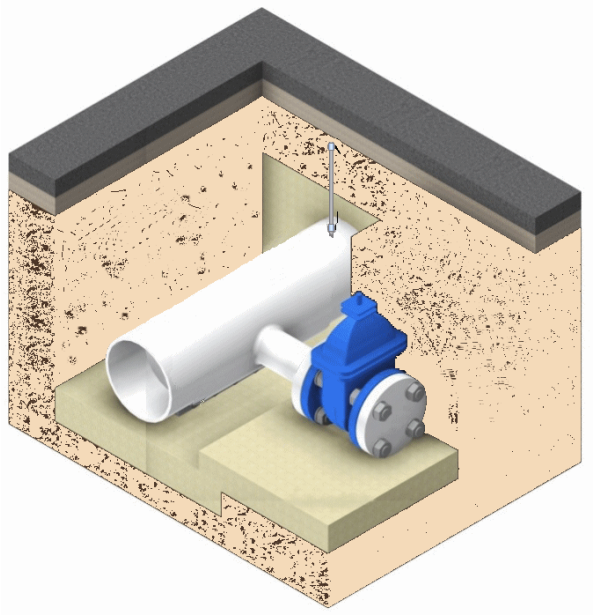


Figure 9 - Weldolet connection

3. Make the remainder of the connection.
   Note: This must be comprised of a pipe pup and weld neck flange in accordance with the approved design to facilitate the fitting of a flanged full-bore valve.
4. Install branch/service isolation valve to the weld neck flange.
   Note: Whenever the site is to be left unattended, the drilling assembly must be removed. The valve must be blanked with an approved fitting and left in the closed position.
   An insulation joint must be fitted between the downstream flange of the valve and any metallic connecting pipe work.

4.2.4. Encirclement Fitting

1. Where it is not possible to comply with the requirements of the connection Table 10 - Small diameter steel welded connections, connections to steel mains above 2bar and up to 7bar require a full encirclement fitting, see Figure 10 - Split/Full encirclement Tee.
   Note: Grouted tees meeting the requirements of GIS/F12 may be used by following the procedure in SGN/PR/P/19.
2. Where a full encirclement fitting is used, the prepared area must be extended to 600mm to each side of the fitting.
3. Position the fitting onto the main so that the seam weld does not occur at the point of pilot cutter penetration and the position is at least 600mm away from any joint or existing fitting.

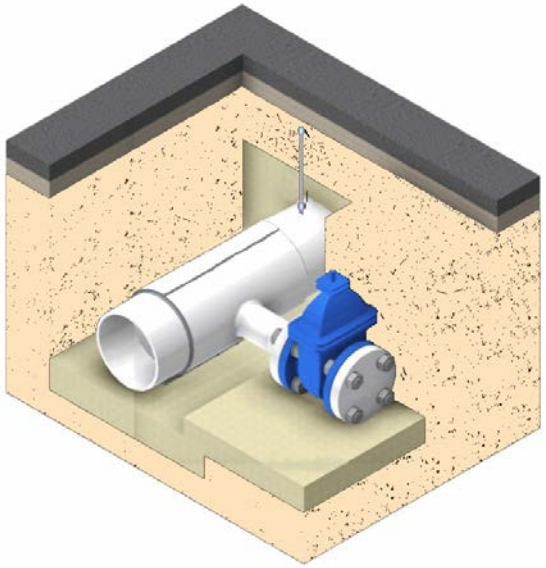


Figure 10 - Split/Full encirclement Tee

4. Position the correctly sized full encirclement fitting onto the main and check the orientation of the tee to ensure the correct depth of cover is achieved.
5. Commence welding operations to install split tee connection.
   Note: All welding must be undertaken using an approved welding procedure, SGN/SP/P/9 for attachments and SGN/SP/P/1 for welding of the service pipe. An approved competent welder must carry out this work. An approved welding inspector must inspect the welding process.
6. Fit a branch/Service isolation valve to the flanged outlet of the tee.

4.3 Testing and drilling operation

1. Test the Tee connection and valve following the testing procedure in Section F2.
2. Before proceeding further record the results of the test.
3. Select a suitable cutter for the operation, and check the bore of the branch valve for size and obstruction. The cutter must be able to pass through the valve without interference.
4. Fit the cutter to the drilling machine.
5. Fit the branch-drilling machine to the flange on the outlet of the branch service isolation valve and support it with suitable timber or concrete supports to compensate for superimposed loads during drilling.
6. Count and note the number of turns required to open and close the branch valve, and the direction.
7. Determine boring bar travel required to complete the drilling operation by measurement.
8. Apply a nitrogen test at a pressure of 1 .5 x the maximum Design Pressure (DP) in the main with the gate valve in the OPEN position and the machine seal checked with an approved leak detection solution. The test should be applied from the test point installed into the drilling machine, for a period of 10 minutes. No leakage should be apparent.
9. Safely vent the pressure to atmosphere
10. Extend the boring bar until the pilot drill touches the wall of the pipe, proving the cutter has cleared the valve and branch fitting. Note the position of the boring bar.
11. Wind back the boring bar to clear the pilot tip from the pipe wall.
12. Confirm tapping machine purge valve is fully open.
13. Commence drilling and advance the drill slowly.
14. When the pilot drill penetrates, the pipe allow air to be purged from the machine vent valve.
15. Close vent valve when purged to gas.
16. When the required travel has been reached, stop the machine.
17. Attempt to advance the cutter by hand. If the cutting is completed, the cutter should be advanced by hand, if not retract ½ turn and resume machine drilling. Repeat until drilling is complete.
18. Fully retract cutter and close branch valve.
19. Vent residual pressure on machine side of tapping valve and confirm valve seal.
20. Remove drilling machine and blank the valve.
21. Remove and retain the pipe coupon.
22. If the coupon has not been retained, you must inform your Operational Manager.
23. Test the all exposed connection joints including the blank and test flanges with a leak detection fluid and wipe clean.

4.4 Completion

1. The remainder of the service should be completed to a service regulator in either steel or PE100 (HDPE) or a suitable grade of MDPE in accordance with the approved design.
2. The section of pipe between the service regulator and the service valve must be tested in accordance with Section F2.
3. Where the service pipe is to operate above 75mbar and up to and including 2 bar a service excess flow valve must be fitted to the service isolation valve.
4. Apply approved mastic paint or wrapping in accordance with SGN/SP/CW/5.
5. Reinstate the cathodic protection system if it has been isolated.
6. Install a valve chamber on the service isolation valve.
7. Complete the low-pressure section of the service if the service regulator is fitted in an outside position.
8. Commission the service in accordance with Section F3.
9. Complete all records and install service information label.

5 DUCTILE AND STEEL MAINS

Ductile Iron corrodes leaving areas/plugs of corrosion products randomly spaced in the main, which leaves the pipe wall thin and weak.

1. There is a risk that when excavating around/exposing DI pipes that any corrosion present may become dislodged from the main. This will cause a sudden and substantial leakage of gas.
2. When working near to or on DI pipes you must do the following:
   - You must work with extreme care always.
   - DO NOT strike the pipe wall with shovels and forks.
   - You must use all safety and PPE, including BA and fire-suits.
   - On medium pressure mains, up to and including 150mm and 6", a wraparound tee must be used when installing fittings.
3. There have been instances where plugs and service fittings have been blown out due to the wall thickness reduction or plug corrosion near to the fitting.
4. If you encounter a ductile main with corrosion areas or bolt corrosion present you must:
   - Inform your Manager as soon as possible.
   - Complete a hazard assessment to assess the integrity of the pipe wall.
   - If the pipe is operating at MP, wherever practicable the pressure in the main should be reduced, or the work delayed until such time system pressures can be lowered.

   Corrosion areas on Steel and Ductile iron mains can significantly affect the integrity of the pipe wall.

5. Your Operational manager will arrange for a leakage survey to be carried out around the area of the work as required in SGN/PM/LC/18 – Leakage Survey)
6. On ductile and steel mains, if fitted remove any plastic sleeving.
7. If you are making a connection to a Steel/Ductile Iron main up to and including 3" diameter operating up to 75 mbar or a main up to and including 6" diameter operating above 75 mbar, a full encirclement fitting must be used to make the connection.
   Note: If it is known that the pipe wall thickness is greater than 4 mm, then a standard top tee can be used i.e. during service replacement work when the first hole is drilled and the wall thickness is known then the remaining mains connection points can be undertaken using top tees.
8. If you are working on steel mains subjected to Cathodic Protection (CP), inform your Manager to establish whether any special precautions are required.
   Note: Disturbed areas of coating and wrapping on steel mains must be repaired prior to backfilling.

6 DRILLING AND TAPPING OPERATIONS

6.1 Position & Size of connection

1. If the nominal diameter of the service will be greater than the mains pipe diameter, inform your Operational Manager.
2. If you are replacing the service, make use of the existing tapping in the main wherever possible.
3. If the thread in the main is tapered, plug that hole and make a new connection.
4. If you are making a new service connection, this should be made at least 200 mm away from any joint, split collar, new or existing tapping.
5. The maximum nominal size of tapped holes that should be used is 2" diameter where the main is 200 mm nominal size or over.
6. Below this 200mm the tapping sizes specified in Table 11 must be applied.
7. When a tapping more than the maximum sizes given in Table 11 is required, a full encirclement fitting must be used.
8. A combined pilot drill and drill/tap must be used for 2" tapping.
9. The main must only be threaded and tapped with a parallel thread.
10. Reducing bushes **MUST NOT** be used in the tapped hole in the main.

Nominal size cast/spun iron main		Maximum BSP tapping size (inches)
mm	Ins	
	3	¾
100	4	1¼
	5	1½
150	6	2
	7	2

Table 11 - Tapping size for mains below 200 mm nominal size

6.2 Preparation

1. You must give preference to the use of top outlet service fittings installed on the top of the main for the work.
2. Where site circumstances prevent the use of such fittings e.g. depth of main, proximity of other plant, then a side outlet tee should be used.
3. Select a position on the main where there are no large corrosion defects or hard encrustations.
4. Clean the main by scraping and wire brushing. If necessary, wash the main with clean water to ensure secure seal at the machine saddle.
5. Check the mains diameter using callipers
6. Select the correct sized machine saddle.
7. Check the condition of the machine saddle should be inspected to ensure that it is in good condition before attaching it to the main.
8. If the main is operating above 75 mbar, or greater than 12" diameter, attach the drilling machine using double chains.
9. You must tighten the fixing chain nuts evenly with the spanner provided.

   Note: It is recommended that a quarter turn at a time be applied to ensure an even seal. (Wask Max Torque 20Nm)

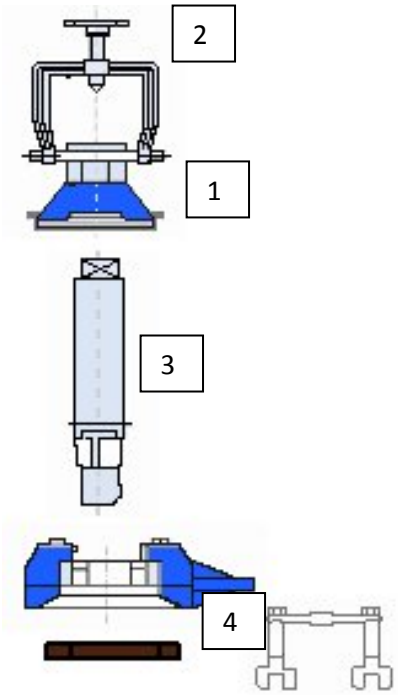


Figure 11- Top entry via Wask tee set

10. You must check the level of the machine to ensure that it is appropriate for the work.

11. Fit a parallel threaded drill tap to the chuck and insert into the machine.
    Note: In the case of double spindle machines, the fitting spindle and fitting must also be assembled to the machine.
    (Table 11 for tapping size for mains 200mm diameter and below).
12. Lubricate the end of the feed screw with oil or grease.

6.3 Testing & Drilling

1. Fasten the correct size of tap into the drill spindle (3) using the hexagon screwdriver provided and fit the spindle into the drilling head (1) retaining it in the raised position with the securing pin which is chained to the head.
2. Using the small spanner provided, fasten the machine body (4) on to a cleaned section of main with the securing chain, selecting the correct size of rubber saddle - the main sizes being clearly marked on the rubber.
3. Check that the gate valve slides fully to close, and leave in the fully open position.
   Note: A longer securing chain and a pair of extension lugs are available as additional equipment enabling the machine to be fitted to any size of main over 300 mm (12").
   On single chain machines, the centre line of the securing chain indicates the centre line of the required hole.
4. Fit the drill head (1) into the body (4), pressing fully home. Pressing the vent button will assist this operation. Use the large spanner provided, rotate the head clockwise to lock onto the base.
5. An air test at a pressure of 1 .5 times the maximum operating pressure in the main or 350 mbar (whichever is the greater) should be applied.
   Note: The gate valve should be in the OPEN position and the machine seal checked with an approved leak detection solution.
   The air test should be applied from either the test point installed into the drilling housing, (Figure 12a), or by using the fitting housing with a pressure test assembly (see Figure 12b below).
6. No leakage should be apparent.
7. If leakage is observed the machine should be removed and the main cleaned further, saddles and rubber checked for damage or the machine replaced.
   Note: Fixing chains must not be over tightened to achieve a good seal (Wask 20Nm).
8. When tested as shown in Figure 12a - Pressure testing tee-set the pressure gauge used for this operation must be left on during the drilling operation and used to monitor the mains operating pressure.
9. Check that the valve is open and lower the drill spindle (3) onto the main.
10. Position the ratchet handle with the chamfer upward on top of the drilling spindle and swing the bridle (2) into position.

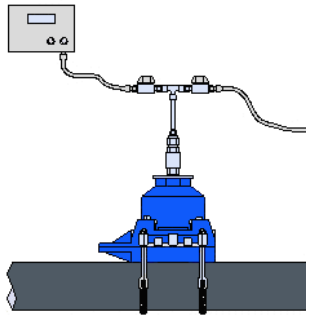


Figure 12a - Pressure testing tee-set

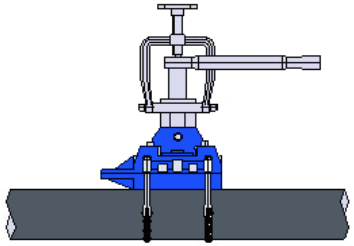


Figure 12b - Tee-set ready for drilling

11. Drill and tap the main taking care to avoid excessive feed.
    Note: When using air-powered drives, the feed speed must be controlled to avoid overloading of the drill motor. Air-powered drives must not be used during tapping operations.

12. When drilling and tapping is complete withdraw the drill spindle (3) and retain in raised position with securing pin.
13. Close the gate valve (note that mark on valve actuating spindle points to the position of the valve plate).
14. The gas pressure in the drill head (1) must now be vented by pressing the vent button.
15. Should gas continue to pass the vent the gate should be re-opened and closed.
16. If gas continues to vent, breathing apparatus must be worn during the installation of the service tee.
17. Keeping the button depressed rotate the drill head (1) anti-clockwise using the large spanner provided.
18. Remove the drill head.
19. Follow manufacturer's advice to prepare the fitting for the carrier spindle.
20. Take the carrier spindle and the fitting to be installed and slide into the fitting head (Figure 13).
21. Tightening gland nut hand tight.
22. Locate head in a similar manner to that of the drilling head keeping the gate valve closed.

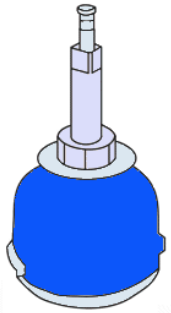


Figure 13 - Wask Fitting Head and With Spindle Attached

23. Open the gate valve, lower the fitting and screw into the tapped hole hand tight.
24. Depress the vent button until all the pressure has been released
25. Slacken the gland nut and remove the fitting head in a similar manner to that of the removal of the drilling head, leaving the spindle attached to the fitting.
26. Release the chain and remove the machine base from the main.
27. Remove any swarf from around the rubber seal and fully tighten into the correct alignment until gas tight and checked with approved leak detection fluid.
28. Remove carrier spindle.

7 CONNECTIONS – TOP ENTRY TEE

1. Insert the service pipe into the tee and complete the joint.
2. Fit an anti-shear sleeve.
3. Install test equipment onto the tee and test in accordance with Section F2 of this procedure.
4. On completion of a successful test, remove test equipment and attach the key to the square drive and fully withdraw the stopper into the tee.
5. Replace the original square head plug on the top tee.
6. Purge and commission the service in accordance with Section F3.

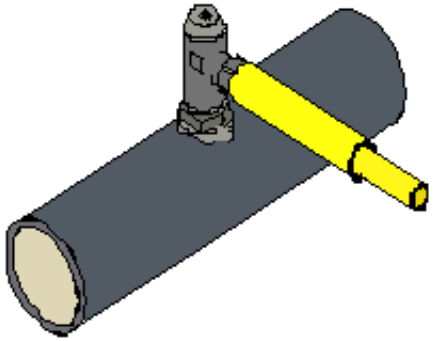


Figure 14 - PE service entry top tee

Part	Service Tee Top Entry
1	¾" BSPM x 20mm
1	¾" BSPM x 25mm
1	¾" BSPM x 32mm
1	1" BSPM x 20mm
1	1" BSPM x 25mm
1	1" BSPM x 32mm
1	2" BSPM x 63mm
2	Anti-shear Sleeve

Table 12 - Available Approved Metallic x PE service top tee.

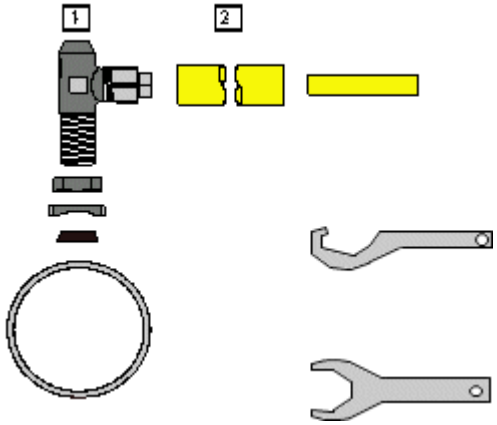


Figure 15 - Exploded view of Top Entry Tee & 'C' fixing spanners

8 CONNECTIONS – SIDE ENTRY TEE

1. When fitting a side entry tee following the instructions below.
2. Fit the drilling equipment onto the side of the main, normally this will be facing the meter location.
3. Fit the machine body with the gate valve mechanism at the top of the main.

   Note: This will ensure that failure of the securing mechanism will be in a "FAIL SAFE" situation.

4. The remainder of the procedure must follow the instructions in Section B7 (Top Tee Entry).
5. Make sure that you use the correct tooling for installation of side entry.

   Note: The manufacturer of the drilling machine or supplier of fitting will provide the carrier tool for the tee to be used (Figure 17).

Part No	Service Tee Side Entry
1	¾" x 20mm
1	¾" x 25mm
1	¾" x 32mm
1	1" x 20mm
1	1" x 25mm
1	1" x 32mm
2	Anti-shear Sleeve

Table 13 - Service side entry tee parts list

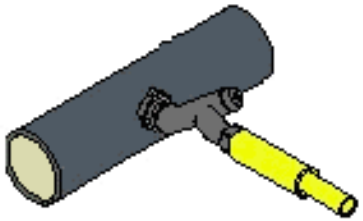


Figure 16 - Example of Side Entry Tee.

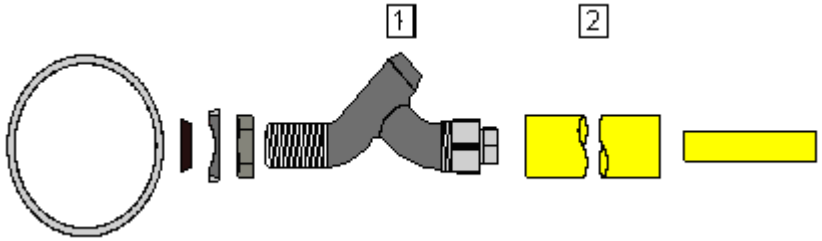


Figure 17 - Exploded view of Side Entry Tee.

9 TWO-PART TOP TEE

Two--part tees are supplied with a standard 2" (63mm) outlet but the nipple assemblies are supplied with 1.5" and 2" BSP threads for greater range of use across 5" to 7" mains without the need to fit a split collar.

The physical size of the two-part tee does not allow the main body to be installed under no gas conditions through the body of the drilling machine. The nipple assembly must be installed first.

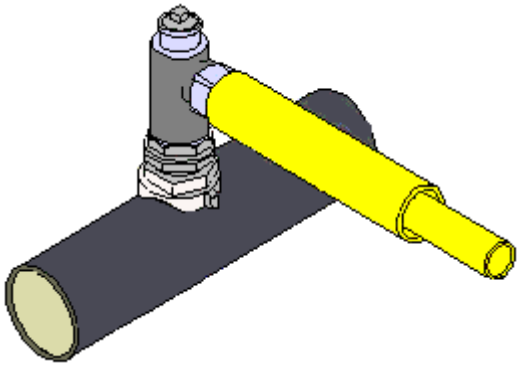


Figure 18- Two-part service top tee

1. For two-part Tees, drill and tap metallic mains following the procedure in Section B6.
2. Check that the internal sealing plug moves freely through the two-part tee and tighten plug.
3. Insert the nipple assembly onto the plug carrier.
4. Attach the carrier to the spindle and insert through the drilling machine into the main.
5. Open the vent on the drill body to check for leakage of gas from the tapping.
6. If satisfactory remove the drill body over the spindle taking care not to disturb or loosen the threaded nipple connection.
7. With the drilling machine removed, remove any swarf from under the rubber seal.
8. Tighten the nipple assembly using the correct tooling.
9. The locking ring and the seal is tightened to give a gas tight seal.
10. Check for leakage using an approved leak detection fluid.
11. Remove the plug carrier and spindle.
12. Assemble the outlet of the tee securely onto the nipple assembly following manufactures instructions.
13. Make sure that the tee is facing the direction of the service entry.
14. Leave the internal plug in the nipple assembly until the service has been tested and is ready to be commissioned.
15. When the service is fully completed, carry out a service test following Section F1
16. On satisfactory completion of the pressure test, the service must be commissioned as follows: -
    i. remove the top tee plug
    ii. fit the plug spindle to the internal sealing plug.
    iii. Withdraw the internal plug into the top of the top tee.
17. Replace the plug for the top of the tee and check using approved leak detection fluid.

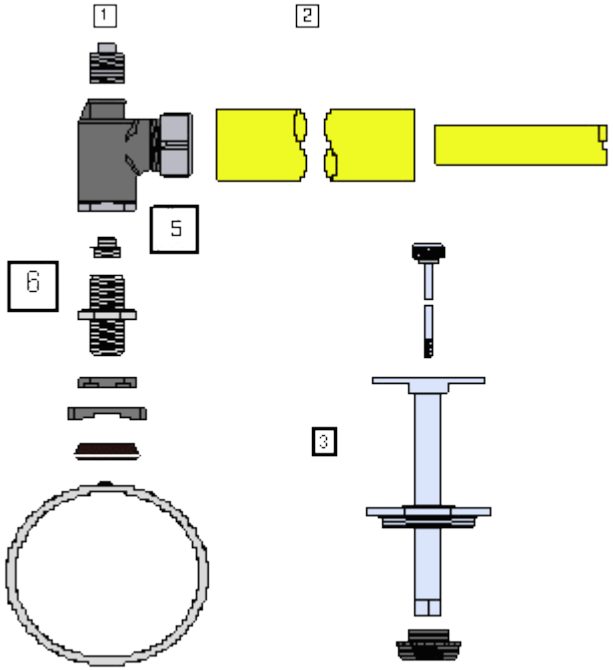


Figure 19 – Two-Part Top Tee Exploded view

Item No	Item
1	Plug
2	Anti–shear sleeve
3	Nipple tool
4	Tee Body
	2”x 63 mm
	2”x 2” Top Entry
5	Internal sealing plug
6	Nipple assembly
	1½” x 2” BSPM
	2”x 2” BSPM

Table 14- Two-part tee parts list

10 ENCIRCLEMENT FITTINGS

1. Full encirclement fittings are required when you are connecting to: -
   - Steel / ductile mains up to and including 3” diameter operating up to 75 mbar
   - Steel /ductile mains up to and including 6” diameter operating above 75 mbar and up to and including 2bar.

   Note: If it is known that the pipe wall thickness is greater than 4 mm, then a standard top tee can be used.

10.1 Preparation

1. Remove the protective coating from the main and clean by scraping and wire brushing.
2. Attach the correct size full encirclement fitting onto the main and tighten using a torque wrench as per manufacturer's instructions (Figure 20).
3. When installing the full encirclement fitting onto the main check the orientation of the tee to ensure the correct depth of cover is achieved.
4. Screw a metallic valve to the Tee.
5. Testing must now be carried out in accordance with Section F1.

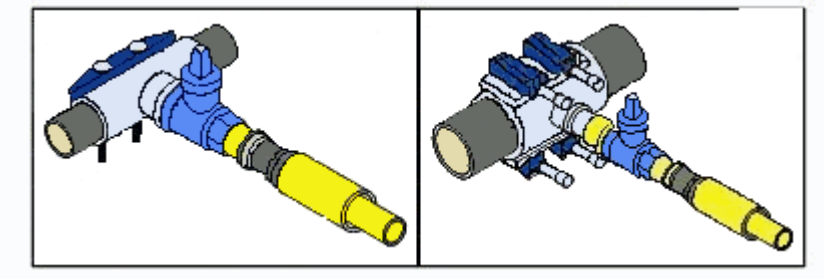


Figure 20 - Example – Service connection to an Encirclement Fitting

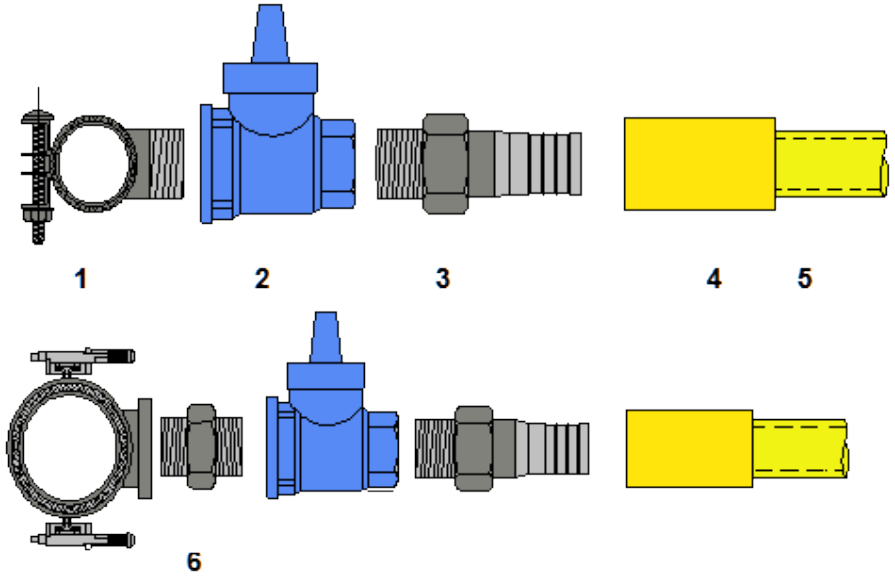


Figure 21 - Component parts

Item no	Description	Sizes
1	Encirclement fitting	Up to 2″ outlet bosses available
2	Full-Bore valve	See Table 30 - Valve sizes
3	Transition Fitting PE x Steel	1″ x 32 mm & 2″ x 63 mm
4	Anti-shear Sleeve	50 mm
5	PE pipe	32 mm / 63 mm
6	Hexagon Nipple	1" & 2″

Table 15 - Encirclement Fitting parts list

10.2 Drilling tee

1. Following successful test, release the test pressure and the main can be drilled.
2. Connect a long reach drill to the outlet thread/flange of the valve.
3. Retest the tee with the drilling machine connected.
4. Following a successful test, release the test pressure
5. Open the valve and check the drill travel distance to the main and mark the stem of the drill (see Figure 22).
6. Drill the main in accordance with the manufacturer's instructions.
7. Monitor the pressure in the parent main throughout the drilling operation.
8. Once complete, retract the drill and close the valve.
9. Vent the drilling machine and remove the equipment.
10. Undertake a pressure test on the service following the procedure in Section F1.
11. The main can be drilled using a long reach drill (as shown in Figure 22) which is connected to the outlet thread/flange of a full-bore valve fitted to the tapped boss of the fitting (as shown in Figure 20).
12. The service is then connected to the outlet connection of the valve.
13. Using leak detection fluid, test the newly made connection.

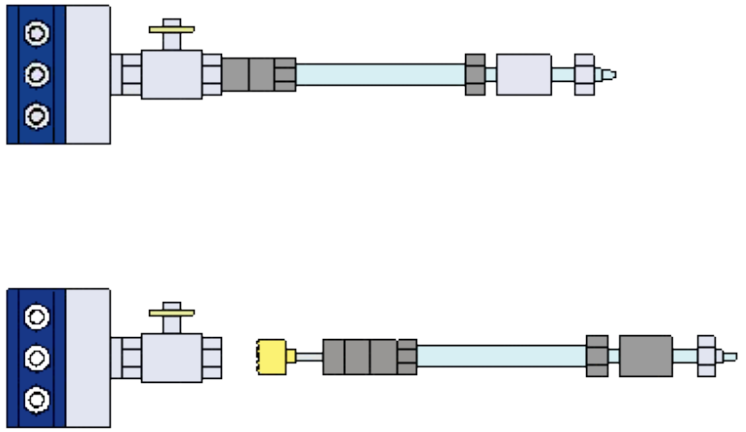


Figure 22- Long Reach Drill and Encirclement clip

11 SERVICE TRANSFERS

11.1 General Requirements

1. Before starting work to transfer a service, you must check to ensure the service is not a dual service.
2. Refer to Section A4 dual service, if the service does not meet these requirements then the services should be re-laid as two individual services.
   Note: All sections of below ground steel services must be replaced.
3. If the service being worked on is PE and it crosses the line of the new main, the service can be squeezed off and capped at that point.
4. You can then transfer the service to the new PE main.
   Note: The remaining section of service connected to the old main can be left and abandoned along with the existing main.
5. If the service being worked on is steel, the service can be temporarily isolated at the point where it crosses the new main. The service can be inserted back to the property if the pressure loss is satisfactory (see Section A5).
   The remaining section of service connected to the old main must then be disconnected at the point of connection on the old main.
6. Only PE services can remain connected to the main, Steel and other Non-standard service materials such as lead or copper must not be transferred onto the new main.
   They must be cut off at the mains connection and fully re-laid. There must be no steel tails left connected to PE services.
7. Services must always be updated to the latest standards such as fitting insulating joints below the ECV or the fitting of a combined IJ/ECV.
8. Wherever possible services should be laid on a predictable route by laying perpendicular between the service entry point of the property and connection to existing pipework.

11.2 Transfer Service - Operation

The following should be followed to complete the transfer.

1. Isolate the existing service at the meter by following guidance in Appendix O.
2. All existing live services must be disconnected in accordance with Section B14 Service Cut Offs.
   If transferring a Medium Pressure service, it should be isolated at the main or at the service isolation valve.
3. Polyethylene Service Connection off PE Main Section B1.
4. Servicelaying and Pressure Testing Section F1 and F2.
5. Commissioning Section F3.
   Note: The proposed service must be sized to ensure that it will operate within permissible pressure loss requirements.
6. Additional precautions are required when undertaking a service transfer to an inserted main in accordance with Section B3. These include:
   - Using additional Personal Protective Equipment (PPE) when removing any fragments of main at the point of connection to the PE main i.e. goggles, gloves, face mask/visor.
   - Inspecting the PE main for damage.

12 SERVICE ALTERATION PE LOW PRESSURE

12.1 General Requirements

1. Before starting work to alter a service, you must check to ensure the service is not a dual service.
2. Refer to Section A4, if the service does not meet these requirements then the services should be re-laid as two individual services.
   Note: All sections of below ground steel services must be replaced.
3. You must cut off the service at a location determined by Section 14.1.
4. Services must always be updated to the latest standards such as fitting insulating joints below the ECV or the fitting of a combined IJ/ECV (Figure 62).
5. When undertaking an alteration on an MP service it must be isolated at either:
   - the service isolation valve, or
   - the mains connection, or
   - a suitable point for single squeeze off up to and including 32 mm and a double squeeze off for above 63 mm diameter.

   Note: If the squeeze off equipment fails to stop the flow of gas an additional squeeze off must be used.
6. The correct squeeze off distances must be maintained between fittings or joints (Figure 35).
7. Wherever possible services should be laid on a predictable route by laying perpendicular between the service entry point of the property and connection to existing pipework.
   Note: Compression fittings must not be used for reconnection of services within 2m of a property.
8. Before you leave the site, check adjacent properties to ensure that supplies have not been affected by the work you have undertaken.

12.2 Service Alteration - Operation

1. Squeeze-off the service and open ECV to prove seal
2. Cut the service downstream of the squeeze-off at a location determined in Section 14.
3. Temporarily cap the live end of the service with an approved fitting
4. Carry out the service alteration.
5. Complete a service test (see Section F1 and Section F2).
6. If any section of pipe work fails, this test then the entire service must be renewed or the leakage source identified and permanently repaired.
7. The service alteration (Figure 23) must be undertaken in accordance with:
   Sections C: Service construction
   Section E: Service entries
   Section F: Testing and commissioning.

8. 'Squeeze off' applied tape must be placed on the pipe at the squeeze off location after removal of the squeeze off tool.
   Note: Services must not be squeezed off again at the same point.

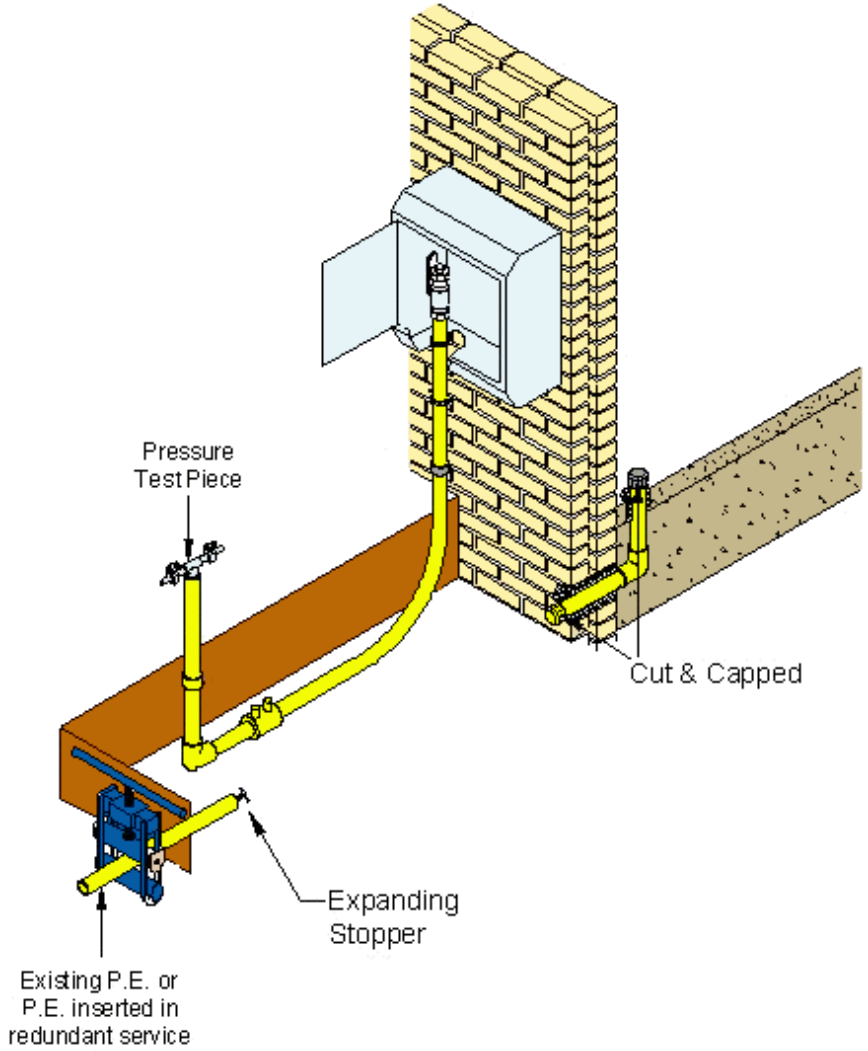


Figure 23 - Typical Service Alteration

13 SERVICE ALTERATIONS STEEL

Where you discover that the service to be altered is constructed of steel inform you manager and the customer that the service will require full replacement.

All sections of below ground steel services must be replaced.

The planned service alteration should be accommodated within the service replacement.

13.1 General Requirements

1. Before starting work to alter a service you must check to ensure the service is not part of a dual service.
2. Refer to Section A4, if the service does not meet these requirements then his should be re-laid as two individual services.
   Note: All sections of below ground steel services must be replaced.
3. You must cut off the service at the main.
4. Cut off the service following the procedure in Section 14.
5. Complete the service replacement taking in to account the service alteration requested following Section C and Section E.
6. When you have completed the construction of the service and made the new connection, test and commission the service following Section F.
7. When undertaking an alteration on a steel MP service it must be isolated at either the:
   - service isolation valve, or
   - mains connection
8. Wherever possible services should be laid perpendicular between the service entry point of the property and connection to existing pipework.
9. Before you leave the site, check adjacent properties to ensure that supplies have not been affected by the work you have undertaken.

14 SERVICE CUT OFFS

This section details procedures to be used when a service is to be cut off when undertaking the following activities: -

14.1 Safety Precautions

1. Ensure that adjacent vents and any other openings have been temporary isolated or closed.
2. Make sure that any other potential sources of ignition are identified and isolated where possible, for example extinguish pilot lights on balanced flue appliances and turn off extractor fans.
3. Where pipework protected by Cathodic Protection systems is to be worked on the CP system must be turned off before work is started.
4. Breathing apparatus and fire extinguishers must be placed adjacent to the working area of the activity being undertaken and available for immediate use.
5. Electrical gloves (1000v class 0) are required to be worn if the drilling operation is remote from where the service connects to the main.

14.1.1. Disconnections in Uncontrolled conditions

1. For all pressure tiers (LP, MP & IP) where the service is to be disconnected under uncontrolled conditions, breathing apparatus must be worn and fire extinguishers placed adjacent to the working area for immediate use.
2. Additional protective equipment i.e. fire suits, balaclava and gauntlets must also be worn. Additional equipment such as lifting equipment, guard lines etc. must be considered.

14.2 General Requirements

1. Turn off the ECV and cap the service.
2. Before and after cutting off the service, check with adjacent properties for a dual service, for example a visual inspection on the service entry positions or labelling on the service.
3. Cut off the service, disconnect at the point identified in Section 14.3.
4. Cap off the service pipe and plug the main.
5. Purge any natural gas to air.
6. Where possible disconnect and or remove the existing standpipe without causing any damage to the fabric of the building and seal the standpipe entry.

   Note: Where the existing standpipe cannot be removed without damaging the fabric of the building, the standpipe should be left in situ and capped off and labelled to indicate service disconnected.
7. Only approved mains sealing plugs must be used (taper plugs and reducers are not permitted).

14.3 Cut off locations

1. For the disconnection of PE service pipes ≤ 63mm, the service should be isolated at a convenient position away from the building providing an electrofusion fitting is used to cap the pipe.

   Note: This is applicable for all buried joints made with electrofusion fittings, this location may be within 2 metres from the building.
2. If a compression type fitting is to be used on a PE pipe the isolation must take place a minimum of 2 metres from the building.
3. The disconnection of metallic pipes using the LGSI equipment on above and below ground external steel pipes may take place within 2m of a building, if the pipe can be sealed without using compression fittings.

   Note: This disconnection should be supervised by an Operational Manager, after completion of a site-specific risk assessment.
4. When disconnecting buried metallic service pipes without using non-gas release LGSI equipment, then the cut off must take place at least 2 metres from the building.

14.3.1. Service relay

1. The service should be cut off at the main or at a location identified in 14.3 above.

14.3.2. Service Transfer

1. The service should be cut off at the main,

2. If the service being worked on is PE and it crosses the line of the new main, the service can be squeezed off and capped at that point.
3. You can then transfer the service to the new PE main.

   Note: The remaining section of service connected to the old main can be left and abandoned along with the existing main.
4. If the service being worked on is steel, the service can be temporarily isolated at the point where it crosses the new main. The service can be inserted back to the property if the pressure loss is satisfactory (see Section A5-4).

   Note: The remaining section of service connected to the old main must then be disconnected at the point of connection on the old main. Steel services must be re-laid to the new main.

14.3.3. Service Alteration

1. Where a service alteration is downstream of an above ground entry tee, with an integral stopper, the integral stopper should be used as a means of isolation.
2. First carry out a 'let by' test using a pressure gauge connected to outlet of the Emergency Control Valve (ECV) to confirm that the entry tee is not passing gas in accordance with Section F5.
3. Metallic services must be cut off at a position meeting the requirements of Section 14.3 above to avoid any gas ingress into the property.

14.3.4. Permanent Service Cut Off

1. A single service to a single occupancy property must be isolated outside the property and should be cut off at the main.
2. When disconnecting services in multi-occupancy buildings follow the guidance in SGN/PM/SER/3.

   Note: in all cases where the service is cut off, the dead section of pipe must always be capped with an approved fitting.

14.4 MP Services

1. Contact your Manager if: -
   - If an MP service is encountered with a Top Tee assembly, as shown in Figure 25, proceed with caution as the integral plug may have been removed.
   - If an MP service is encountered with a bend/long screw as shown in Figure 29,
2. Your Manager may need to initiate a pressure reduction of the main.
3. Once the pressure in the main has been reduced the service can be cut off as stated below.

   Note: Breathing apparatus and fire extinguishers must be out ready for use when carrying out live gas operations.
   Additional PPE including, fire suits and gauntlets must be worn during Medium Pressure operation.

14.5 IP Services

1. Intermediate pressure steel services must be isolated at the valve connection to the main.
2. PE services ≤ 63mm may be temporarily disconnected by the use squeeze off equipment, however an isolation must be made at the valve connection with the main as soon as possible.

14.6 Temporary Continuity Bonding (TCB) on metallic services

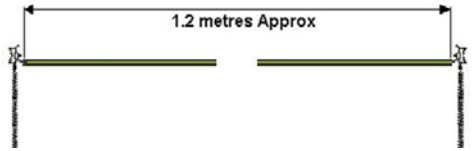


Figure 24 - Temporary Continuity Bond (TCB).

Note: A temporary continuity bond (TCB) is used to protect the Operative and ensure that an ignition source will not be created by an electrical discharge across a temporary gap in pipe work. (Figure 24 illustrates a typical temporary continuity bond used for cutting off services).

1. Use a volt stick prior to installing a TCB to the check for stray voltage on the service pipe.

2. Fit a TCB before any metallic pipe work or meter is connected, disconnected or cut.
   Note: The correct type of continuity bond must be selected prior to the work beginning, ensuring that the correct type clamp is used and is properly attached to the pipe (***Figure 25***).
3. Visually inspect the TCB prior to use for obvious signs of damage, mechanical weakness or broken electrical terminations.
   Note: If there are any signs of damage they must not be used and must be repaired or replaced.
4. When fitting TCBs ensure that they will not be disturbed during the progress of the work and must not be removed until the work is completed.
5. Connect the TCB to the pipe work on both sides of the section to be worked on and it must be fitted and removed in a gas free area only.
   Note: If sparking occurs at any time when fitting or removing a bond, work must cease immediately and you must contact your Manager. Advise the consumer that the installation needs to be checked by a competent electrical contractor or the electrical authority.

14.7 Installation of a temporary continuity bond

To fit a TCB, the following procedure must be followed:

1. Select the position on the main, service or installation pipe work at which the temporary continuity bond is to be connected.
2. Use a volt stick prior to check for stray voltage on the service pipe.
3. If there is no stray current clean the pipe to provide a sound metal contact at two positions one either side of the proposed cut.
   Note: This may involve removing protective coatings. The surface of the pipe should be cleaned to a bright finish using a wire brush to ensure a good electrical contact.
4. Check that the TCB is of adequate length and that the connection ends are clean and in good condition and the cable not damaged.
5. Attach the two ends of the TCB to the two cleaned sections of pipe work and ensure that both connections are secure.
   Note: The TCB must not be held securely using Stillsons, etc.
6. Proceed with the connection or disconnection of pipe work.

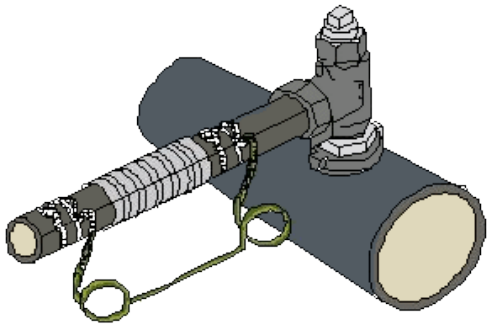


Figure 25 - Typical installation of Temporary Continuity Bond.

7. Remove the TCB following completion of work.
8. Reinstate protective coating on pipe as required.

14.8 Cut Off Procedures

14.8.1. Isolation and removal of a service tee fitted to metallic mains

1. Check any exposed metallic pipe with volt stick, and excavate around circumference of the main.
2. Carefully remove the plug from the service tee in case the integral plug is not fitted.
3. Lower the integral stopper to the bottom of the tee if one is fitted. If there is no integral stopper, then the service must be cut off in accordance with Section 14.8.2.
4. Check the integral plug for leakage by applying an approved leakage detection solution and replace the plug on the top of the service tee.
5. Slowly vent the gas within the isolated service pipe
6. Disconnect service pipe from service tee, depending on whether the service pipe is PE or metallic:

a) **PE service:**

1. Disconnect the service outlet as near to the tee as possible and cap the other end of the pipe with an electrofusion cap end.

b) **Metallic service**

1. Remove any protective wrapping from the service pipe in two locations approximately 300 mm apart, the pipe should be cleaned with a wire brush to a bright finish to ensure a good electrical contact.
2. A temporary continuity bond must be fitted to bridge across the section of pipe to be removed as per Figure 25.
3. Cut through the pipe using a hacksaw in such a manner as to enable the cut piece to be easily removed.
4. Sealed the service pipe on the property side temporarily with mastic.
5. Remove the cut section of pipe, cap downstream (property side) pipe with an approved cap end.
6. Disconnect the continuity bond from the service and disconnect the service pipe from the outlet of the top tee.
7. Loosen the service tee on the main, taking care to restrict any leakage to a minimum.
8. Centralise the drilling machine over the tee, fit carrier spindle and remove the tee under controlled gas conditions. Withdraw the tee into canopy and close the gate valve.
9. Attach Emid plug onto the carrier spindle and plug off the main under controlled gas condition (Tapered Plugs must not be used).
10. Remove the drilling machine and tighten the plug.
11. Test the plug with an approved leak detection solution.
12. The old service should be removed from the property where possible.
13. The existing standpipe and service entry should be removed, and all redundant holes sealed and any damage made good.
14. If this cannot be achieved the underground entry must be capped off to prevent the ingress of gas.
15. The ends of any abandoned pipe work left in the ground must be sealed with an approved cap end.

14.8.2. Isolation and removal of a service tee fitted to metallic mains with no internal plug fitted

Where a service Tee is fitted but no internal plug is fitted the service must be isolated.

a) **Metallic service – Using Service Isolator for Low Pressure services up to 2”** (see Figure 26)

1. Remove any protective wrapping for a minimum of 300mm.
2. Clean the pipe with a wire brush to a bright finish to ensure a good electrical contact.
3. Fit a temporary continuity bond to bridge across the section of pipe to be removed as per Figure 25, and in accordance with Section 14.6.
4. Attach the isolator clamp
5. Install the drill and stopper sections to the Clamp.
6. Check for a gas tight seal
7. Open the clamps vertical valve and feed the drill into position.
8. Commence the drilling of the service
9. On completion, retract the drill and close the vertical valve
10. Open the angled valve and push the stopper into the upstream side of the service using the Rod.
11. Disconnect the stopper shaft
12. Withdraw the insertion rod into the gland chamber and close the angled valve.
13. Remove the isolator clamp.
14. Make the first cut on the service through the drilled position
15. Make a second cut downstream of this position and remove the section of service pipe.
16. If required fit a retrieval rod to the exposed stopper.
17. Fit a live insertion valve and retract the stopper and close the valve.
18. Otherwise cap the service.

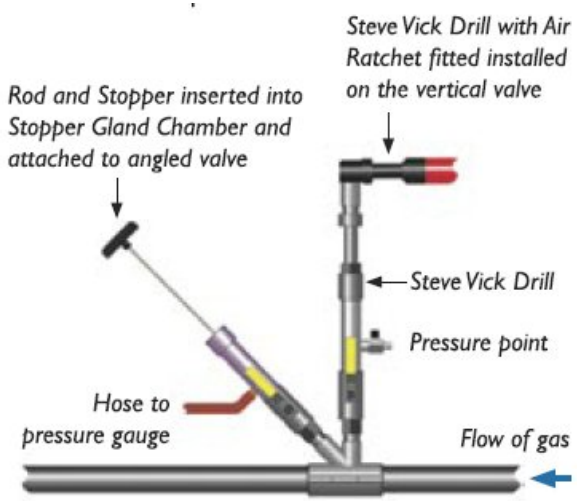


Figure 26- Service Isolator

b) **Metallic Service – Disconnection by cutting through bandaged pipe**

This system should only be used if the Service isolator or Rapid service isolator cannot be fitted.
Your Operational Manager must be contacted and their approval before work starts.
This is a hazardous operation additional personal protective equipment is required, Fire Suites, balaclava, gauntlet gloves, Breathing Apparatus must be worn during this operation, and fire extinguishers placed adjacent to the working area available for immediate use.

1. Remove any protective wrapping from the service pipe in two locations approximately 300 mm apart; the pipe should be cleaned with a wire brush to a bright finish to ensure a good electrical contact.
2. A temporary continuity bond must be fitted to bridge across the section of pipe to be removed as per Figure 27 stage 1.
3. Prior to cutting, wrap the pipe with a suitable mastic bandage.
4. Cut through the mastic bandage using a hacksaw in such a manner as to enable the cut piece to be easily removed.

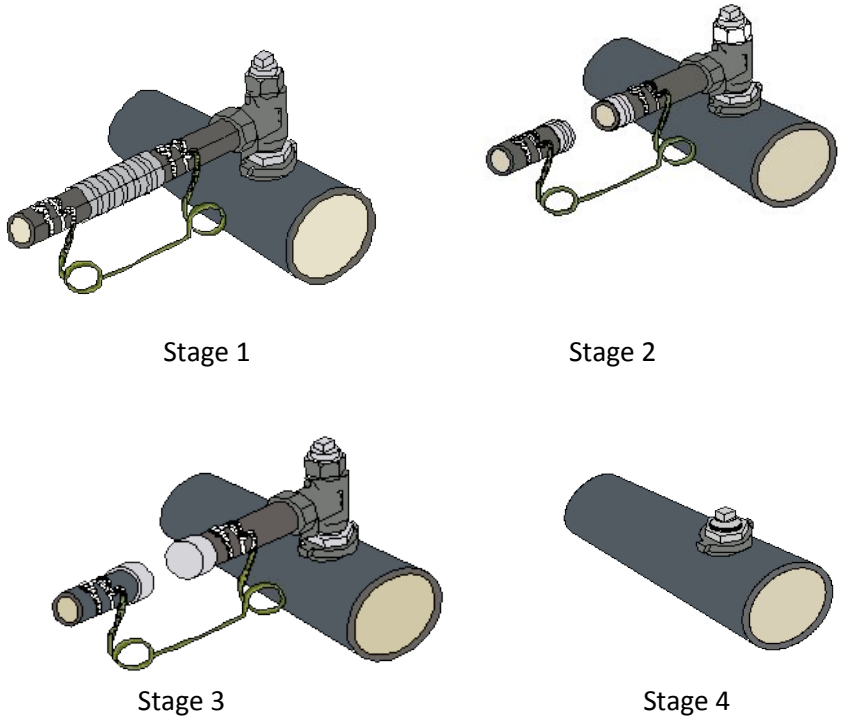


Figure 27 - Disconnection by cutting through bandaged pipe

5. Seal the cut with mastic as cutting proceeds to minimise the discharge of gas. (Figure 27 Stage 2)
6. Remove the cut section of pipe, cap downstream (property side) pipe with an approved cap end. (Figure 27 Stage 3).
7. Disconnect the continuity bond from the service and disconnect the outlet of the service top tee.

8. Loosen the service tee on the main, taking care to restrict any leakage to a minimum.
9. Centralise the drilling machine over the tee,
10. Fit carrier spindle and remove the tee under controlled gas conditions.
11. Withdraw the tee into canopy and close the gate valve.
12. Attach a main plug or new top tee onto the carrier spindle and plug off/replace the top tee under controlled gas condition
    Note: Tapered Plugs must not be used, Figure 27 Stage 4.
13. Remove the drilling machine and tighten the plug/top tee.
14. Test the plug/tee with an approved leak detection solution (Figure 27 stage 4).
15. Remove the old service from the property.
16. Remove the existing standpipe and service entry and all redundant holes sealed and any damage made good.
    Note: If this cannot be achieved the underground entry must be capped off to prevent the ingress of gas.
17. Seal the ends of any abandoned pipe work left in the ground with an approved cap end.

14.8.3. Isolation and removal of a bend fitted to metallic mains

a) **Using Rapid Service Isolator for Low Pressure service ¾" to 1 ¼"** (see **Figure 28**).

1. Remove any protective wrapping for a minimum of 150mm.
2. Clean the pipe with a wire brush to a bright finish to ensure a good electrical contact.
3. Fit a temporary continuity bond to bridge across the section of pipe to be removed as per Figure 25, and in accordance with Section 14.6.
4. Attach the modified jaw locking pliers to the service at the point of isolation (see **Figure 28** – 1).
   Note: This can be on a vertical or horizontal section) close to the main.
5. Using the air drill and a 5mm bit, drill through the gland and into the service. This takes seconds. (see **Figure 28** – 2).
6. Once drilling is complete, withdraw the drill to the point you can close the valve.
7. Remove the gland and attach the barrel nipple.

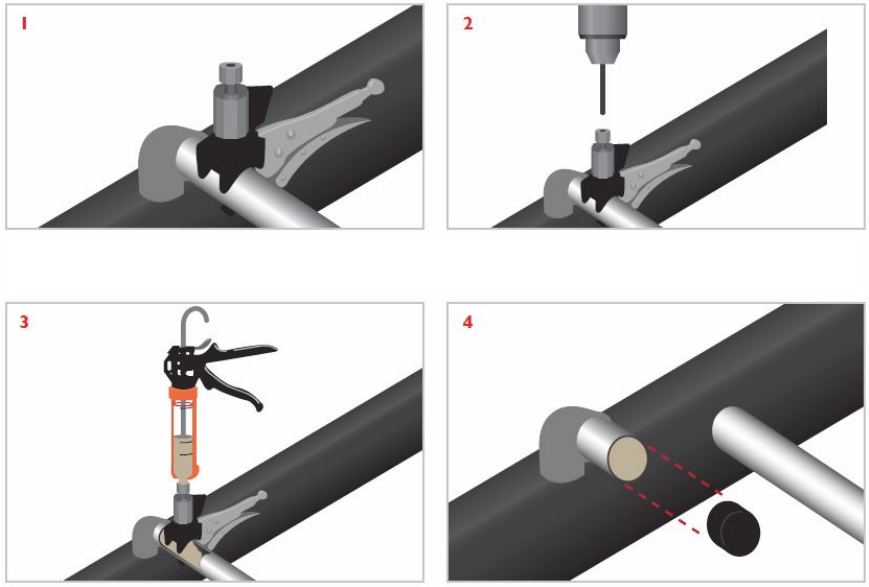


Figure 28 - Rapid service isolator

8. Screw the sealant cartridge onto the barrel nipple (see **Figure 28** – 3).
9. Slide the applicator gun over the cartridge.
10. Open the valve and inject the correct quantity of sealant.
11. This is marked on the cartridge, e.g. half a cartridge for 1".
12. The cartridge may be resealed for later use.
13. Test for a gas-tight seal, then cut through the service.
    Push the rubber cap over the cut end of the service (see Figure 28 – 4) then remove the stub from the main and fit either a plug, or new top or side tee (with integral stopper closed). (See Section B7).

b) **Cut off steel bend/long screw to metallic mains through bandaged pipe**

This system should only be used if the Service isolator or Rapid service isolator cannot be fitted.

This is a hazardous operation additional personal protective equipment is required, Fire Suites, balaclava, gauntlet gloves, Breathing Apparatus must be worn during this operation, and fire extinguishers placed adjacent to the working area available for immediate use.

1. Refer to Section 14.8.2b and Figure 29 Stage 1-4 regarding the cutting of the service pipe.
2. Remove the cut section of pipe; cap both ends of the pipe with an approved cap.
3. Carefully unscrew the bend and short length of pipe from the main and immediately plug the main or insert top tee or side entry tee (with integral stopper closed) if the main tapping is to be reused.
4. Avoid the build of static charge and the possibility of a spark, by resting the plug/or service/side entry tee on the main about 350 mm from the hole and sliding it along the surface of the pipe to the hole (stage 4).
5. Relay service or if plugged removed the old service from the property.
6. Remove the old standpipe and existing service entry, all redundant holes sealed and any damage made good.

   Note: If this cannot be achieved the underground entry must be sealed with a cap end to prevent the ingress of any leakage of gas.
7. Seal the ends of any abandoned pipe left in the ground with a suitable cap.

   Note: If the service pipe connection is found to have no tee or bend at its junction with the main, then refer to Section B 14.8.2b for guidance on cutting the pipe. Caution must be taken when unscrewing the pipe direct from the mains drilling.

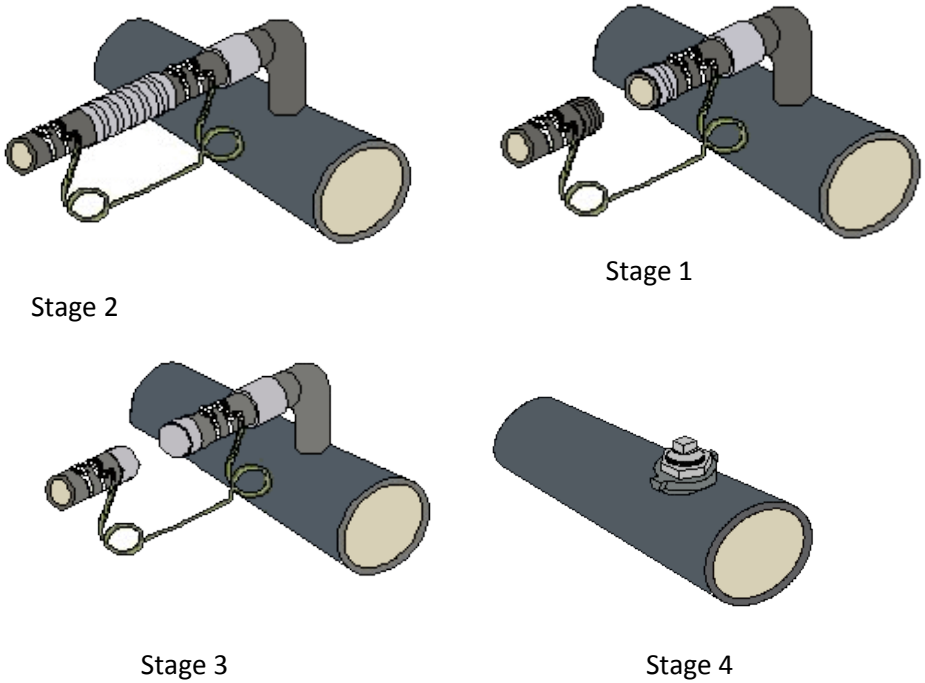


Figure 29 - Cut off metallic service with service bend to main

8. Make sure that a service extraction tool, and a service pipe expanding stopper tool, are always be available on site for use in the event of pipe collapse.
9. If required, make safe the retained section of the pipe (still housed in the main) using the expanding stopper or retrieve using the extraction tool immediately depending on the failure mode.

14.9 Cut metallic service remote from the mains connections.

1. In situations where the service pipe to be cut off is remote from the mains connection point, then refer to Section 14.8.2.
   Note: The cut off position must be at least 2m from any building line, and if you cannot do this the service must be cut off at the main.
2. Remove the old service from the property.
3. Remove the existing standpipe and service entry and all redundant holes sealed and any damage made good.

14.10 Cut off PE service at PE main

1. Excavate to the main
2. Remove cap from the tapping tee and wind the cutter to the down position. (Figure 30 & Figure 31).
3. Check cutter seal by applying approved leak detection fluid into the tapping tee.
4. Drape damp cloths over the section to be cut out ensuring that the ends of the cloth are in contact with the ground. Refer to Figure 32.
5. Cut the section of pipe.
6. Fit electrofusion caps to both ends of service pipe. Figure 33.
7. Raise the cutter and replace Tapping Tee cap.
8. Test the electrofusion cap end and top tee cap using a leak detection solution.
9. Wash off leak detection solution using clean water.
10. The end of the any abandoned pipe work left in the ground must be sealed with electrofusion caps.
11. Remove the old service from the property.
12. Remove the existing standpipe and service entry and all redundant holes sealed and any damage made good.

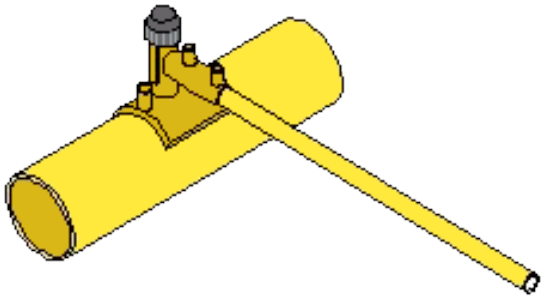


Figure 30 - PE service

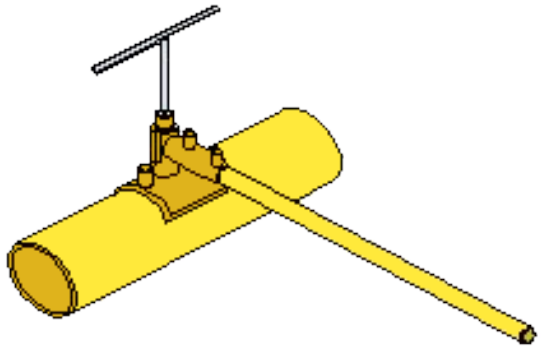


Figure 31 - Top tee plug screwed down

14.11 Cut off PE service remote from the mains connection

1. Excavate on the line of the service.
2. Clean around the service pipe leaving sufficient room to install a squeeze off unit and to remove a short section of pipe.
3. Set the squeeze-off tool to the correct pipe diameter.
4. Position the squeeze off tool upstream from the proposed cut out section and at distance A away from any joint or fitting see
5. Table 16.
6. Excavate on the line of the service.

7. Clean around the service pipe leaving sufficient room to install a squeeze off unit and to remove a short section of pipe
8. Set the squeeze-off tool to the correct pipe diameter.
9. Position the squeeze off tool upstream from the proposed cut out section and at distance A away from any joint or fitting.
10. Drape damp cloths over the section of pipe to be cut out.
    Note: Ensure that the ends of the cloth are in contact with the ground.
11. Turn off the service at the emergency control valve
12. Squeeze the service pipe at a position at least distance A away (stated in Table 16) from the squeeze-off position cut the service pipe.

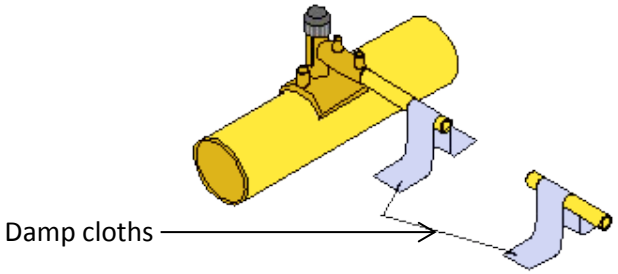


Figure 32 - PE service cut off

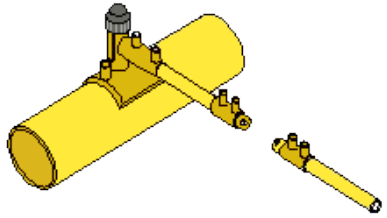


Figure 33 - - PE service capped off

13. Fit an electrofusion cap to both ends of service pipe Figure 33.
14. Remove squeeze off
15. Check electrofusion cap on live section of service pipe with approved leak detection fluid.
16. Wash off leak detection solution using clean water**.**
17. Apply 'squeeze off' tape at the squeeze off location.
    Note: Whenever imperially sized DuPont Aldyl-A PE pipe material (tan or pink in colour) is squeezed off then a mechanical repair clamp must be fitted over the squeeze-off location following its removal. This is to reduce the risk of a subsequent pipe failure resulting from slow crack growth from inside of the pipe wall to outside.
18. Remove the old service from the property.
19. Remove the existing standpipe and service entry and all redundant holes sealed and any damage made good.

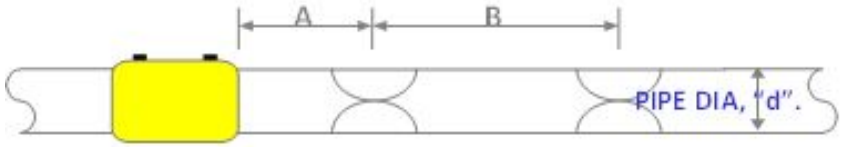


Figure 34 - Proximity distances

14.12 Squeeze-off dimensions

Below are dimensional requirements for the use of a squeeze- off next to fittings and other squeeze off tools. Figure 35.

	A	B
Imperial & HDPE Pipes	3D	6D
Metric Pipes	2.5D	5D

Table 16 - Proximity distances

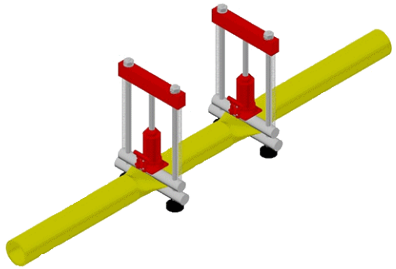


Figure 35 - Twin Squeeze offs

15 REMOVING AN EMID PLUG

1. Clean around the area of the main where the rubber seal is to be sited on the main.
2. Taking care not to move the body of the plug, remove the locking washer and rubber seal from the plug assembly.
3. Position the drilling base over the plug and attach the chains loosely around the main.
4. Attach the plug removal tool and spindle to the plug.
5. Install the plug housing over the spindle and onto the drilling base.
6. Secure the housing into position by depressing the plunger on the drilling base.
7. Slowly commence alternate tightening each side of the chains ensuring that the spindle can always turn both clockwise and anti-clockwise.
8. If the spindle becomes jammed, slacken off the chain and re-commence tightening when the spindle can turn again.
9. Repeat this operation until the drilling base is tightly fitted onto the main.
10. Begin to unscrew the plug from the main by rotating the spindle anti-clockwise.
11. When the plug is out of the main, raise the spindle and plug into the housing.
12. Close the slide valve on the drilling base and depress the plunger to remove gas pressure within the plug housing.
13. If gas pressure continues to escape open and close the valve to gain a better seal.

    Note: If gas is still escaping Breathing Apparatus must be worn prior to proceeding with step 14.
14. Remove the plug housing and remove the plug.
15. Install new fitting in accordance with Section B7 to B9.

Figure 36 - Emid Plug

16 OPEN TRENCH (TRENCH PROVIDED BY OTHERS)

Open Trenches provided by others may not always be constructed correctly it is important that you carry out several checks before you place the gas service or yourself into the excavation.

16.1 Site Survey

Complete a site survey see Section A1.

16.2 Site Preparation

1. Refer to Pre-requisites and make sure that all tools and equipment to complete this task are available on site.
2. PPE must be worn appropriate to the task being undertaken.
3. Check the site plan to confirm that trench has been excavated in the agreed position.
4. Check that the trench has been excavated to the correct depth.
5. Confirm that ground levels will not be altered at a later stage.
   Note: This is to confirm that the final depth of the service will not be too shallow or too deep (see Table 3- Recommended Minimum depths of cover).
6. Check the integrity of the excavation to ensure it is safe to enter.
7. Remove any sharp objects or large stones which may damage the service pipe.
8. If 3rd parties have prepared the excavation and/or laid the service pipe, check: -
   a) The depths are correct (Table 3).
   b) There are no visible signs of damage to the PE pipe.
   c) That there is Marker tape above and fine fill around the pipe.
   d) The pipe is not in tension.
   e) The pipe is not contaminated.
   f) Proximity to other utilities and property.
9. Once the pipe is installed ensure Gas warning tape 75 mm above the crown of the pipe.

17 PIPE LAID IN DUCTS

17.1 Site Survey

Complete a site survey see Section A1.

17.2 Site Preparation

1. Refer to Pre-requisites and make sure that all tools and equipment to complete this task are available on site.
2. PPE must be worn appropriate to the task being undertaken.
3. All excavations must be completed following guidance in Section A1.
4. Check the site plan to confirm that the duct has been laid in the agreed position.
5. Ensure that the ducting used for the PE gas service pipes is yellow and have perforations along its length.
   PE pipe must not be used as ducting.
6. Check that the duct is the correct size (Table 17).

Typical Pipe size	Typical Minimum Duct Size
25/32mm	60mm
63mm	100mm

Table 17 - Typical Duct sizes

Note: BS 4962 is a suitable standard for plastic ducting.

7. Check that the ducting has been laid by the most direct route from the main to the proposed house entry position.
   Note: This should normally be on a predictable route at right angles to the main.
8. On new construction sites, check that the external ducting has been terminated adjacent to the service entry point, allowing a minimum of 1 metre to assemble installation fittings below ground.
9. Check that the mains connection excavation has been left open or clearly marked to identify the main and the end of the service duct.
10. Prior to any work beginning, confirmation of the finished ground levels must have been made to ensure that the service will be at the correct depth (Table 3).
11. The ducting must not be used for entry into buildings or laid through underground chambers such as inspection manholes, etc.
    Note 1: If these requirements have not been met you must contact the developer/occupier's representative to arrange remedial work by them. Ducts should be coloured yellow, should be overlaid with gas marker tape and should preferably be perforated along its length when external to a building.
    Note 2: BS 4962 is a suitable standard for plastic ducting.
12. Check the duct for any blockages prior to inserting the PE pipe.
13. Fit a bullet nose cone to the end of the service pipe to be inserted.
    Note: This will avoid any contamination or egress of foreign matter into the pipe.
14. For long lengths of ducting the site owner should have inserted a guide rope. Where provided, you should attach the guide rope to the nose cone.
15. Insert the pipe into the duct and if provided pull the pipe through using the guide rope.
16. Examine any exposed section of inserted service for scoring or damage to the pipe wall. If the damage is found and is greater than the 10% of the pipe wall thickness, then the service must be retracted and the cause of the damage identified and removed.
17. Upon completion, the duct should be sealed with an SGN approved sealant.

18 INSERTED PIPE - GENERAL

Insertion is the preferred method for undertaking replacement service activities and must be applied wherever practicable.
Pressure loss must be considered in accordance with Section A5***.***

1. When replacing a gas service and you need to join two pipes together the point of connection must be either:
   - a minimum of 2 metres from the building, if a compression type fitting is to be used to join the pipes or
   - at a convenient distance from the property, if an electrofusion coupling is to be used to join the pipes (2 metre rule does not apply)
2. Wherever possible you should relay the service back to its existing meter position.
   Note: The following insertion techniques are suitable based on the maximum distances detailed in Table 19***:***
   - Dead Insertion ***(meter to garden or main)***
   - Serviflex ***(meter to garden)***
   - Live Service Insertion ***(PE garden to main only).***

   Note: Live Service Insertion into a property is not allowed.
3. Meter disconnections must follow the procedure in Appendix O.
4. You must only insert PE pipe by pushing the PE pipe it must not winched.
   Note: Only SGN approved pushing machines can be used to insert the service.
5. After completion of the PE Service renewal you must remove any redundant valve or syphon covers.
6. You must seal the annulus between the inserted new service and the old pipe using an SGN approved sealant.
7. You must only use approved insertion equipment, materials and sealants see Table 18.
   Note: SGN preference is to seal from the inside of the building to the outside, however sealing from the outside into the property is acceptable providing precautions are taken to prevent and protect against unintentional spillage and over pressurisation.

In all cases, positive confirmation must be given that the service has been fully sealed. This may be by visible confirmation at the service head adapter (SHA).

	Live Service Insertion	Dead Insertion Serviflex	Dead Insertion PE
Foam Pack MP41	✓	X	✓
Annerseal 2763	X	✓	✓
Full Seal	X	✓	✓

Table 18 - Annular Gap Sealants

19 DEAD INSERTION

19.1 Site Survey

Complete a site survey see Section A1.

19.2 Site Preparation

1. Refer to Pre-requisites and make sure that all tools and equipment to complete this task are available on site.
2. PPE must be worn appropriate to the task being undertaken.
3. All excavations must be completed following guidance in Section A1.

19.3 Dead Service Insertion Preparation

1. Before the installation of the gas service, check with adjacent properties to determine whether a dual service exists

   Note: If so refer to Section A4 to determine if the service should be replaced to the main in a new position.
2. Identify if there are any syphons, valves or tees on the service. If so one of these may be a suitable location isolate the service. Otherwise these positions must be excavated and the pipework and fittings removed to allow the insertion to proceed.
3. Where the minimum depth for the service is not met then the service cannot be inserted and must be re-laid using an alternative method.
4. Carry out a visual inspection of the existing steel service look for signs of corrosion.
5. Where pipes with holes or pitting are found, you must not use the pipe for insertion and you must contact your Operational Manager.
6. The presence of an elbow or partial blockage of the existing service pipe can be detected by:
   - 'trial inserting' from the ECV using spring or
   - The use cobra rods in accordance with the manufacturer's instructions.
   - The use of a service inspection camera

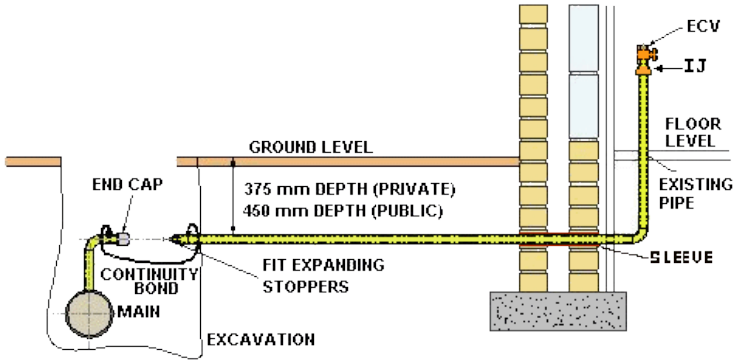


Figure 37 - Service cut off prior to dead insertion – internal position

7. Excavate either at the service connection at the main or at a location described in Section B14. (Figure 37 - Service cut off prior to dead insertion – internal position & Figure 38 - Service cut off prior to dead insertion – external position
8. Follow the procedure in Section B14 to isolate the service.
9. Fit a continuity bond wherever a pipe is cut or disconnected, they must be fitted in the following situations:
   - At the meter position, between the service pipe and the installation pipe.
   - At the connection to the main and the service pipe (in accordance with Section B14).
   - At any other cut or disconnection, between sections of pipe that remain (in accordance with Section B14).
10. Disconnect the meter see Appendix O.
11. Connect a purging hose and purge service to 0% GIA.
12. Remove purging hose.
13. Remove the ECV.
14. Using Table 8 - Pressure Loss over Given Length and Diameter (Based on 32 kWh/^{3} scmh for existing Supplies) and Table 19 select the correct PE pipe for inserting the service pipe.

Check that the diameter of the service is compatible with the PE pipe diameters Pipe size for insertion

Insertion Technique	Maximum distance for Technique	Rationale
Serviflex	Based on spring length	Maximum length of spring.
Live Service Insertion. 17.5mm/¾" 20mm/1" or 1¼ 25mm/1¼" 32mm/1½"/2" 40mm /2"	 8m 18m 18m 18m 12m	The maximum length of the travel for the foam in metres.

Table 19 - Maximum distance for insertion techniques based on manufacturers' recommendations

Note: This table should be used in conjunction with Pressure loss given in Table 8 - Pressure Loss over Given Length and Diameter (Based on 32 kWh/³ scmh for existing Supplies).

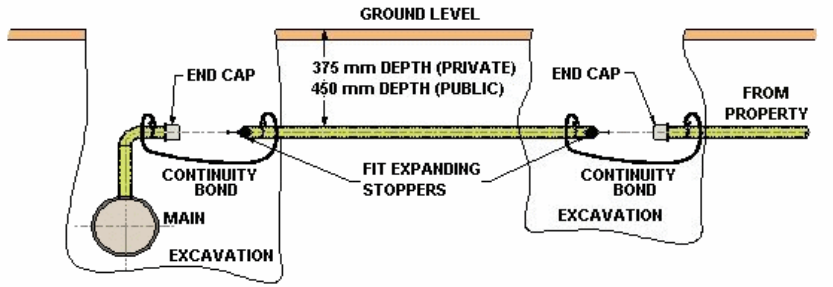


Figure 38 - Service cut off prior to dead insertion – external position

Steel Size inches	PE Size mm
0.75	16/17.5
1.00	20
1.25	20/25
1.5	32
2.0	32/40mm

Table 20 - Pipe size for insertion

Note: The new PE service should preferably be a single diameter, although if this is not possible maximum design lengths of different pipe size are given in Table 19. The maximum permissible pressure drop allowable for the service pipe must be determined for the complete service length in accordance with Table 8 - Pressure Loss over Given Length and Diameter (Based on 32 kWh/³ scmh for existing Supplies).

15. Insert a 'Protective cone insert' into the end of exposed redundant pipe to protect the PE pipe from damage while inserting the PE pipe.
16. Measure the amount of pipe required for the insertion allowing extra pipe for final connections or house entry installation arrangements.
17. No joints must be installed on the PE pipe within the carrier pipe inside the building.
18. If there is likely to be a problem with the Handling of the pipe coil cut the pipe length to suit the insertion.
19. Ensure the inside of the host pipe is clean (Internal cleaning of metallic service) and de-burred or where appropriate cleaned.
20. If necessary, from the meter position outwards blow clear the service with air using a force pump. **DO NOT USE A COMPRESSOR.**
21. Use a collection bag to collect dust and debris from the pipe.

Note: The bag contents must be disposed of in the approved manner. When inserting PE into the premises, the PE pipe may not negotiate an elbow without 'creasing'. To avoid the correct selection of PE pipe is essential, or the elbow can be removed and a long radius bend and pipe back to the insertion point.

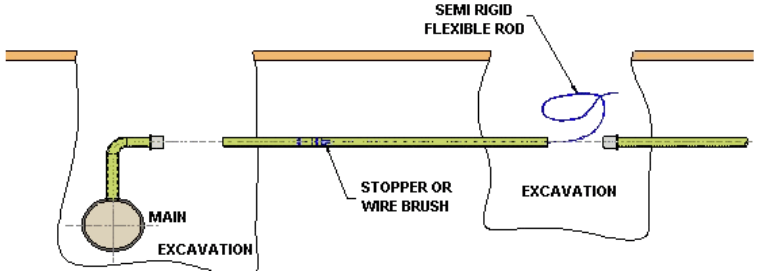


Figure 39 - Internal cleaning of metallic service

19.4 Procedure

1. Insert a protective nose cone into the leading end of the PE pipe to be inserted.
   Note: This will assist insertion and prevent debris entering the insertion pipe.
2. The pipe can be inserted using a pipe-pushing machine or by hand.
3. If a pushing machine is to be used for the pipe insertion, fit the pushing machine into place.
   Note: This can be attached to the mains connection or the service entry position (see manufacturer's instructions).
4. Before starting the pipe insertion, make sure that an effective system of communication is established between both ends of the job.
5. Commence the insertion of the PE pipe.
6. Take care through bends to ensure that the PE pipe does not kink or become trapped.
7. The PE pipe should be inserted to allow sufficient pipe to protrude, in order that visual examination for damage can be undertaken.
   Note: Where defects occur, which are greater than 10% of the wall thickness of the pipe, this should be cut out.
   If scoring is persistent then an alternative method of laying the service must be used.

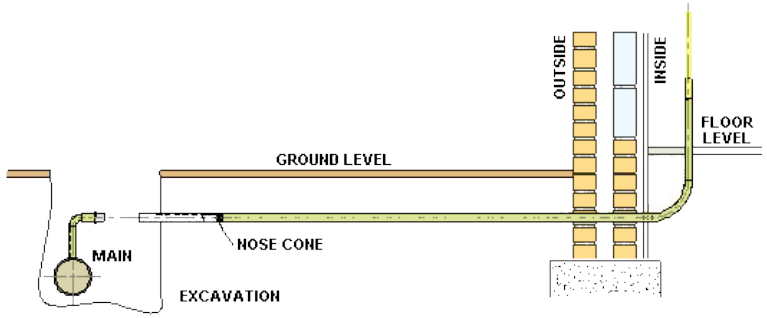


Figure 40 -Insertion of PE pipe

8. There should be at least 1 metre of pipe, which can be cut back following satisfactory inspection, to enable the service head adaptor to be fitted.
9. With the service insertion and the inspection completed, cut back the service and fit the service head adaptor. (see Appendix G) and manufacturer's instructions.
10. Fit an Insulation Joint on all existing steel services as part of the relay between the ECV and the Service Head Adaptor.
    Note: A combined IJ and ECV may be used for this purpose.
11. If a house entry is used to enter the property, fit the service pipe in accordance with Section E7.
12. Cap the service.
13. Test the service in accordance with Section F1.
14. On completion of a satisfactory test, connect the service pipe to the main (see Section B4).
15. Commissioned in accordance with Section F3.
16. Wrap any below ground and exposed metallic joints.

    Note: Exposed pipe below the ECV can be protected with "Sleeve it" material
17. Inject an approved annular sealant into the inserted service to a position at least beyond the building line to protect against gas ingress and gas tracking.
    Note: Ensure the annulus between the PE service pipe and existing service is filled with correct quantities of approved annular gap sealant in accordance with the manufacturer's instructions and Table 18 - Annular Gap Sealants or Table 21 - Fullseal quantities.

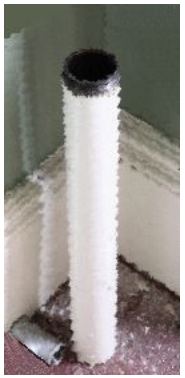
Number of 1 litre Cartridges	16mm	17.5mm	20mm/Serviflex		25 mm	40mm Serviflex
	into ¾"	into ¾"	Into 1"	Into 1¼"	into 1½"	Into 2"
1	4.0m	8.0m	4.5m	2.5m	2.2m	0.9m
2	n/a	n/a	9.0m	4.8m	4.4m	1.8m
3	n/a	n/a	13.5m	7.5m	6.8m	2.7m

Table 21 - Fullseal quantities

20 DEAD INSERTION USING SERVIFLEX

20.1 General Requirements for Service insertion using Serviflex

1. The 'Serviflex' system is used to insert a service pipe from the garden to the existing meter position.
2. The 'Push Guide method' is the only approved method of undertaking this activity.
3. Serviflex must only be used as a dead insertion technique.
4. Serviflex has similar performance characteristics to 20mm PE pipe, but the pipe is not designed to be laid in any open ground.
5. Serviflex must only be undertaken on metallic 1", 1¼" and 2" diameter services operating at low pressure.
6. This technique must not be used on dual services.
7. The maximum length of service that can be inserted using this technique will vary depending on the spring used.
8. Maximum pressure loss for the proposed total length of service pipe must be determined in accordance with Table 8.
9. The line of the service must be accurately traced from main to meter to check its suitability with the chosen replacement technique.
10. The Serviflex pipe can be reliably inserted through two tight knuckle elbows depending on the condition of the service pipe, or up to 6 long radius bends.
11. Service pipes containing syphons are not suitable for replacement using Serviflex insertion technique.
12. Service installations containing tees or other forms of branch connections, or containing valves are only suitable for insertion if they maintain full-bore and they are capable of being filled with an annular gap sealant.



13. Prior to installation you should inspect the condition of the service pipe. Any corrosion pitting or holes will prevent the sealant sealing off the annulus and could prevent the Serviflex pipe installation.

Site Survey and Setup
Complete a site survey and set up see Section A1.

20.2 Contingency Plan

1. There may be circumstances where the installation cannot be completed, an example of some of these instances is provided below. As part of the risk assessment, you must consider a contingency plan to be put in place should the Serviflex installation not be completed.
2. The contingency plan will only commence if the existing metallic pipe is decommissioned to allow for the Serviflex relining to commence, but is not completed.
3. Some potential causes leading to an incomplete installation are listed below when: -
   - attempting to prove the main a blockage is found that cannot be cleared.
   - attempting to prove the main the proving probe does not arrive at the garden location, due to a break in the pipe.
   - proving the service has a minimum of three knuckle type bends in the pipe route.
   - installing the Serviflex pipe; the pipe is unable to successfully negotiate the pipe route.
   - installing the Serviflex pipe; it becomes stuck and cannot be freed.
   - the pipe arrives at the meter position, the damage observed on the leading end of the pipe suggests the pipe is unfit for purpose.
   - The installed Serviflex pipe will not pass a pressure test.
4. The recommended contingency plan should any of these or other instances occur that result in an unsuccessful Serviflex relining operation, is that the metallic Service pipe is isolated and sealed at each end and new location is sought for the new Service installation.

20.3 Site Preparation

1. Refer to Pre-requisites and make sure that all tools and equipment to complete this task are available on site.
2. PPE must be worn appropriate to the task being undertaken.
3. All excavations must be completed following guidance in Section A1.
4. Inspect the line of the service for evidence of valves, syphons and tees.
   Note: If these are identified, then an alternative service insertion technique must be selected.

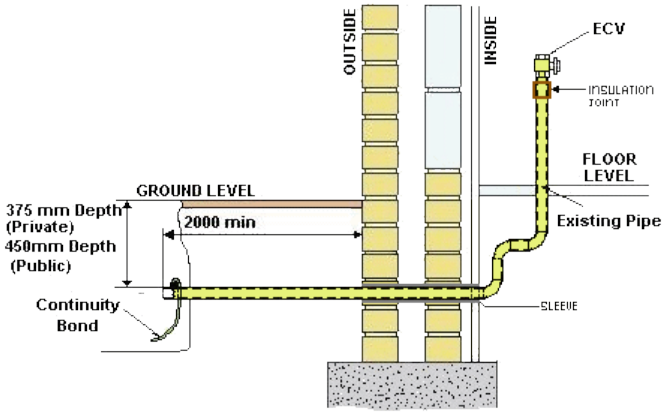


Figure 41 - Cut off service for Serviflex technique

Note: If the service is not at the required minimum depth, it must be re-laid to the correct depth.

5. Close the emergency control valve (ECV) and disconnect and cap the meter and ECV at the union immediately connected to the outlet of the ECV. Meter disconnections must follow the procedure in Appendix O.
6. Undertake an excavation on the line of the service pipe, approximately 1 metre in length and positioned so that disconnection point meets the requirements of Section 14.3.
7. Allow enough room to enable the service disconnection cut out and removal of a section of the metallic pipe. (Figure 41)
8. Cut off the service either at the main or in the garden in accordance with Section B-14.
   Note: The location will depend on the technique being used to live or dead insert the service back to the main. At least 600 mm section will need to be removed for 40mm Serviflex insertion.
9. Inspect the exposed pipework for signs of corrosion such as holes and pitting of the pipe and for any fittings that may prevent insertion.
10. Confirm that the pipe diameter is suitable for the Serviflex pipe (1", 1¼" or 2" nominal bore steel).
11. Fit purging hose and purge the service to 0% gas.
12. Remove ECV.
13. The pipework should be separated at the riser location.
14. Check the thread condition on the riser pipe and de-bur steel pipe in the house.
15. The riser pipe should be identified as being in a 'serviceable condition'. They may be a requirement to cut the riser pipe and rethread the pipe end to the relevant sized BSP thread.
16. Fit union with long sweep elbow and launch tube at the service entry end (Figure 42 - Spring attached to stopper/wire brush).
17. De-burr steel pipe in the garden.
18. Screw the proving probe onto the sprung cable.
19. Apply Silicon grease to the fins of the proving probe.
    Note: The silicon grease helps he probe to negotiate the bends.
20. Insert the probe into the service pipe inside the property at the meter end.

21. Push the probe through the service pipe until it emerges out of the service pipe in the outside excavation.
    Note: the probe can be pushed either way through the pipe work.
22. There will be some resistance at each bend, so a 'back and forth' action is required to persuade the probe around each bend.
23. This process informs the operator: -
    a) The numbers of bends along the route and some idea of their location
    b) Whether the route is clear.
    c) Whether the pipe installation should be attempted.

    Note: The general rule of thumb is that the pipe will pass around 2 'knuckle' type bends.
24. Unwrap the length of towing cable.
25. Connect the towing cable to the proving probe in the outside excavation using a small tie wrap.
26. Place a mark or some tape on the sprung cable that is visible above the riser pipe in the property.
    Note: This is to enable the total length of installation to be calculated later.
27. Draw the sprung cable (with the wire cable attached to the proving probe) back through the Service pipe until the wire cable arrives at the inside meter position.
28. Pull 1 metre of excess cable through into the property and then cut the tie wrap to disconnect from the sprung cable/ proving probe.
29. One end of the towing cable will be in the outside excavation and the other end of the towing cable inside the property.
    Note: If unable to probe service, fit elbow wire brush to the end of the spring and clean the service see Figure 42 - Spring attached to stopper/wire brush.

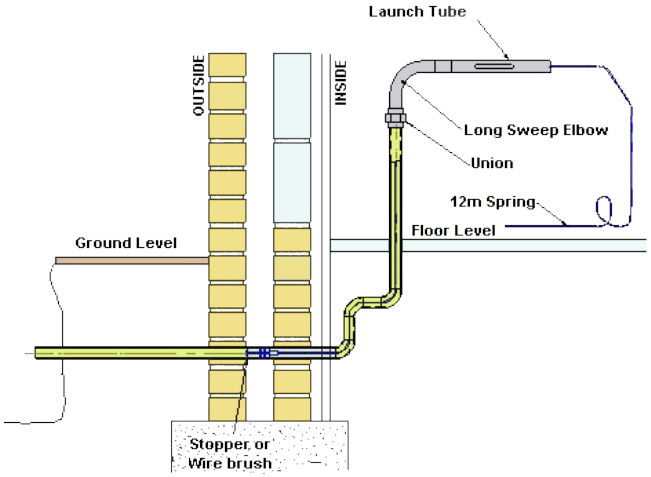


Figure 42 - Spring attached to stopper/wire brush

The Serviflex installation process uses a push and guide technique to guide the pipe through the Service pipe. The riser pipe is fitted with a winch mechanism to guide the pipe from inside the property.
As part of the risk assessment, the winch unit is operated using a torque wrench set at 12Nm which restricts the load on the pipe and prevents over stretching.
If the riser pipe is close to the boundary wall (can restrict winch operation) a 90° bend can be fitted which directs the pipe work away from wall allowing the winch unit to be operated in free space.
Both the 90° metallic bend and the Winch unit are connected with simple screwed union connections.

20.4 Fitting the 90° metallic pipe bend

1. Inside the property, thread the towing cable through the 90° metallic pipe bend and the secure the bend on the riser pipe.
2. Thread the towing cable through the winch mechanism and then secure the winch unit on the riser pipe or on the end of the 90° metallic pipe bend.
3. The sprung cable should be measured from the end of the proving probe to the marked point (tape).
4. The operator should then add 1metre to that measured distance.
5. This distance is then measured back from the Anchor fitting and the pipe is cut to length.

   Example: Sprung Cable installed distance = 6metres + 1metre added
   Total length of Serviflex required = 7metres.
   7m is measured back from Anchor fitting and the pipe is cut at that point.

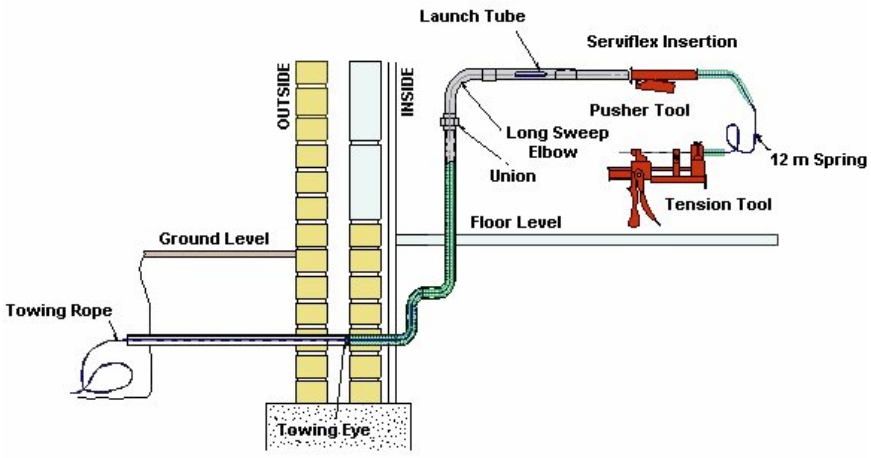


Figure 43 - Insertion of Serviflex pipe

20.5 Cutting the Serviflex pipe - Procedure

1. Take the Pipe section out of the Serviflex installation kit.
2. Remove the tape and open out the pipe coil while ensuring it is not damaged.
3. Measure out the distance of pipe required from the anchor fitting and mark the pipe with the amount required.

   Note: Always double check the measurements before cutting the pipe. Allow extra pipe if unsure of your measurements.
4. Cut the pipe at the marked measured distance see Figure 44.

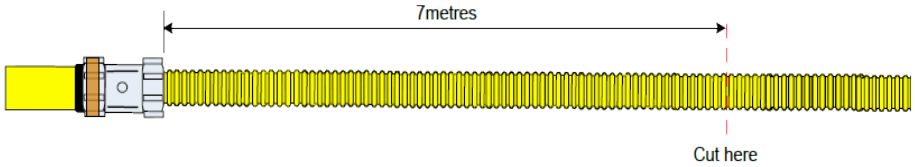
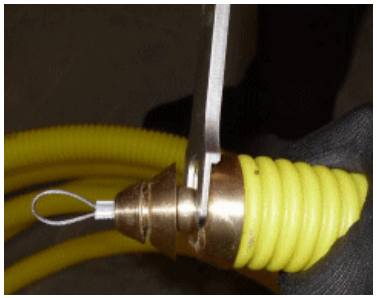


Figure 44 - Measuring the cut

20.6 Fitting the flexible towing head

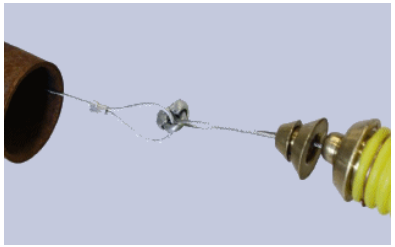
Note: The Flexible towing head consists of a sectional 3-cone head, to guide the pipe around the Service pipe and an expanding gripper section, which is inserted inside the pipe and expanded by rotating the bottom cone section.

1. Take the flexible towing head from the installation toolbox.
2. Insert the flexible towing head into the pipe up to the shoulder of the towing head.
3. Squeeze the Serviflex pipe onto the inserted section of the towing head and rotate the bottom cone section to hand-tighten.



4. Tighten further by locating the tightening tool in the bottom cone section and rotating until the pipe is suitably gripped.
5. Wrap a wire tie around the pipe (over the expanding section of the towing head) until the two loops line up on one side.
6. Locate the tensioner hook through the loops, then pull back on the tensioner to secure the wire tie.

7. Press the wire tail into the pipe convolutions so it does not hinder pipe installation.
8. Liberally apply silicone grease around the Flexible towing head and pipe.
9. Pass the u bolt section through both wire loops of the towing cable and the flexible towing head.
10. Pass the U section though the cross unit and then secure by tightening the two nuts hand tight on the end of each loop.



20.7 Serviflex pipe installation

1. Establish a method of communication inside and outside the property, possibly involving a third party, dependent on the specific location and distance apart.
   Note: This is to enable the operations inside and outside are carried out simultaneously, during pipe installation.
2. At the Outside location, position the Serviflex pipe to be inserted in the outside excavation.
3. Align the flexible towing head and pipe at the entry point to the service.
4. Inside the property, disengage the winch gear.
5. Outside: Push the Serviflex into the service pipe
6. Inside: While the pipe is being pushed into the service, take up any ‘slack’ in the towing cable, by pulling the cable through the winch unit.
   Note: Keep up a constant flow of communication so the operators work in unison and the pushed pipe is guided inside the property.
7. When the pipe reaches a bend in the service the winch unit should be engaged and operated using a calibrated torque wrench.
   Note: The torque wrench is set at 12Nm to prevent the pipe being over stressed in tension.
   At no time, should more that 12Nm load be applied to the Serviflex pipe in a direct pull.
   The torque wrench is used to aid the pushing process until the Serviflex pipe reaches the winch unit.
8. Inside: When required, engage the winch and operate using the ½” drive torque wrench in a clockwise direction to help guide the pipe through the service.
9. Continue to operate the winch using the torque wrench until the flexible towing head at the front of the pipe, arrives at the winch unit.
10. Stop the winch operation.
11. Outside: Cease the pushing the pipe.
12. Inside: Release any tension on the pipe by operating the winch in reverse for a quarter turn.
13. Disengage the gear arm on the winch.
    Note: When the Serviflex pipe reaches the winch unit the operator stops the winching operation and advises the operator in the outside location to stop pushing.
14. The winch unit and the 90° bend (if used) can now be disconnected.
15. Separate the towing cable connection
16. Unscrew the union connection on the 90° bend or winch connection.
17. Pull the bend and winch connection over the installed pipe.
18. Disconnect the wire towing cable from the flexible towing head.
19. The towing wire should be separated from the winch unit and safely stored.

20. The leading end of the Serviflex pipe installed must be examined for damage, scoring or tearing of the pipe.

    Note: Damage that appears directly behind the flexible towing head can be ignored, but any damage that continues along the length of the exposed pipe indicates a problem that could be apparent along the whole installed length.

    The installation must then be considered suspect, and the following **actions taken: -**

    a) **The Engineer or competent person should seal the ends of the Service pipe and commence with the contingency plan.**

    b) **The damaged pipe should be removed so the cause of the problem can be investigated.**

    c) **If the blockage or cause is identified a further Serviflex installation may be attempted following agreement with the competent person and in accordance with any risk assessment completed.**

21. If the pipe is found to be not sufficiently damaged continue to next step.
22. Push/pull the pipe through until the anchor fitting can be located on the service pipe in the outside position.
23. The grip ring attachment is separated from the anchor fitting and slid over on the service pipe.
24. Push the anchor fitting and PE pipe section forward until the PE reducer section meets the service pipe, then back it off 5mm.
25. The grip ring is re connected to the main Anchor fitting body, hold the anchor fitting body (to prevent rotation) and rotate the end section until hand tight.
26. Ensure the anchor fitting 'tapped hole' is uppermost.
27. Grip the anchor fitting body (Stillsons) to prevent rotation.
28. Further rotate the grip ring 1½ turns to secure the anchor fitting.

    Note: A laminated guidance on fitting the anchor fitting is provided with the fittings.

20.8 Fitting the Service head adapter (SHA)

1. Clean the threads on the service pipe and apply thread sealant.
2. Take the SHA and unscrew the top section and remove from the bottom section.
3. From the bottom section, remove the white anti rotation washer and the profiled black seal.
4. The main body of the SHA is then passed over the Serviflex pipe and screwed onto the service pipe.
5. It is secured using a wrench and Stillsons to hold the service pipe.
6. The port holes must be accessible on the SHA when it is fully tightened onto the Service pipe.
7. Place the profiled black seal and then the white anti–rotational washer over the Serviflex pipe and relocate in the SHA.
8. Cut the Serviflex pipe 1 convolution above the bottom section of the SHA using a hacksaw.
9. Clean the pipe end and then push the pipe insert into the end of the pipe, up to the shoulder.
10. The top section of the SHA can now be fitted.

11. Thread paste should be applied to the male end of the SHA containing the fire washer.
12. While ensuring the fire, washer remains in place and that the ‘o’ ring remains intact, screw the top section of the SHA onto the main body.

13. Screw the top section of the SHA into the main body until hand tight.
14. Use one of the 75mm wrenches to hold the main body of the SHA and rotate the top section with the 2nd 75mm wrench until the top section is tightened against the bottom section of the SHA.
15. The Fire washer should be visible between the two SHA sections when tightening is complete.
16. It is most important the fire washer is not destroyed in the tightening sequence.
17. Fit the insulation joint.
18. Fit garden fitting as per manufacturer’s instructions with injection port uppermost.
19. Fit the ECV.
20. Rod the service to check for no constrictions.

20.9 Testing

1. Now test the service in accordance with Sections F1 and Section F2
2. If the pressure test proves unsuccessful then make an investigation to find the possible cause of the failure.
3. If required, the contingency plan agreed prior to the work starting must be initiated.

20.10 Grouting the service annulus

Only use the correct approved grout for this operation

Following a successful pressure test the annulus between the installed pipe and the service should be filled with an approved annulus sealant. The Annulus sealant should be injected from the outside position and will be purged through an open port on the SHA when the annulus is filled.

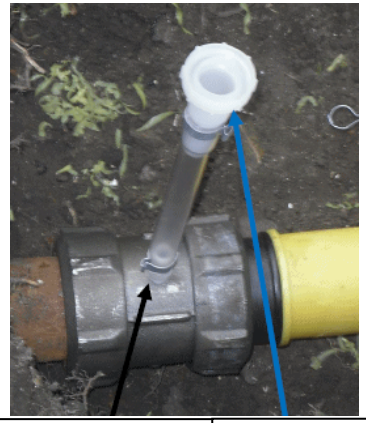
1. Follow the manufacturer’s instructions for use of the annulus sealant which should be provided with the sealant.

   As guidance for the required volume of annulus sealant required for 40mm Serviflex, when Fullseal is used: - 1.25 litres Fullseal = 1 metre of pipe

   For example, for a 7-metre-long 2” service installation; 7m x 1.25litres = Total 8.75 litres of Fullseal.

   Both Fullseal and annerseal can be used.
2. Where mixing of the grout is required follow the manufacturer’s instructions.
3. Remove the port plug on the outside anchor fitting.
4. Remove 1 port plug on the Service head adapter.
5. Screw in a port plug into the 2nd port on the SHA and tighten using an 8mm spanner.
6. Ensure the port on the Anchor fitting is not restricted before screwing in the ‘Short hose tail’ injection nipple.

7. Slide the clear hose onto the injection nipple and secure the connection using the 'O' clip.



Injection nipple with 'o'clip connection to hose.	Female threaded end for cartridge connection

8. Screw the injection nozzle assembly into the female threaded end of the cartridge see Figure 46 - Sealing of annulus with grout.
9. Load the cartridge into the applicator gun.
10. Close the applicator gun.
11. Push down the plunger rod on to the top of the piston.
    Note: Do not apply pressure to the piston.
12. Inject the thixotropic sealant at a steady rate to ensure all the material is injected into the annular space.
13. When changing the cartridge, press down on the tab on the applicator gun to release the injection pressure.
14. Gently squeeze the applicator trigger to ensure the pressure is released.
15. Open the applicator gun to release the cartridge.
16. The cartridge can now be unscrewed from the female end on the hose connection.
17. The new cartridge can now be screwed into the female hose connection and the process re started as in point 8 and 9.
18. Continue to inject the annular sealant until it is evident at the SHA.
19. Fit the remaining port plug on the SHA using the 8mm spanner.
20. When changing the cartridge, press down on the tab on the applicator gun to release the injection pressure.
21. Unscrew the cartridge from the female end of the hose connector.
22. Remove the cartridge from the applicator gun and re fit the red plug to the cartridge.
23. Disconnect the hose tail injection nipple from anchor fitting.
24. Fit the port plug on the anchor fitting using the 8mm spanner.
25. Clean up any spillage and empty sealant cartridges and dispose of as household waste.
    Note: Any unused sealant can be saved to be reused if the part used cartridge is correctly sealed at each end.
26. Commissioning the service following the requirements in Section F3.
27. Dispose of all waste materials in line with current environment procedure.
28. Complete appropriate documentation to record full service details.

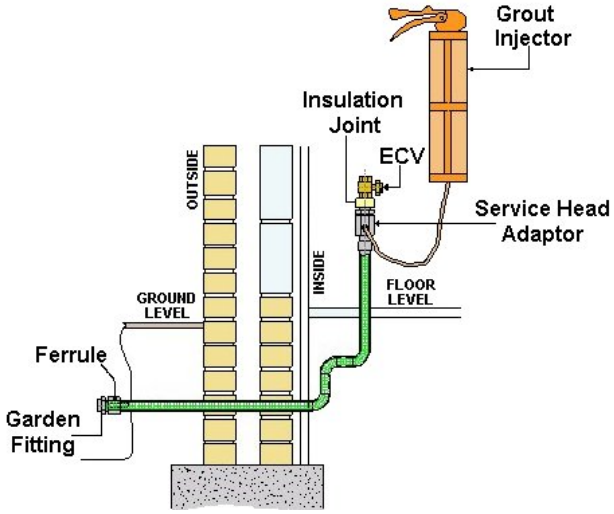


Figure 45 - Serviflex part lists

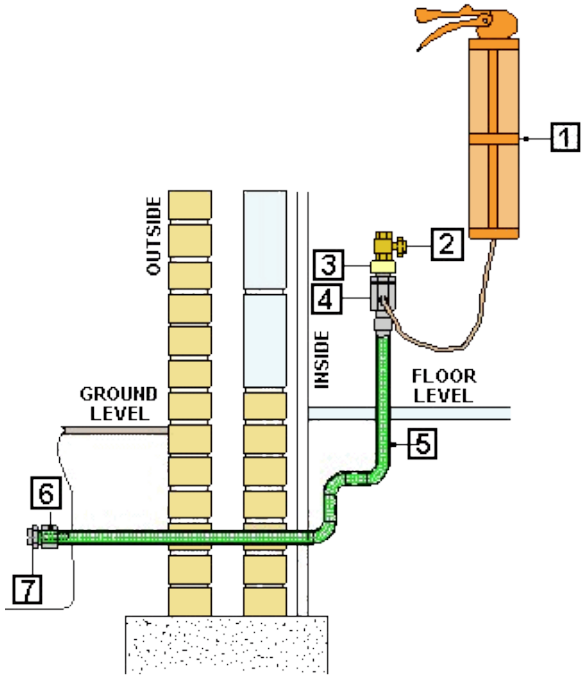


Figure 46 - Sealing of annulus with grout

	Description
1	Applicator Gun for Dispensing Foam
2	Emergency Control Valve
3	Insulation Joint
4	Serviflex Pipe Service Head Adaptor,
5	Black Serviflex Pipe 20mm, (Corrugated P.E. 65 x 50 metre Coil)
6	Garden side of Transition fitting
7	Transition Fitting 20mm x 20mm Serviflex

Table 22 - Serviflex pipe and fittings

21 LIVE INSERTION GARDEN TO MAIN

21.1 General Requirements

1. This method can be used for single or bulk service replacement in conjunction with mains renewal projects.
   Note: If you use this method then you must make a bar hole leakage survey on the line of the service from the main to the house entry position for gas readings. The survey must be carried out both before and after completion of the renewal.
   If gas readings are still present after completion of the insertion, then further investigation will be required, in accordance with emergency procedures.
2. If gas readings are found, the Operational Control Centre (OCC) must be informed.
   Note: This is to ensure that the escape is captured as a Public Reported Gas Escape and is recorded as a leak statistic.
3. Identify the service connection position on the main.
4. If Gas readings are identified on the service connection to the main must be cut off at the main and a survey undertaken to confirm no further readings. The service must now be renewed by dead insertion.
   Note: Only trained and competent personnel must undertake the barhole survey.
5. All exposed service pipes must be visually checked for corrosion. Pipes with holes or pitting must not be live inserted.
6. If carrying out Live Service Insertion, it must only be undertaken on domestic properties from a location a minimum of 2m outside of the building back to the main.
7. The existing service pipe must be 2” diameter or below and operating at low pressure (75mb or below).
8. Maximum size of PE pipe for live insertion is 32mm. Reference Table 23 - Maximum insertion diameters and foam travel for manufacturers' recommendations for foam travel and inserted pipe.
9. The maximum total length of the service should not exceed 20m,
   Note: This is the length of the push out rod; this allows a combination of both live and dead insertion to be undertaken.
10. Maximum pressure loss for the proposed total length of service pipe must be determined in accordance with Table 8.
11. If the overall length is greater than 20m the PE inserted must be squeezed off after the knock out rod has been used to allow reassembly of the service pipe.
12. You must accurately trace the line of the service from the main to meter. If you identify any elbows and changes in direction these must be investigated to ensure their suitability for insertion.

KIT COMBINATIONS FOR LENGTH & SIZE OF INSERTION*				
Sachet size ml	Length of foam travel in metres			
	20mm in 1” use one kit only	20/25mm in 1¼”	25/32mm in 1½”	32/40mm in 2”
200	1.0 – 2.0	1.0 – 1.5	1.0 – 1.5	up to 0.5
400	2.1 – 4.0	1.6 – 3.0	1.6 – 2.5	0.6 – 1.5
600	4.1 – 5.5	3.1 – 4.0	2.6 – 3.5	
800	5.6 – 7.0	4.1 – 5.0	3.6 – 4.5	1.6 – 3.0
1200	7.1 – 10.0	5.1 – 6.5	4.6 – 6.0	3.1 – 4.5
1200 + 400	do not use more than 10m	6.6 – 8.5	6.1 – 7.0	4.6 – 5.5
1200 + 600	n/a		7.1 – 8.0	5.6 – 6.5
1200 + 800	n/a	8.6 – 12.0	8.1 – 10.0	6.6 – 7.0
1200 + 1200	n/a	12.1 – 14.0		7.1 – 8.5
1200 + 1200 + 800	n/a			8.6 – 10.0

Table 23 - Maximum insertion diameters and foam travel

***Note: Always check the manufacturers instructions for foam travel.**

21.2 Preparation

1. Gauge the existing service pipe prior to commencement of the work using a semi-flexible rod or service camera, to confirm that live service insertion is possible.
2. Identify the location of all valves, syphons or branch connections along the line of the existing service route.

3. Where appropriate these fittings must be removed prior to commencing the operation.
4. The live insertion should be undertaken from this point.
5. Ensure approved compatible nose cone, mini end seal; sealant, sealant injection gun and sufficient PE pipe are available on site.

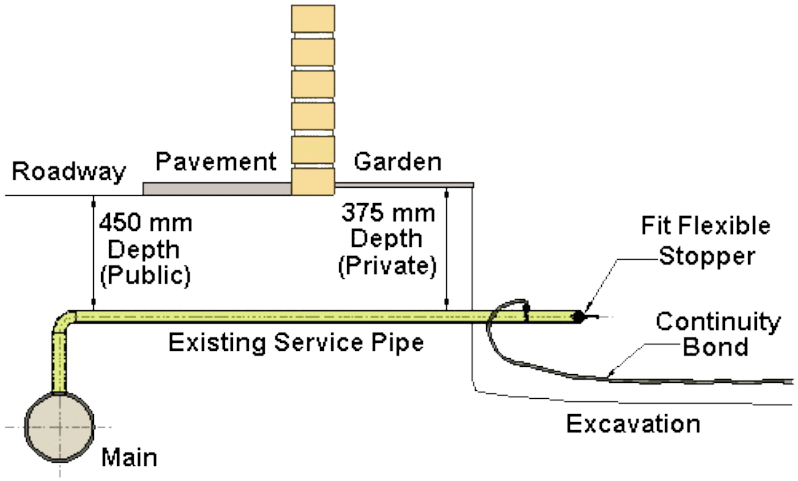


Figure 47 - Live service insertion, cut off service

21.3 Installation

1. Carry out excavation at point of service disconnection/insertion.
   Note: If the service is found to be less than the minimum depth (see Table 4) then you must not use the live insertion technique and the service must be re-laid by an alternative method.
2. Close the ECV and arrange for disconnection of the meter.
3. Prepare valve gland assembly to accommodate flexible stopper.
4. Cut out section of live gas service pipe in accordance with Section B14.
5. Temporarily seal live service pipe with flexible stopper (Figure 47 - Live service insertion, cut off service).
6. Install valved gland assembly over the flexible stopper rod, taking care not to disturb the stopper, and secure to the steel service pipe.
7. Withdraw the flexible stopper into the valve gland assembly and close valve and remove flexible stopper.
8. Insert semi-rigid flexible rod complete with correctly sized elbow tester fitted into valve gland assembly as far as the closed valve, ensuring the first 150 mm of pipe is as straight as practicable. Mark with tape as an indicator on withdrawal.
9. Install pressure gauge, open gland assembly valve and check district mains pressure (refer to Figure 49 - Insertion of PE).
10. Insert flexible rod as far as possible along the service. This will indicate length of service to be inserted.
11. Mark indicated service length on flexible rod with tape and withdraw through valve (Figure 48 - Checking proposed length of LSI and cleaning steel service).
12. Close gland assembly valve.
13. Confirm that the marked length is comparable to the indicated mains position identified earlier (item 11 above).
    Note: Carry out further investigations if indicated length is considered inaccurate.
14. Measure and mark PE service pipe against the marked flexible rod length.
    Note: Record this measurement so that later you can make the correct selection of the amount of sealant later (refer to Table 18).
15. Add 1m of pipe to allow for the pushing machine and fittings, cut and temporarily seal to avoid contamination.
16. Fit the pipe cleaning wire brush to the end of the semi-rigid flexible rod and fit into valve gland assembly. (Figure 49)
17. Open valve and push the wire brush into the service pipe and continue pushing until the entire length of the service has been cleaned as indicated by the mark on the flexible rod.
18. Withdraw the wire brush into valve gland assembly.

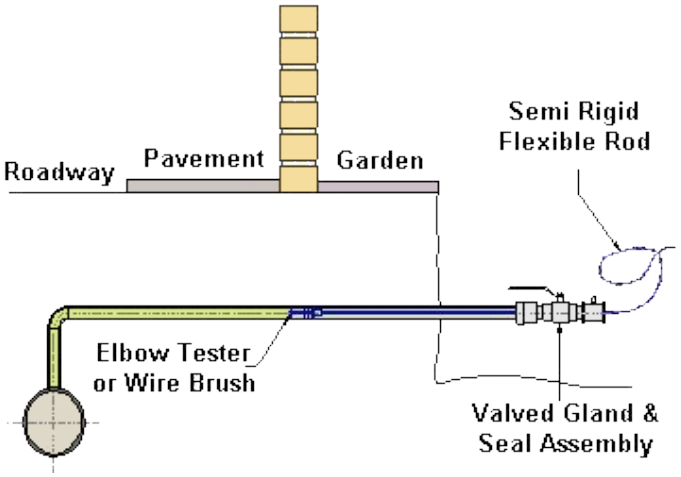


Figure 48 - Checking proposed length of LSI and cleaning steel service

19. Re-check mains pressure to ensure no blockage has occurred during the pipe cleaning process.
20. Close valve, remove flexible rod sealing fittings from the valve gland assembly.
21. Feed PE pipe through pushing machine and fit appropriate gland to the pipe pushing machine.
22. Fit nose cone following manufacturer's instructions.
23. Fit nose cone following manufacturer's instructions.
24. Carry out 100 mbar integrity test for 5 minutes (no drop allowed) on PE pipe.
25. Pull PE pipe and nose cone back into the pushing machine.
26. Connect the pipe-pushing machine to the valve gland assembly.

    Note: The use of a swept bend may be appropriate for ease of application. If bend is used it must be installed during the procedure at step 12.
27. Install pressure gauge and connect purge hose to the vent on the valve gland assembly (refer to Figure 49).

    Note: Purge hose must be positioned at least 2.5 m above the excavation and downwind.
28. Slowly open gland assembly valve and record district mains pressure.
29. Using pipe-pushing machine, insert PE pipe for approx. 300 mm.
30. Fully open the vent on the valve gland assembly and purge the 300 mm of annulus to zero pressure. Leave vent open.
31. Slowly continue inserting PE pipe into the carrier pipe using the pipe-pushing machine, observing the pressure gauge continuously.

    Note: A build-up of pressure may be observed prior to the PE pipe reaching the main due to several possible circumstances e.g. entering a syphon, flexible coupling, tee, change of diameter in existing service pipe.

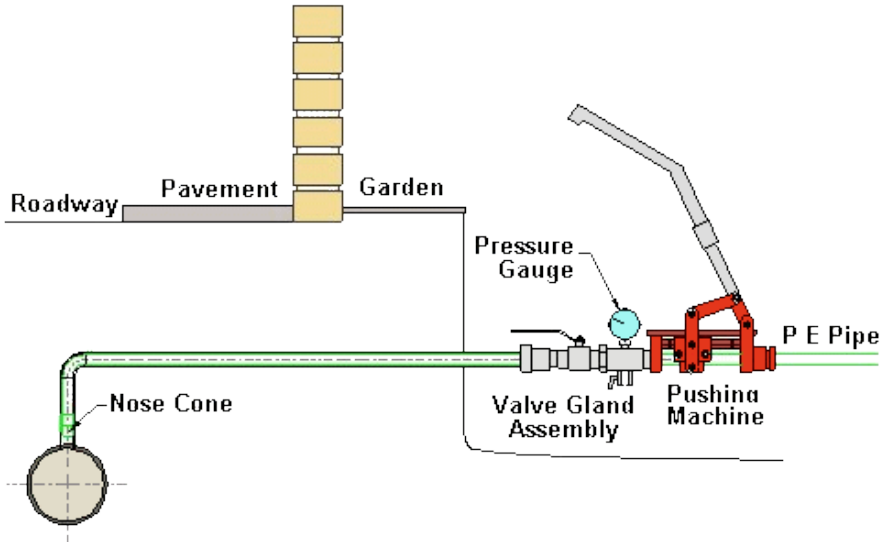


Figure 49 - Insertion of PE

32. Push the PE pipe through the carrier pipe to the service tee or bend in the main.
    Note: When the nose cone enters the service tee or main, the gauge pressure should rise to full mains pressure.
33. Check that the tape mark on the PE pipe is close to the entry point on the carrier pipe.
    Note: It is expected that the marked position of the PE will be within 150-300mm of the entry point.
34. Reverse the pushing machine and slowly retract the PE pipe by 50mm/2" steps into the carrier pipe.
35. Shut the purge valve and check the pressure gauge for effectiveness of the seal.
36. Check for a good seal from the nose cone by checking the pressure gauge remains at zero.
37. Ensure pressure does not rise back to full line pressure within 5 seconds. (Figure 49).
    Note: The operation of pulling the nose cone back into the PE pipe reverses the fins and is intended to create an effective seal against the mains pressure but minor let-by may occur.
38. Pull pipe back by a further 50mm/2" to lock nose cone into final position.
39. Re- check for good seal from the nose cone by ensuring the pressure gauge does rise back to line pressure.
40. Ensure no build-up of pressure.
41. If the gauge does not rise to district pressure within 5 seconds, there is an acceptable seal between the nose cone and carrier pipe.
42. If the gauge reaches district pressure with 5 seconds, a good seal has not been achieved. In this case pull back the PE pipe by a further 50mm/2" into the carrier pipe and recheck the seal as before.
43. If a good seal is still not achieved, push pipe forward into the main and repeat steps 38 - 42.
    If a good seal is still not achieved, then remove and replace nose cone and repeat procedures again.
44. If a good seal is still not achieved the operation stop the operation and continue using the dead insertion technique by excavating at the main and removing the top tee fitting.
45. Once an acceptable seal has been formed close the vent and remove pressure gauge.
46. Remove pipe pushing machine and valve gland assembly.
47. Ensure PE pipe and nosecone are not disturbed.
48. Fit appropriate mini end-seal to the carrier pipe and the inserted PE pipe, following manufacturer's instructions.
49. Undertake 100mbar soundness test for 5 minutes on the inserted pipe. No pressure drop allowed.
50. Fill annulus between PE pipe and carrier pipe in accordance with manufacturer's instructions. (Figure 50).
    Note: The sealant is temperature sensitive and must not be stored or used below -5°C or above 30°C. Follow usage guide on sealants kits.

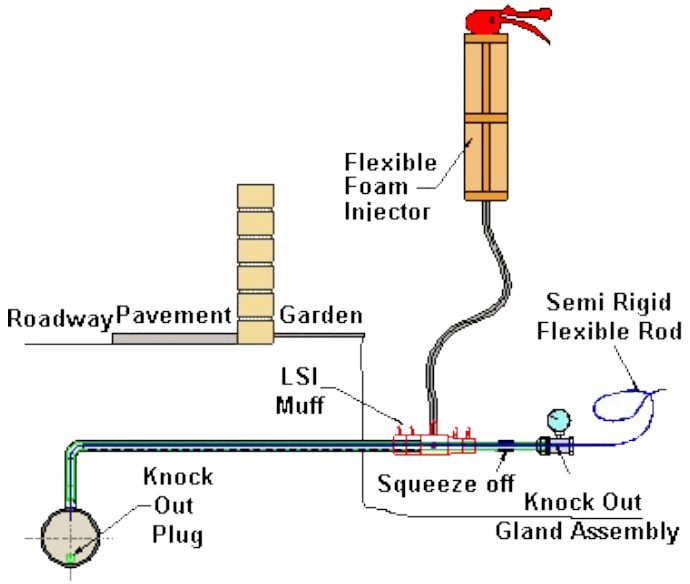


Figure 50 - Foam off inserted service

No	Item
1	Flexible Foam Injector
2	Semi Rigid Flexible Rod
3	Knock out Gland assembly
4	LSI Muff
5	PE Pipe

Table 24 - Foam Injector parts list

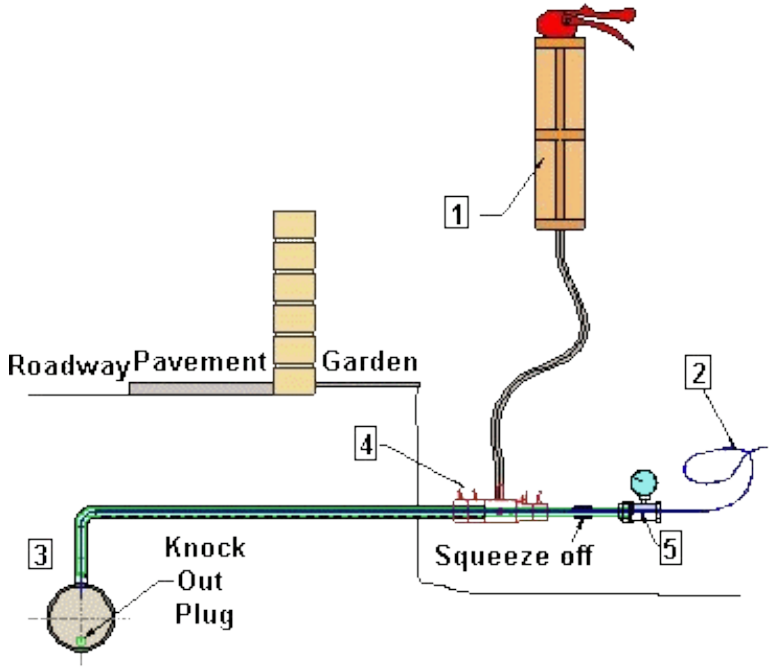


Figure 51 - Inserted service parts list

21.4 Service completion

1. You now need to complete the rest of the service relay to the property by the most appropriate method e.g. dead insertion, Serviflex, moling, open cut techniques (see Sections C etc.)
2. Connect to the live inserted section using an approved fitting.
3. Test the complete service as per Section F.

   Note: If there is any doubt about the ability of the flexible knock-out rod to negotiate: -

   - ***The section of PE pipe not live inserted e.g. due to elbows or excessive bends in the section particularly where Serviflex, or***
   - ***Where the total length of service from the main to meter is greater than 20m.***

   Then the live inserted section should be squeezed off and commissioned independently of the other section as detailed in Service Commissioning 21.5-part service below). Otherwise complete commissioning in accordance with 21.6.

21.5 Service commissioning (Part Service)

1. Install a PE knockout gland over the end of the PE pipe.
2. Insert the flexible knockout rod to the nose cone.
3. Fit pressure gauge and push out the plug in the nose cone with the flexible rod, checking Network pressure.
4. Carefully withdraw the rod into the PE gland and squeeze-off the exposed section of PE pipe.
5. After testing the newly re-laid dead section back to the meter the knockout gland can then be removed and the 2 separate sections of PE pipe joined by an approved fitting.
6. The squeeze-off can then be removed and the service purged and commissioned as per Section F3.
7. The final joint will require testing for soundness with leak detection fluid.

21.6 Service Commissioning (Full length - Main to Meter)

1. Install gland assembly, with pressure gauge, onto the Emergency Control Valve (ECV).
2. Open the ECV and insert flexible rod into PE pipe to knock out nose cone plug.
3. Push the flexible rod forward/backwards a few times to ensure a clear gas path is achieved.
4. The pressure gauge should show district mains pressure.
5. Withdraw flexible rod and close the ECV.
6. Remove gland assembly from the ECV and purge and commission the service in accordance with Section F3.

21.7 Work Completion

1. Carry out final bar hole leakage survey from the insertion point to the meter position to ensure there are no readings.
2. Bag and dispose of all waste materials in line with current environmental procedures.
3. Enter all service details on the Service label.
4. Complete appropriate documentation/ and computer systems.

22 IMPACT MOLING

22.1 Safety

Impact Moling is the preferred method for laying services where utilisation of an existing pipe cannot be undertaken. The success of this activity depends on the composition of the soil, and the preparation and application of equipment.

This technique is hazardous and every attempt must be taken to stay out of the excavation during the launch operations. It is essential that a launching cradle is used.

22.2 Site Survey

Complete a site survey see Section A1.

22.3 Site Preparation

1. Refer to Pre-requisites and make sure that all tools and equipment to complete this task are available on site.
2. PPE must be worn appropriate to the task being undertaken.
3. All excavations must be completed following guidance in Section A1.
4. Additionally, when undertaking impact moling operations electrically insulated PPE must also be worn (typically insulating gloves and boots of with a rating of 20kV) when in contact with the equipment.

   Electrical insulating PPE must only be used by personnel that have received correct training, instruction and briefing on its correct use, storage, maintenance and cleaning requirements.

   DO NOT USE THE ELECTRICALLY INSULATED WELLINGTON BOOT FOR EXCAVATING.
5. Excessive contact with the lubricant must be avoided and PVC or disposable gloves and goggles must always be worn when undertaking maintenance checks or filling the lubricator with the oil.

   Note: Detailed working and safety instructions for use of types of equipment must be obtained from the manufacturer and used.
6. An approved gauze facemask (FFP3) must be worn when working within 1m of the exhaust from the impact mole.
7. Complete pre-moling check sheet as shown in Table 25.
8. Where the safe passage of the impact mole beneath any cable is in doubt then:
   a) Excavate launch and receive holes either side of the cable and
   b) Lay the pipe under the cable by open cut techniques.

   or

   c) Use an alternative means to lay the pipe.
9. If traces of plant are found, or if the location is too congested for the use of the launch cradle, consider:
   a) Launching from a different location.
   b) Use an alternative means to lay the pipe.
   c) Longer bores may require a slit trench, which is later, expanded into a reception pit when the exit point of the impact mole is known.
   d) At all times make sure the reception pit is in full view of the launch pit
10. Review the pre-moling checklist (Table 25).

22.4 Equipment selection

The performance of the equipment to be used can be affected by certain ground conditions. Table 12 recommends ancillary equipment that will aid the travel of the equipment in various soil types.

1. PE pipe can be used as an air supply hose provided a water-based lubricant is used. Check with the manufacturer's instructions.
2. Select the correct type of equipment that will suit the PE pipe to be inserted due to an average of 10% bore shrinkage that will occur with each size of impact mole, Table 26 sets out minimum requirements).

   Note: Always use the maximum size PE pipe when moling- Minimum bore is typically 90% of the mole size.

Pre-Moling Checklist		Safe to Continue YES/NO
1	Have you undertaken a site-specific risk assessment?	
2	Have you studied and understood the Utility drawings provided?	
3	Have you checked for visual indications of buried services?	
4	Have you traced the entire area to be moled, using the CAT & Genny on Power, Radio and Genny Modes?	
5	Have you used the plug connector to trace the electricity service from the property to the main?	
6	Have you used the street light clamp to trace the street lighting cable?	
7	Have you excavated on and exposed all buried utilities on site including electric, gas street lighting, cable TV, BT, water, or any other known street furniture, and others?	
8	Have you excavated and exposed the entire route in the footpath that will be affected by the route of the mole?	
9	Have you identified a safe moling route leaving at least 300mm clearance from parallel electric cables and 250mm clearance from other parallel services?	
10	Have you identified in which direction to bore, such as towards the lowest risk area?	
11	Do you have all appropriate correct and tested (where applicable) PPE and are you wearing it?	
12	Have you accurately marked the distance to be bored on the nonconductive hose?	

Table 25 - Pre-moling check list

Soil Condition	Recommended Equipment	Recommended method of Inserting pipe.
Clay Ground	Slip on sleeve, and oversized cone.	No preference
Compacted – sand, sandstone, chalk	Smooth cone to eliminate friction and lateral movement	No preference
Loose Shingle, sand, loose ground	Pulls the pipe in behind it at the same time as the boring takes place to stop bore collapse. Install a duct or sleeve in behind the impact mole at the same time as the boring takes place to stop the bore collapse	Towing attachment Rear fitting duct towing attachment

Table 26 - Equipment selection for different conditions

PE pipe to be inserted (mm)	Min Bore diameter (mm) [1]	Standard impact mole size (mm)
20,25,32	45	45
40	52	55
55	61	65
63	70	75

Table 27 - Equipment size range

Note: An average of 10% bore shrinkage will occur with each size of impact mole.

22.5 **Procedure – Positioning the launch cradle**

1. Inspect the moling equipment before use.
2. You must always use a non-electrical conductive hose.
3. Identify the launch excavation so that you launch the impact mole from cables and never towards them.

   Note: Whenever possible, launch the impact mole from the most congested side of the road to minimize the risk of damage to underground plant. Avoid impact moling towards cables.

   Boring towards other utility plant should always be avoided, unless a site survey is carried out first to establish their location and depth.
4. Recheck the base and sides of the launch excavation for cables and other plant.
5. The launching cradle should be used in all circumstances; the launching pit needs to be large to accommodate the cradle.

   In exceptional situations where you cannot use the launching cradle, you must seek approval from your Operational Manager if the launching cradle is not used, and reasons noted on your risk assessment.

   a. **The reasons for not using the launching cradle**
   b. **The approving operational manger**
   c. **The additional site safety requirements.**
6. Position the cradle in the launch excavation approximately 150mm (6") from the front face of the pit or horizontal supports.
7. Secure the cradle in position using the securing pins.

   See Table 28 and Figure 52 - **Example of launch cradle and fixing anchors**.
8. The length of the impact mole operation needs to be considered for each section.
9. Make sure where possible there is a clear line of sight.

	Item	
	Figure 52	Figure 53
A	Friction roller	Friction roller
B	Vertical height Adjustor	Vertical height Adjustor
C	Horizontal adjustor	Horizontal adjustor
D	Securing pins	Horizontal supports
E	Cradle	Cradle

Table 28 - Launch Cradle parts list

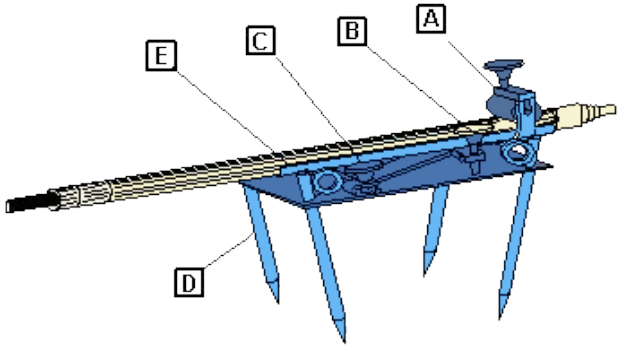


Figure 52 - Example of launch cradle and fixing anchors

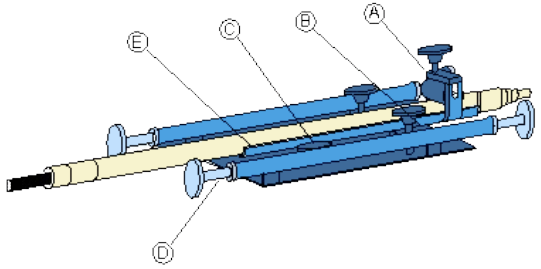


Figure 53 - Example of launch cradle with horizontal supports

22.6 **Assembly of the equipment**

1. Attach the non-conductive airline to a suitable compressor.
2. Air delivery pressure from the compressor should be a maximum of 6-7 bar (85 - 100 psig).
3. Holding the airline and directing the end away from people or property switch on the compressor in a controlled manner to remove any residual dust or moisture by blowing the line.
4. Make sure that a water separator is fitted prior to the attachment to the lubricator.

   Note: All hose connections should be supported with whip checks.
5. Use that the correct lubricant in the lubricator as per manufacturer's instructions.
6. Attach the air hose to the oil bath noting the direction of operation.

   Note: Failure to operate the impact mole through a lubricator will cause machine wear and damage.
   In extreme circumstances, the air will cause freezing and prevent operation.
   This will usually happen after a period of operation.
   Do not pour any non-recommended lubricant, such as diesel, petrol, antifreeze, oil down the air hose as this will cause seals to be damaged, reduced performance and in extreme circumstances the tool will cease operation and could be irrevocably damaged.
7. On top of the lubricator, are two screws, one with a tee and one with a ring.
8. Opening these will allow access for topping up levels and access to the feed screw.

   Note: Do not attempt to gain access to these locations if the system is under pressure.
9. Using the integral screwdriver adjust the lubricant oil feed screw until it is open ¼ of a turn anticlockwise. Max of ½ turn.

   Note: Max–of 1 - 2 turn for winter operations (refer to manufacturer's instructions).
10. Securely replace the screw caps.
11. Attach the impact mole airline to the oil bottle lubricator and mole respectively.
12. Take the impact mole to the receive pit with the hose following the proposed new installation.
13. At the launch pit end, mark the hose.

    Note: Additional marks may be added to indicate the expected location of other utilities in line of the proposed route.
14. Lift the impact mole so the piston can be heard to slide to the rear of the machine.

    Note: Failure to do so will result in the machine not starting correctly.
15. Return to the launch pit, lay the hose out towards the bore direction beware of creating a tripping hazard.

22.7 **Sighting the impact mole**

1. Check that the impact mole is in the forward position.
2. Place the nose of the impact mole in the cradle and secure it in position using rubber friction one-way feed roller.
3. Position at the desired depth and in the required direction.

   Note: If you are working on an incline direct of the impact mole up hill.
4. A sighting rod must be used to be sure that an accurate launch will take place.
5. Place the sighting rod in the receive pit where the impact mole is expected to appear.
6. Place the rod/staff in the base of receive pit where the want the machine to exit.
7. Measure 1.6m (1.0m) 1.5m (0.9m) if the scope is kept in the closed position) and mark the target stick.

8. This mark is the height of the scope plus 100mm (the 100 mm allows for the height of the cradle from the bottom of the excavation). Refer to Figure 54.
9. Where the launch depth is deeper, adjust the measurements accordingly.
10. This mark is the height of the scope to the centre of the impact mole. Refer to Figure 54.
11. Place the scope on the impact mole a 1/3rd of the mole length from the bore wall.
12. Adjust the position of the impact mole with the adjustable screws on the starting cradle so that the cross hairs in the scope line up with the site target stick.

    Note: The impact mole is ready to be launched.
    The impact mole should be aligned to give the maximum clearance from other underground plant, but not less than 250 mm clearance for bore lengths up to 8 metres.

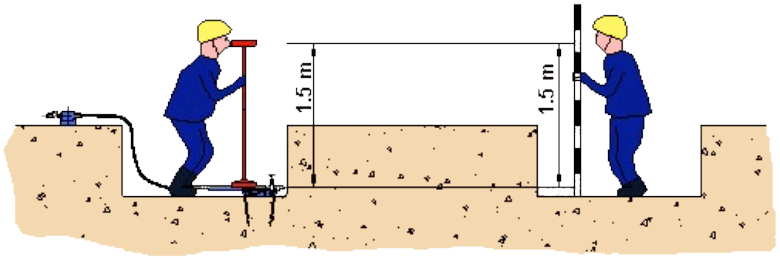


Figure 54 - Sighting the impact mole equipment

22.8 **Use of the impact mole**

1. Stand clear of the excavation when launching (see Figure 55).
   Note: Do not stand directly behind the exhaust of the impact mole at any time.
2. You must not allow the impact mole to be in contact with any plant when it is launched.
   Note: Maintain a minimum distance of 250mm between the gas pipe and other known locations of buried utilities.

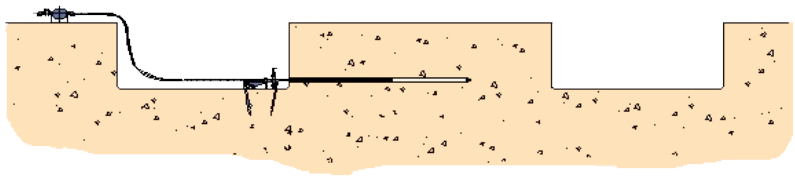


Figure 55 - Launching the impact mole

3. DO NOT make direct contact with the air hose/ impact mole during operations.
   Note: If during the operation, it becomes necessary to be in direct contact with the equipment, additional PPE by way of insulating gloves and boots of a rating no less than 20 kV must be used.
4. Switch on the air, no more than a ¼ turn of the lubricator so that the piston starts reciprocating. This will give a reduced hammer action and allow a controlled entry into the ground.
   Note: Any resistance encountered during the flight of the impact mole (particularly during launching) should be investigated.
5. When the impact mole has entered the ground by approximately 200mm, the air should be turned off and the line of site should be checked to be sure the direction has not changed.
6. This process should be repeated until the mole is ⅔ of its length into the bore, after this the direction of the impact mole cannot be changed and a new launch will be required if the direction is not corrected.
7. Gently increase the air supply, the safest speed for the operation is a maximum of (0.5 metre/minute).
8. Monitor the progress of the impact mole by standing above the line of route (where reasonably practicable and safe) to follow its line and depth, whilst in operation. DO NOT stand in the excavation.
   Note: This should be done in conjunction with marking the air hose, to determine the length of travel; and the vibration would normally indicate the satisfactory depth of cover.

9. When the moling operation is nearing completion, indicated by the marks on the hose, one operator should stand by but not in the receive pit and observe ground movement of the impact mole emerging into the pit.

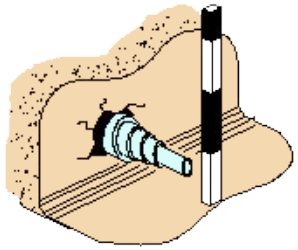


Figure 56 - Impact mole head appearing in receiving pit

10. The operative should signal to the mole operator controlling the operation to reduce the air supply to a gentle hammer action. Do not allow anyone to stand in the reception pit when the impact mole is entering the reception pit Figure 56.
    Note: There is a risk of being struck by the impact mole or, in deeper pits, because of the risk of ground collapsing as the impact mole enters the pit.
    There must be two operatives on-site throughout the moling operation and at no time must an operating impact mole be left unattended.
11. If you suspect that the impact mole is deviating from the line or has met an obstruction, stop the machine and investigate the cause.
12. DO NOT remove the launch cradle until the operation is complete and it is safe to re-enter the excavation

22.9 Impact moling operations across the line of existing gas mains or services

1. Where you need to cross the line of an existing main or service, you must complete trial hole to confirm depth and location.
2. Moling across the line of existing mains or services may be subject to a Permit to Work (PTW) check with your manager. If crossing an Intermediate or High pressure (IP & HP) mains a PTW is mandatory.
3. You must complete a site-specific hazard assessment.
4. Ask your manager to arrange for the line of the extended service and the connection point to be recorded on "as laid" drawings)
5. You must record details on the job record card and added to the appropriate records database.
6. Plans covering the route of the extended service run should be available.
7. Fit suitable warning labels on the service entries adjacent to the meter positions.
8. If you are unable to complete the leakage survey, ask your manager to arrange for a leakage survey to be completed.
9. A survey is required along the building lines of the nearby properties using an approved LEL/% gas volume detection instrument or tested with a PPM gas detection instrument, to ensure no leakage has occurred because of the impact moling operation.

22.10 Moling Operation completion

1. After completion of the impact mole operation make the following checks.
    a) Check the bore of the mole hole with an approved gas detector Impact moling operations across the line of existing gas mains or services for gas readings.
    b) Make a visual check for any signs of damage to other plant such as water seepage from storm or waste water pipes.
2. Impact moles must be regularly maintained and never stored vertically.

22.11 Inserting the PE pipe

1. Depending on the type of ground conditions, check that the pipe is inserted/towed or pushed in accordance with the manufacturer's instructions.
2. Use an approved towing head or nose cone and follow the manufacturer's instructions to make sure that the correct attachment of the PE pipe.
3. Make a visual check of the inserted pipe for evidence of damage.
4. If the damage is found and is greater than 10% of the wall thickness, the damaged pipe must be removed.
5. Insert enough pipe to make the connection to the main.

22.12 Procedure installing pipe

1. Join the pipe following the guidance in Appendix D (Electrofusion) or Appendix E (butt fusion). Butt fusion is the preferred method.
2. If required restrain the pipe in accordance with SGN/WI/DIS/4.2.2 to protect against movement effects of thermal expansion.
3. Pressure test the service in accordance with Section F 2.
4. Record details of pressure test on test certificate.
5. If the test fails, check for any leakage on test equipment and retest? Replace test pipework if required.
6. If retests still fail, contact your Operational Manager for further guidance.
7. If the test is passed, continue by making final connections following Section B.
8. Commissioning of the pipe should be carried out in accordance with Section F3.
9. Complete reinstatement of the excavations.

POINTS TO REMEMBER

1. *The impact mole should normally progress at 0.5m/min 7-8m per Hour. as per manufacturers' instructions.*
2. *The average bore shrinks by 10%.*
3. *10x diameter of mole for the required depth of launch & receive pits. For minimum ground cover*
4. *Launch the impact mole at a reduced speed 0.25 – 0.5 m/min.*
5. *Always check for correct alignment.*
6. *Use launch cradle, aiming frame and surveyor's staff.*
7. *More preparation and time taken at launch will result in a more accurate and successful boring operation.*
8. *Compressor should deliver 7bar (85-100 PSI).*
9. *Electrically insulated PPE must be insulated to 20kV minimum together with the leather outer gloves when in contact with the impact mole.*
10. *Always monitor the progress of the impact mole throughout the boring operation.*
11. *The greater the bore length the greater the bore diameter required.*
12. *Before and after use, check that equipment is operating and stored correctly.*
13. *Regularly maintain the impact mole.*
14. *Never store the impact mole vertically as it can seize the mole, always store horizontally.*
15. *Regularly maintain the impact mole every 4 months or 150 machine running hours.*
16. *Always store the impact mole horizontally in the van or tool store, ensuring the dust cap is fitted to the airline to stop the ingress of debris.*
17. *Crossing under exposed cables should be witnessed and the speed of the impact mole should be reduced as it passes under the exposed cable.*

23 OPEN CUT SERVICELAYING

23.1 General

1. When excavating using open cut technique it is important to minimise both the width and depth of excavation.
2. The reasons for minimising excavation are: -
   - Minimises time and effort required for excavation.
   - Minimises reinstatement effort and materials.
   - Less waste material to be disposed.
   - Less vehicular movements associated with reinstatement and tipping.
   - Reduces risk of subsidence.

23.2 Site survey

Complete a site-specific risk assessment and site survey see Section A1.

23.3 Depth of cover

1. Minimum depths of cover are stated in Section A2.
2. Use Table 3- Recommended Minimum depths of cover and add the diameter of the pipe to work out the minimum depth of your excavation.
3. Additional depth may be required to negotiate under obstructions and where fine fill materials must be added to the bed of the trench.
4. If you encounter situations where the required depth of cover cannot be achieved, then contact your Operations Manager.

23.4 Manual excavation

1. All excavations must be completed following guidance in Section A2.
2. Where the proposed route has been surfaced with bituminous materials or concrete, use either
3. A road breaker fitted with an asphalt cutter or road saw.

23.4.1. Road saw

1. This will reduce the associated reinstatement costs and make the reinstatement tidier and more effective.
2. A risk assessment should be undertaken whenever a person enters a trench and ground / weather conditions must be considered, as rain could weaken the trench walls.

23.5 Mechanical excavation

1. The use of mechanical excavators with a narrow trencher can be used as they can excavate to greater depths at a reduced excavation width.
2. Reference must be made to SGN/PM/SW/3 and SGN/WI/SW/2.
3. Before starting work complete the mechanical excavator risk assessment.
4. Cut the road surfaces using either a road breaker fitted with an asphalt cutter or a road saw.
5. Keep the trench width to a minimum to minimise the reinstatement costs.
6. A variety of bucket widths from 150mm - 900mm are available (wider ones can be obtained if required).
   Note: Use only buckets with NO teeth.
7. DO NOT allow any Operatives to be working in the trench when a mechanical excavator is being used to dig out the excavation.
8. If the machine operator is unable to see the excavation, a banksman must be employed to guide the operator.
   Note: Allow for excavated spoil material to be positioned at a minimum distance equal to the excavation depth away from the trench.

23.6 Excavation general

1. Excavate a trench to the depth previously determined.
2. Where practicable excavate the line of the service at right angles to the main, and to the front of the building.
3. The line should take the shortest possible but may require diversions to accommodate any obstructions.
4. Follow guidance in SGN/PR/SW/1.
5. Remove all sharp stones and hard or abrasive objects from the base of the excavation.
6. Level and compact the trench bed.
7. If a suitable bed cannot be achieved in given ground conditions, excavate the trench by a further 75mm and lay a bed of sand (or other suitable material) 75mm deep for the pipe to rest upon.
8. Maintain a minimum distance of 250mm between the gas pipe and other buried utilities.
9. When laying the service pipe check that the service pipe does not exceed the minimum bend radius for PE pipe.

Minimum bend radius = 15x diameter of PE pipe.

Pipe size	Minimum Bend Radius
20mm	0.3m
25mm	0.4m
32mm	0.5m
63mm	1.0m

Table 29 – Minimum Bend radius

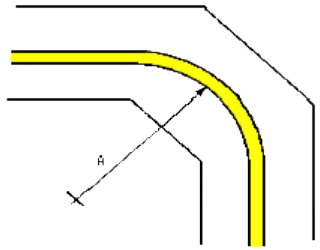


Figure 57 - Minimum Bend radius

10. PE Pipe jointing must be in accordance with Appendix D (Electrofusion) or Appendix E (butt fusion). Butt fusion is the preferred method.

Note: When installed, the pipe should come to a natural rest on the trench bed.

11. If required restrain the pipe in following SGN/WI/DIS /4.2.2 to protect against movement effects of thermal expansion.
12. Cover the pipe with sand or suitable fine fill material to a maximum depth of 250mm above crown of the pipe.
13. Lay gas marker tape on top of fine fill.
14. Deeper excavations become more liable to collapse and trench support systems will be required in accordance with SGN/PR/SW/1.
15. Where excavations require trench support a hazard assessment must be undertaken prior to work commencing and a Permit to Work must be initiated.
16. Keep the amount of trench is excavated to a minimum.
17. Wherever possible keep the trench to a uniform shape.
18. Tunnelling and undercutting should be avoided (Figure 58).

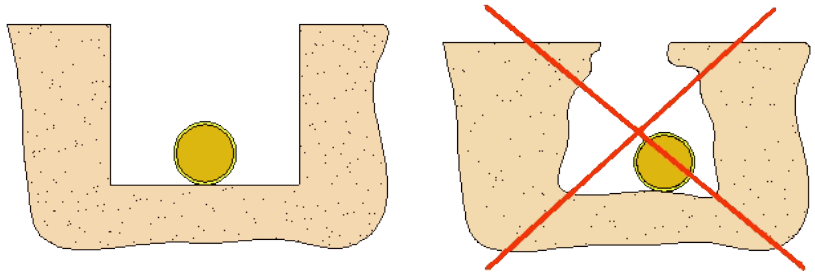


Figure 58 - Correct and incorrect excavations

19. Make the bed of the trench level and suitably compacted to provide a firm support under the pipe.
20. The trench should be free of hard spots or sharp stones, which are potentially damaging to PE pipe.

23.7 Ditch and special crossings

1. If a service is laid under a ditch, a depth of cover (below the true bed of the ditch) of not less than 1.1 metres must be maintained.
   Note: This will avoid any problems due to interference damage when cleaning of the ditch is carried out.
2. Concrete slabs or concrete filled bags should be placed a minimum 300mm above the crown of the pipe.
3. Marker posts must then be installed on both sides of the ditch to indicate its presence.
4. Further consultation with the appropriate Environment Agency and /or Highway Authority may be required for additional precautions or contact your Operational Manager for advice.

23.8 Marker tape for HDPE pipes

1. For HDPE pipes, place marker tape incorporating a single insulated tracing wire between the backfill and sub-base layers in road or footpath constructions, or 250 mm above the crown of the pipe in open ground.
2. Where this tape is installed, follow the instructions in SGN/WI/ML/2.

23.9 Completing the Service

1. The remaining sections of the service pipe must be completed in accordance with the appropriate parts of Section C.
2. Pressure testing of the service must be undertaken in accordance with Section F1 and F2.
3. Once the test has successfully passed, the connections can be completed see Section B.
4. Commissioning of the pipe should be carried out in accordance with Section F3.
5. The line of the service should be recorded on digital records information systems.
6. The record should include detailed dimensions.

23.10 Reinstatement

1. Reinstate all excavations in public and private roads in accordance with the Specification for Reinstatement on Highways. See Section A1.
2. Further information is available in the Excavation and reinstatement documents.

D1 Work Instruction Servicelaying –Valves General

1 MAIN VALVES TO BE USED DURING SERVICE INSTALLATION

There are several different valves used for specific purposes to be installed in service pipes from the mains connection up to and including the ECV. These are explained below:
A new supply of gas to premises must not be made available unless a suitable ECV is installed

1.1 Definitions:

1.1.1. Emergency Control Valve (ECV)

1. An ECV is a valve for shutting off the supply of gas in an emergency, being a valve intended for use by a consumer of gas.

1.1.2. Service Isolation Valve (SIV)

1. A service isolation valve is a valve (other than the emergency control) for controlling a supply of gas, being; Incorporated in a service pipe; and Intended for use by a supplier or transporter of gas; and Not situated inside a building.

1.1.3. Service Excess Flow Valve (SEFV)

1. Service excess flow valves must be installed in domestic medium pressure services with a maximum flow rate of $6m^3/hr$ and up to 32mm dia. It will substantially reduce the flow of gas if the flow exceeds a defined limit. (Such devices restore full flow once the upstream and downstream pressures are equalised.
   Note: Service excess flow valves are not available for intermediate pressure services.

2 EMERGENCY CONTROL VALVE

2.1 General

2. When constructing a service, the service entries to all premises you must terminate with an ECV.
3. You must install the ECV to be both accessible and operable by the consumer.
   Refer to Table 30 for types and sizes of ECV's.
4. Install Low pressure ECV's with a handles colour coded Red and for medium pressure ECV handles colour coded Amber.
   Note: The same colour coding applies to ECVs used in semi concealed meter installations.
5. The preferred orientation of the ECV should be in the vertical position.
6. Fit handles to ensure that the off position is indicated by the key or lever being at right angles to the installation pipe work.
7. You must fit any key or lever to move in the downward direction from the 'ON' position to the 'OFF' position. (Figure 63).
8. Make sure the handle (key or lever) of the ECV must is securely attached to the operating spindle of the valve.
9. ECV's must not be installed in a position where downward travel of the handle results in the valve opening.
10. **You must NOT use Medium pressure ECV's for Low Pressure services because the external outlet thread will only fit MP meter installations. Additionally, MP ECV's must not be installed internally as they do not meet fire resistance standards for use inside a building.**
11. The ECV must be securely capped and sealed with the valve in the closed position immediately following purge and commissioning of the service unless the meter is going to be immediately connected or reconnected.
12. Complete and attach the service information label to the inlet side of the ECV on all new and replacement installations

Typical Emergency Control Valves

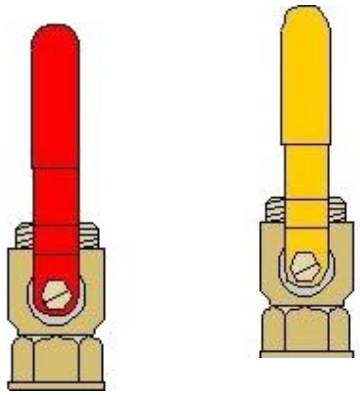


Figure 61- BS 746 LP ECV

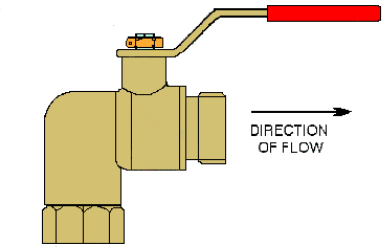


Figure 59 - BS EN 10806 LP Semi-concealed ECV ¾" BSPF x 1" (Ball)

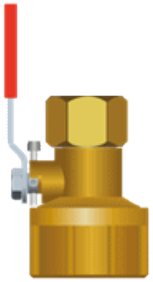


Figure 62 - Combined IECV

Figure 60 – BS EN 10806 MP ECV

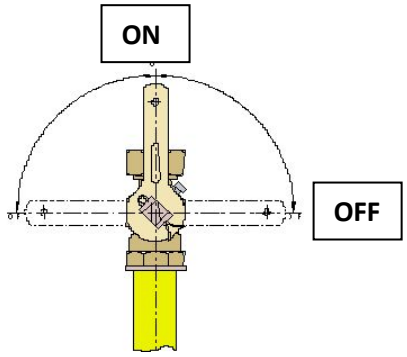


Figure 63 - Emergency Control Valve

2.2 Emergency Control Valve Sizes

Refer to this table for the correct size, type and meter installation the ECV will only be compatible with

Application	Sizes Inlet x Outlet	Valve Type	Specification	Outlet Thread to	Handle colour	Fire resistance
Low Pressure Diaphragm Meter Installations	¾ BSPF x ¾” 1” BSPF x ¾” 1” BSPF x 1” ¾” BSPF x 1” (1)	Ball valve	GIS/V7: 3	BS 746	Red	YES
	2” BSPF x 2 “	Plug valve	GIS/V7: 3	BS 746	Red	YES
Medium Pressure Diaphragm Meter Installations	¾” BSPF x ¾” ¾” BSPF x ¾” (1) 1” BSPF x ¾” 1” BSPF x 1”	Ball valve	GIS/V7: 3	BS EN 10806	Amber	Not required
Medium Pressure Rotary & Turbine Meter Installations	2” BSPF x 2”	Ball Valve	GIS/V7: 3	BS21	Yellow* Amber	Not required
Intermediate Pressure installations	20-50mm	Ball	BS ISO 7121	BS EN 1092-1 PN 16 type B1	n/a	Not required
Intermediate Pressure installations	80mm	Gate Double block & bleed	GIS/V7: 1	BS EN 1092-1 PN 16 type B1	n/a	Not required

Table 30 - Valve sizes

Note (1) denotes right angled ball valves for semi concealed meter boxes
ECV for MP domestic services should terminate with a ¾” BS EN 10806 outlet thread to fit MP inlet meter kits.

3 SERVICE ISOLATION VALVE

3.1 General

1. You must install a Service isolation valve in the following situations:
    i. Any low-pressure services of 63mm PE diameter and above.
    ii. Multi-occupancy buildings (Schools, Hospitals, High Rise).
    iii. Places of public assembly (Cinemas, Public Houses, Shops etc.).
    iv. Supplies to industrial processes and commercial properties.
    v. All Services supplying more than one primary meter in the same premises.
    vi. All Medium pressure (MP) services: operating pressures greater than 75 mbar where no Service Excess Flow Valve (SEFV) is fitted.
    vii. All Intermediate pressure services.
    viii. Wherever the property being supplied has the service entering below ground and terminating in a cellar.

3.2 Service Isolation Valve installation

1. Use a PE valve for below ground operations wherever they are available in preference to a metallic valve. (Figure 64).

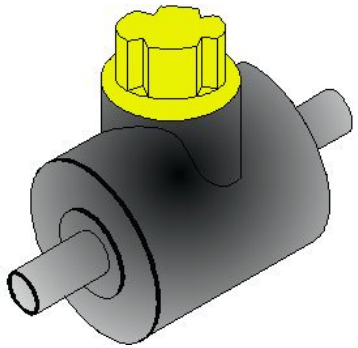


Figure 64 - Example - PE Service Isolation Valve

2. You must use a metallic valve for all above ground installations.
3. You must always install service isolation valves in an accessible position as near as possible to the property boundary.
4. Clearly indicate the valves location with a surface cover marked G or GAS (Figure 65 & Figure 66).

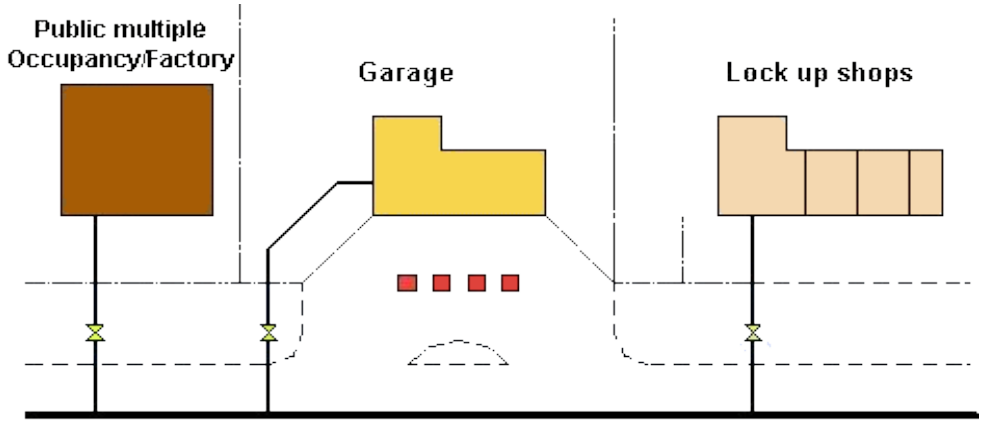


Figure 65 - Service Isolation Valve location

5. Construct the Service isolation valve covers using a concrete surround or purpose made plastic chamber installed over the centre line of the valve Figure 66 & Table 31 - Service Isolation Valves parts list.
6. If the valve is deeper use an extension spindles which are available for deeper installations.
7. Leave the Service isolation valves in the 'open' position after purging.
8. For metallic underground valves, you must wrap them with approved mastic tape after the service has been purged.
9. Position the service isolation valve to ensure unrestricted access for operation and maintenance.
10. You must not use a service isolation valve as an ECV.

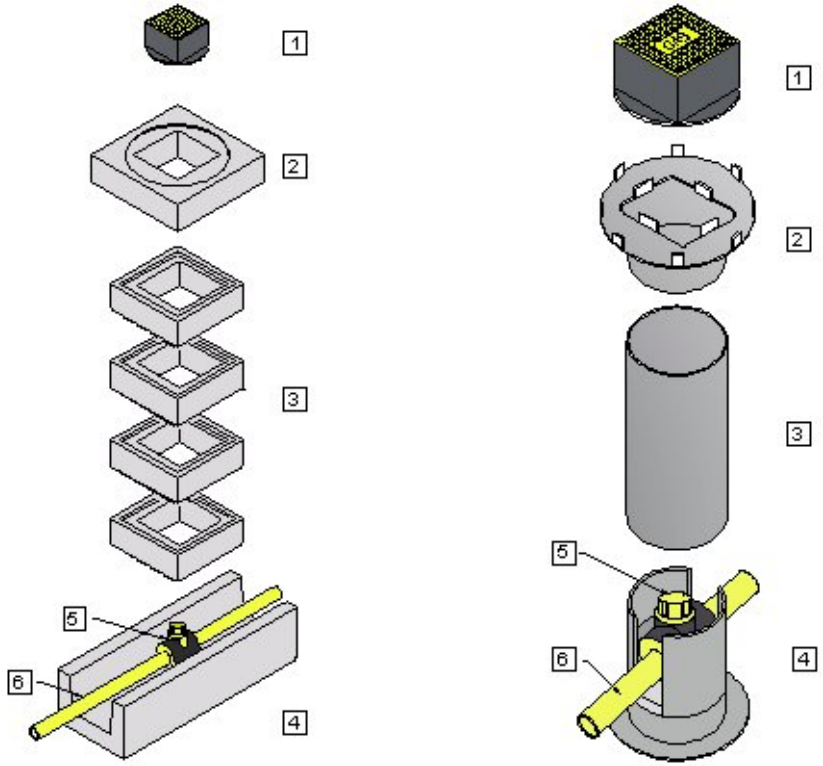


Figure 66 - PE Service Isolation Valve Chambers

No.	Item
1	Surface Box
2	Top Section
3	Intermediate section/ plastic chamber
4	Base section/ plastic chamber base
5	Service Isolation Valve
6	PE pipe spigot

Table 31 - Service Isolation Valves parts list.

4 SERVICE EXCESS FLOW VALVE

4.1 General

1. SEFV's reduce the volume of gas released should damage occur to the service downstream of the SEFV.
2. You must fit a Service Excess Flow Valve (SEFV) on services up to and including 32mm diameter supplying domestic properties from a MP main in the following locations: -
   - Surface mounted Meter box installations.
   - Inset meter box installations.
   - Semi Concealed Meter box installations.
   - Above Ground Boundary Regulators.
3. **An SEFV must not be installed on a medium pressure dual service.** (Figure 68).

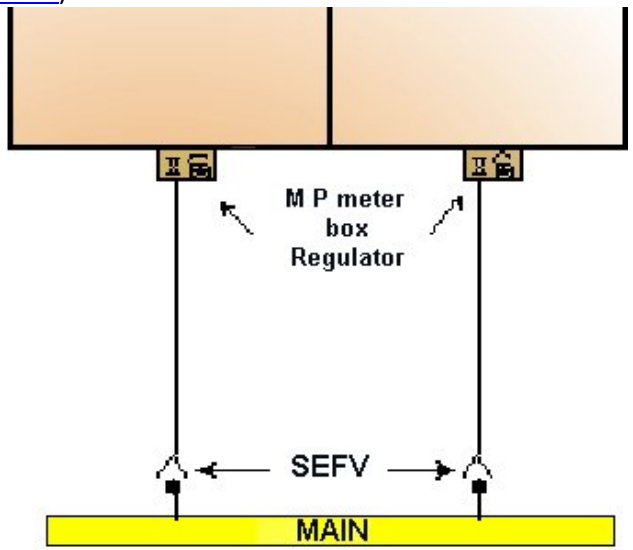


Figure 67 - Acceptable dual MP service

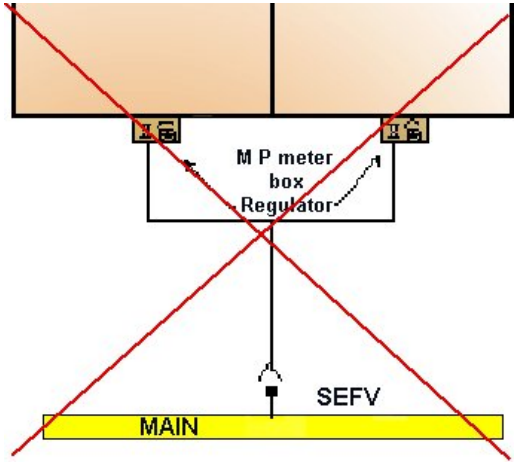


Figure 68 - Unacceptable dual MP service

A service isolation valve (SIV) is not required where a SEFV is installed.

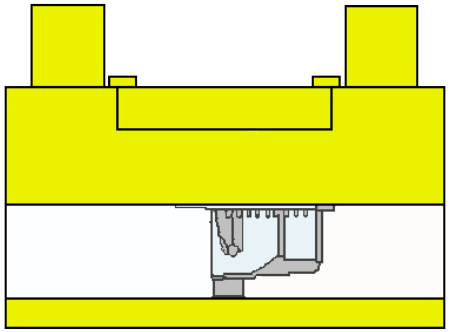


Figure 69 - Typical SEFV

The service must be pressure tested and commissioned in accordance with Section F.

4.2 Installation

1. You must install the SEFV immediately on the outlet of the service top tee connection.
   Note: This is to protect the entire length of the MP service. (Figure 71).
2. When installing SEFV on metallic connections they must be situated as close to the top tee as possible.
3. Check that the SEFV is fitted in the correct orientation.
   Note: This is indicated by a flow direction arrow on the fitting or the manufacturer's instructions contained in the packaging.
4. Electrofusion of the PE SEFV must be in accordance with Appendix D Electrofusion.
5. The service must be pressure tested and commissioned in accordance with Section F.

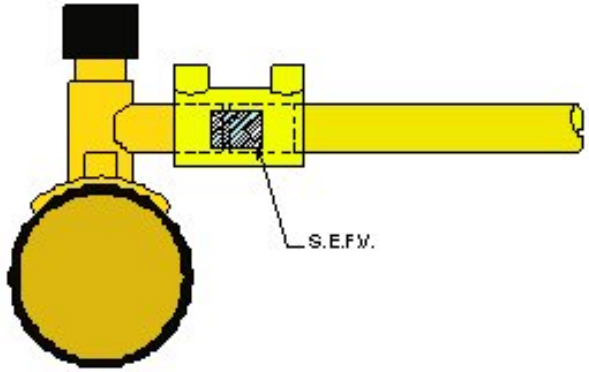


Figure 70 - Service Excess Flow Valve in place on service

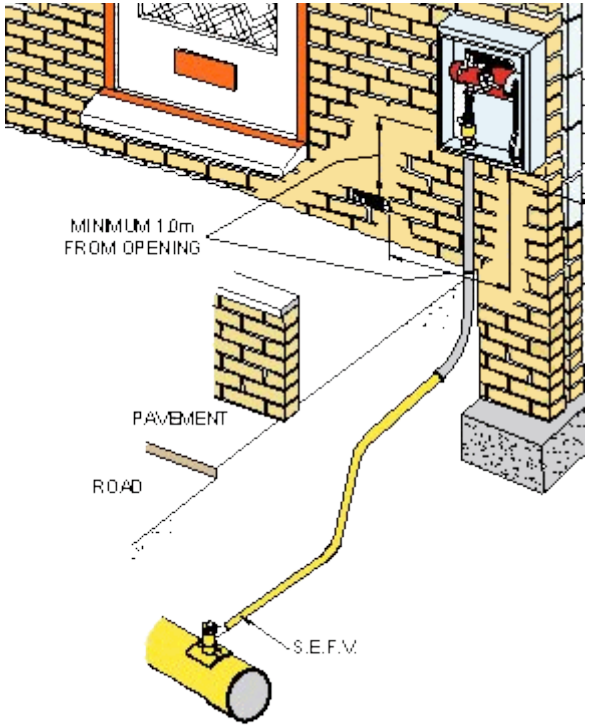


Figure 71 - Example of S.E.F.V on an MP service

4.3 Labelling of service

You must ensure that the service information label when completed indicates that an SEFV is fitted in accordance with Section E18 of this work instruction.

4.4 Records

You must record on field systems details of where an SEFV has been installed.

1 SERVICE ENTRIES

1. You must install a service with its future integrity and safety in mind.
2. Take account of the position of other services.
3. You must make sure that the new installation will not cause any structural damage to the building, impair the fire resistance of any part of the structure, or affect any damp proof course.
4. The repositioning, exchanging, or removing low pressure primary gas meters, (not exceeding 6 m^3/h capacity), installed in domestic, industrial or commercial premises, must be undertaken by qualified operatives deemed competent to do so.

1.1 New Services

1. The proposed service termination and meter position should have been decided at the planning stage.
2. Preference should be given to the use of a meter box, which should be located:
3. On the front face of the building, or within 2m of the front face of the external wall of the building.
4. Where a meter box cannot be used, a meter should be sited within the premises, preferably on the internal face of the external wall.
5. If this is not practicable an alternative position can be used if the service termination point is within 2m of the service entry point into the building.

   Note: Service terminations to external meter houses should comply with SGN/SP/SER/8.

1.2 General Requirements

In addition to the following general requirements, technique specific information is contained within individual service entry sub-sections.

1. MP or IP domestic services must not be installed within a building.
2. IP services must not be installed into built in boxes.
3. Service entries must not be laid in unventilated voids.
4. Where applicable, services should enter premises above ground and above any Damp Proof Course (DPC).
5. PE pipe must be terminated at an external meter box or approved transition fitting.

1.3 Services Entries

1. A service must not be installed under the footing of the building, under the base of a load-bearing wall or under a floating raft.
2. Where the building construction involves a concrete raft, and there is not the recommended depth of cover between the concrete raft and proposed finished ground level (375mm), the developer must provide a slot or vertical channel in the raft to allow safe installation of the gas pipe.
3. SGN will not be responsible for breaking out the concrete rafts footings to provide a slot for the service pipe.
4. PE services must not enter any premises, including integral and attached garages, unless enclosed in a metallic pipe where the annular space is filled with an approved material or has a gas tight approved seal.
5. Where a service pipe is installed through any wall or through any floor of solid construction the service pipe must be enclosed in a sleeve.
6. Mechanical pipe joints must not be installed within the sleeve.
7. Ensure that the proposed internal meter position is not within 150mm of electrical apparatus, and 25mm from electrical cables and other metallic services. Unless suitable insulation board can be used to reduce these requirements.
8. PVC bends must not be cut to allow for reduced depth.
9. The socket part of the PVC bend should protrude above the finished surface level to ensure correct depth and that the bend radius of the pipe is maintained.
10. Any above ground service pipe entry must be retained using pipe clips at 1 metre intervals where practicable.

11. Use approved detection equipment and visual inspection of any walls that are to be drilled for service entries, pipe clips etc., to help identify the position of any electrical cables that may be positioned in the wall.
12. Hand held locators are not approved and the "Cat and Genny" must be used.
13. Where there is a serious threat of vandalism to an external service entry, or as part of the remedial work following interference damage, preference should be given to alteration to an internal meter position.
14. Where this is not possible, steel pipe should be used in accordance with Section E10.
15. You must terminate all services with an Emergency Control Valve (ECV).
16. You must fit the correct ECV for the correct operating pressure tier of the service pipe in accordance with Section D2.

    Caution – IP and MP ECV must NOT be used for low-pressure services and likewise LP ECV's must only be used for LP service and not MP or IP.
17. Labels must be affixed on every service termination and ECV at the time of installation or alteration in accordance with Section E18.

1.3.1. Meter Boxes

1. Always check there is no damage to the meter box before installation.
2. Do not locate Meter boxes directly above drains, air bricks, manholes or under appliance flues etc. or where access / egress may be restricted in the event of an emergency e.g. narrow foot walks.

   Note: See guidance in Appendix H for installation of meter boxes.
3. Do not install a surface mounted or semi concealed meter boxes on public footpaths or highways where damage from pedestrians or vehicles can occur.
4. Do not install services to meter positions where there is a risk of flooding.
5. MP meter box regulators fitted to the property wall are the preferred option whenever boundary regulators and/or associated services are replaced.

   Note: Agreement with the Meter Asset Manager must be obtained.
6. IP meter box and regulators must be fitted at the boundary of the property.

1.4 Unacceptable Service Terminations - ECV Position Checklist

Persons undertaking meter work must be competent to do so, and hold the appropriate qualification to meet the criteria laid down in the Gas Safety (Installation and Use) Regulations.

1. You must assess the proposed ECV position before any service alteration or replacement is undertaken.
2. The following list provides examples of locations that should be avoided for service terminations:
   - Near any source of heat, or where it may be subjected to extremes of temperature.
   - Where food is stored.
   - Where it might be liable to mechanical damage.
   - Where it might be liable to flooding
   - Where it might cause an obstruction.
   - In bathrooms.
   - Where it might be affected by a corrosive atmosphere or liquid.
   - Where readily combustible material is stored.
   - ECVs must not be installed into any lockable meter housing/compartment unless the consumer has been provided with a suitably labelled key providing access.

     Note: If such a location cannot be avoided or there are any concerns specific advice must be sought from a qualified meter installer or your Manager for further guidance.

1.4.1. New installations - Premises with two or more floors above ground floor.

Installation design will have been determined at the planning stage.

1. You must not install a meter position and its ancillary controls: -
   - on or under a stairway,
   - in a common hallway,
   - passageway
   - any other part of the building which provides the sole means of escape in the event of fire.

1.4.2. All other installations - (including premises with less than two floors above the ground floor, and replacement meters in premises with two or more floors above ground floor).

1. If it is necessary, to install a new or replacement meter position on or under a stairway, or in any other part of the premises, where the stairway or that other part of the premises forms the sole means of escape in the event of fire:
   - The meter should be of fire resistant construction; or
   - The meter should be housed in a compartment constructed of materials having a fire resistance of not less than half an hour and which has a door fitted with an automatic self-closing device; or
   - The pipe immediately upstream of the meter, or meter regulator if fitted, should be provided with a thermal cut-off device, which is designed to automatically cut off the gas supply if the temperature of the device exceeds 95°C.

1.5 Completion

1. Ensure the ECV is left in the closed position and capped on completion of commissioning.
2. Ensure Service Labels are completed, displayed and attached to the service pipe.
3. The meter box key must be left with the consumer or developer.

1.6 Other Premise Types

1.6.1. Listed Graded Buildings

Installations to these types of premises need to meet the requirements of the local planning authority. Your Manager will authorise the service entry method to be used for a building following consultation with the local planning authority.

Where any doubts exist concerning a building, which is believed to be listed, your Manage must be contacted.

1.6.2. Mobile Home/Canal boats/Timber frame buildings

Installations into these types of premises or structures must be specifically designed. Your Manager will authorise the service entry method.

2 NEW BUILD INSTALLATIONS ONLY

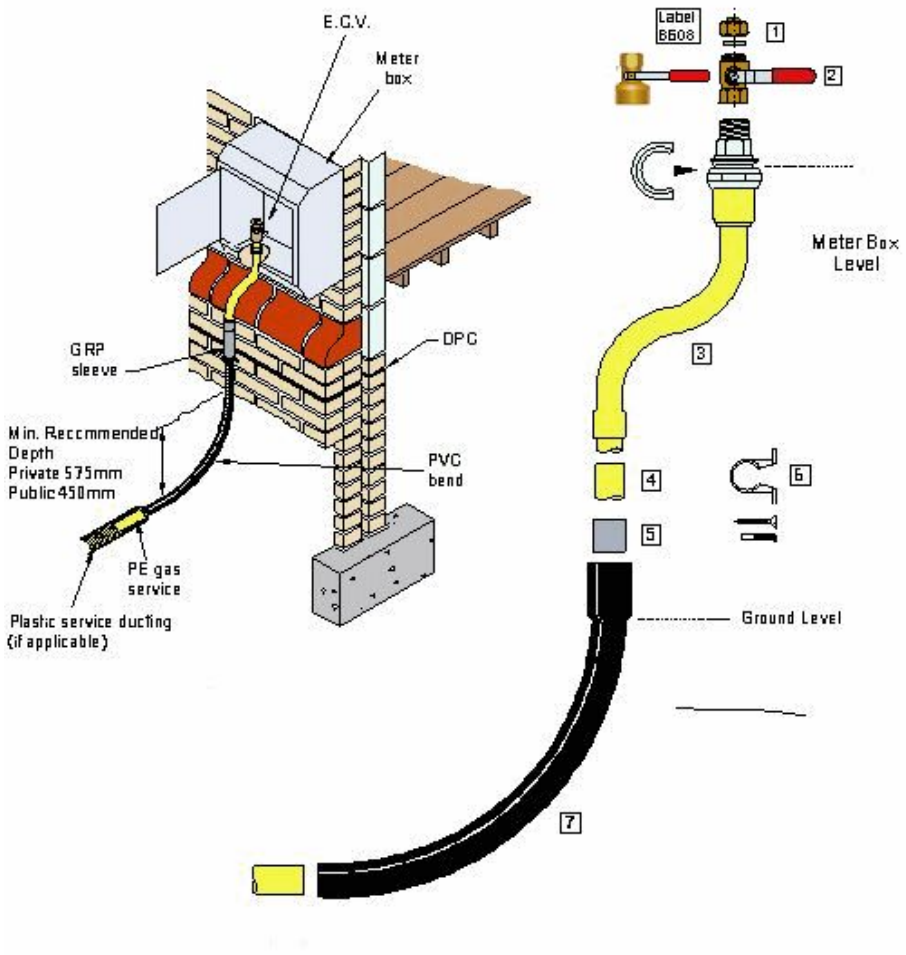
2.1 General Requirements

1. Your work must only commence when the inset meter box has been installed by the developer/builder.
   Note: This is the responsibility of the builder/developer or consumer.
2. Check that the meter box has been installed correctly (Appendix H).
3. Check ground levels to confirm the correct depth of the service can be achieved after completion of civil works by the developer.
   Note: The base of the box must be located between 500 mm and 1500 mm above the finished ground level.

2.2 Installation:

1. Prior to the installation of the service carry out an inspection of the meter box to: -
   - make sure that the outlet spigot is correctly fitted and sealed to prevent gas leakage into wall cavity.
   - confirm that the meter box is not damaged
   - Confirm that no other holes have been provided within the meter box structure, except in the prescribed position.

2. It is possible to provide the gas service to a recessed meter box where a corbelled wall is present, as illustrated in Figure 81.



Note: The base of the box must not be less than 2 courses above the corbelled wall to allow for the correct transition fitting.

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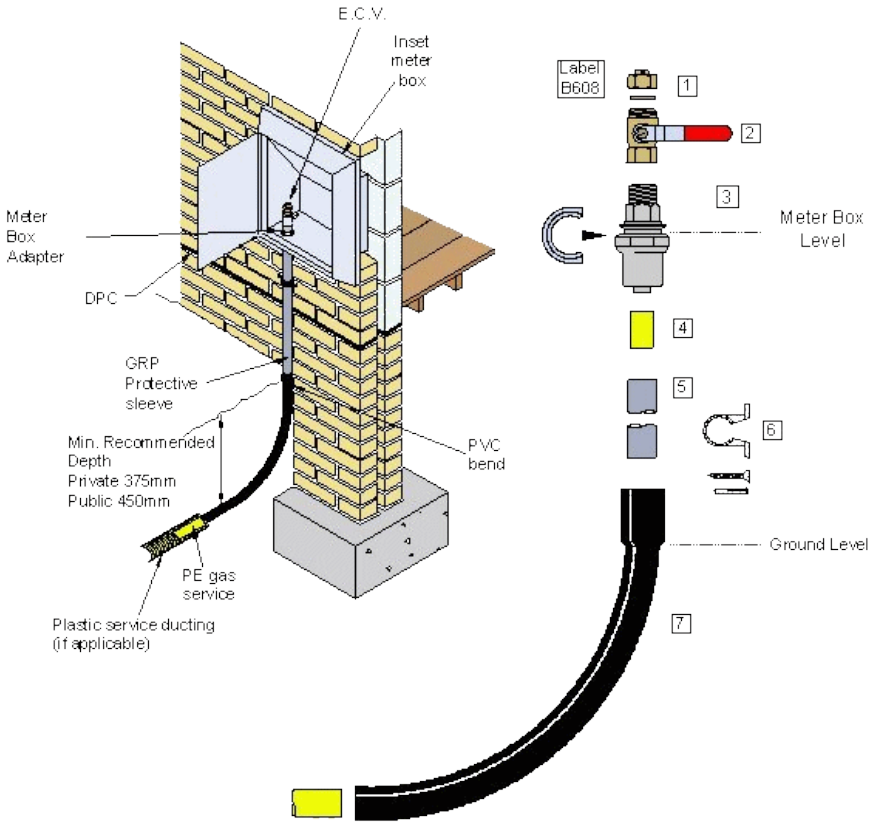
Figure 72 - LP PE surface to Inset meter box



NO	ITEM
	Service Information Label (B806)
1	**Emergency Control Valve Cap**
	¾″ x BS 746 Brass Cap c/w Washer
	1″ x BS 746 Brass Cap c/w Washer
2	**Emergency Control Valve**
	¾″BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″ BSPF x 1″ BS 746 M c/w Handle (Ball)
3	**Meter Box Adaptor**
	20 mm x ¾″ BSPM
	25 mm x ¾ ″BSPM
	32 mm x ¾ ″BSPM
	32 mm x 1″ BSPM
4	**20/25/32 mm PE pipe**
5	**GRP Sleeving (1 & 3 metre lengths)**
	GRP Sleeving 38 mm
6	**Pipe Clip for GRP Sleeving**
	GRP Sleeving 38 mm
7	**PVC Preformed Bend**

Table 32 - LP service inset box material list

3 SURFACE MOUNTED METER BOX

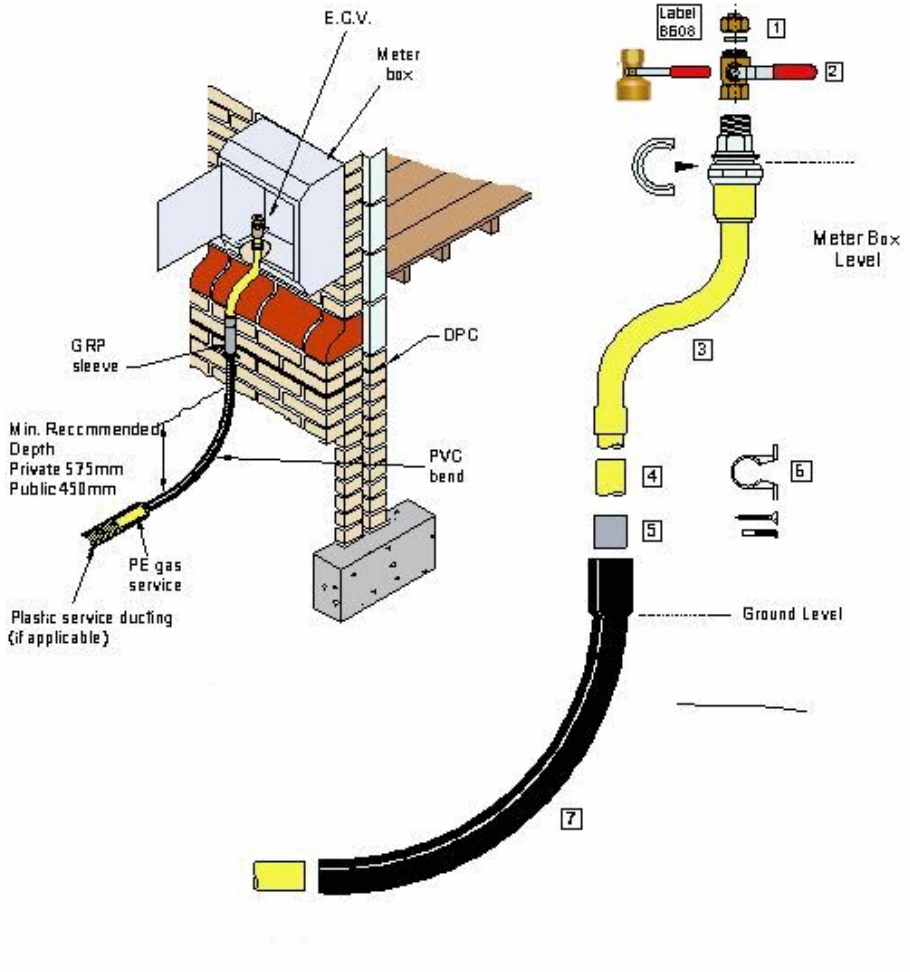
3.1 General Requirements

1. Surface mounted meter boxes must not be installed
   - in an unventilated or
   - enclosed area,

   Note: These may include building extensions such as front porches, garages etc.

3.2 Installation:

1. The base of the meter box should be installed between 500 mm and 1500 mm above finished ground level and must be fitted either above or below the DPC but must never cross it (Figure 73).
2. It is possible to provide the gas service to a surface mounted meter box where a corbelled wall is present, however, the base of the box must not be less than 2 courses above the corbelled wall to allow for the correct transition fitting to be used see Figure 81.



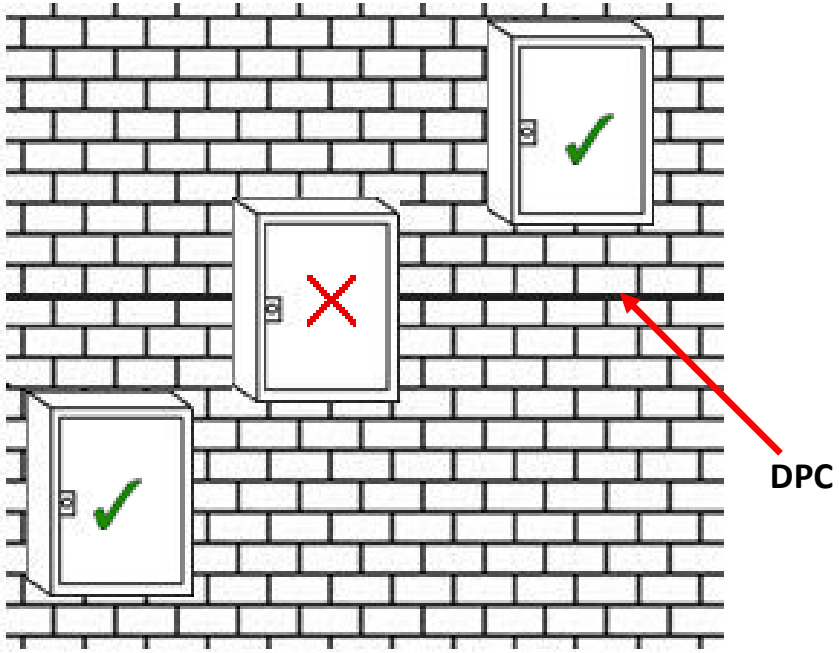


Figure 73 - LP PE surface to mounted meter box positioning

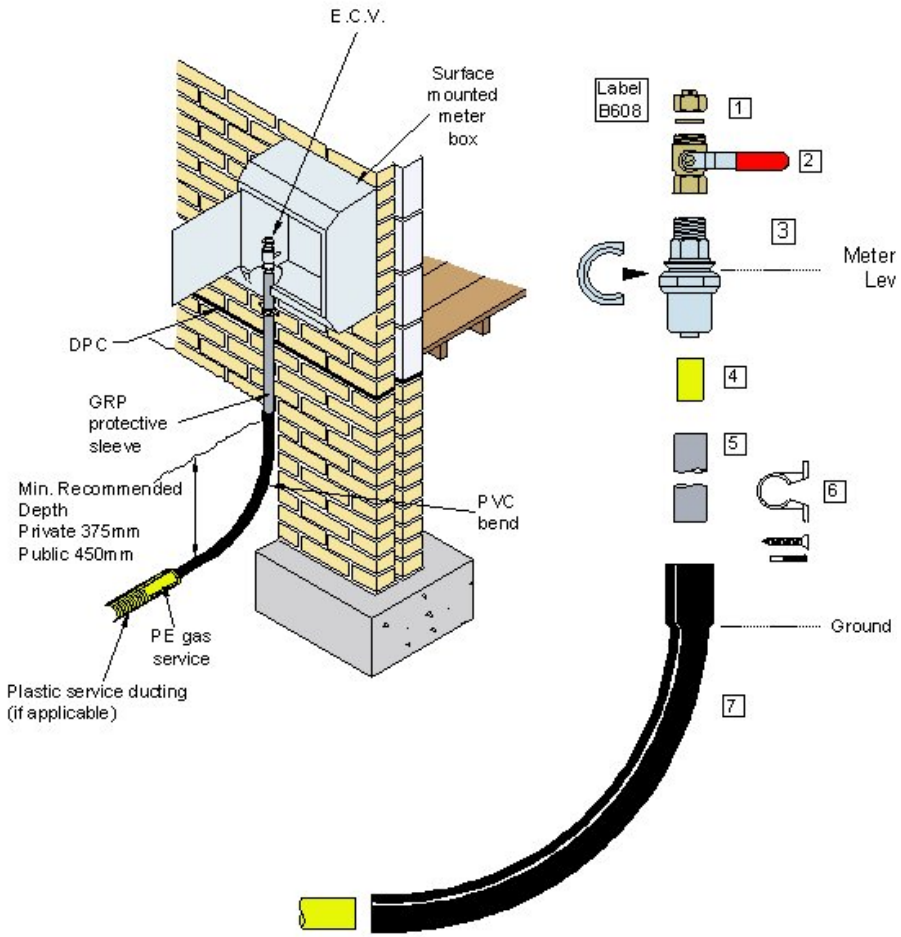


Figure 74 - Service to surface mounted box

NO	ITEM
	Service Information Label (B806)
1	**Emergency Control Valve Cap**
	¾″ x BS 746 Brass Cap c/w Washer
	1″ x BS 746 Brass Cap c/w Washer
2	**Emergency Control Valve**
	¾″BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″ BSPF x 1″ BS 746 M c/w Handle (Ball)
3	**Meter Box Adaptor**
	20 mm x ¾″ BSPM
	25 mm x ¾ ″BSPM
	32 mm x ¾ ″BSPM
	32 mm x 1″ BSPM
4	**20/25/32 mm PE pipe**
5	**GRP Sleeving (1 & 3 metre lengths)**
	GRP Sleeving 38 mm
6	**Pipe Clip for GRP Sleeving**
7	**PVC Preformed Bend**

Table 33- Service to surface mounted box material list

4 LP PE SERVICE TO UNIBOX METER BOX

The Unibox is now the preferred option where the customer requires a less obtrusive box, and should be the first choice for resolving these situations. The existing semi-concealed box should only be used as a last option.

It can be used for both LP and MP services, and allows for various diaphragm meters to be relocated outside a property, without having to replace the meter with a different model/style.

4.1 General requirements

1. Unibox meter boxes may be installed by the developer or installed by the operative as part of the service installation.
2. The meter box must be fixed to the exterior using the kit supplied.

4.2 Installation

1. Check that the box is always fitted on level ground and fixed securely to the wall.
2. Where the property is on a concrete raft, a cut-out section must be provided by the developer/owner.
3. A minimum excavation size of 0.5m by 0.5m is required to accommodate the meter box.
4. You must not leave exposed pipework entering the Unibox meter box.
5. Services must terminate with a meter box adapter
6. Protect the service within a GRP / PVC preformed bend below ground.
7. Refer to Appendix B3 for meter box dimensions and fitting directions.

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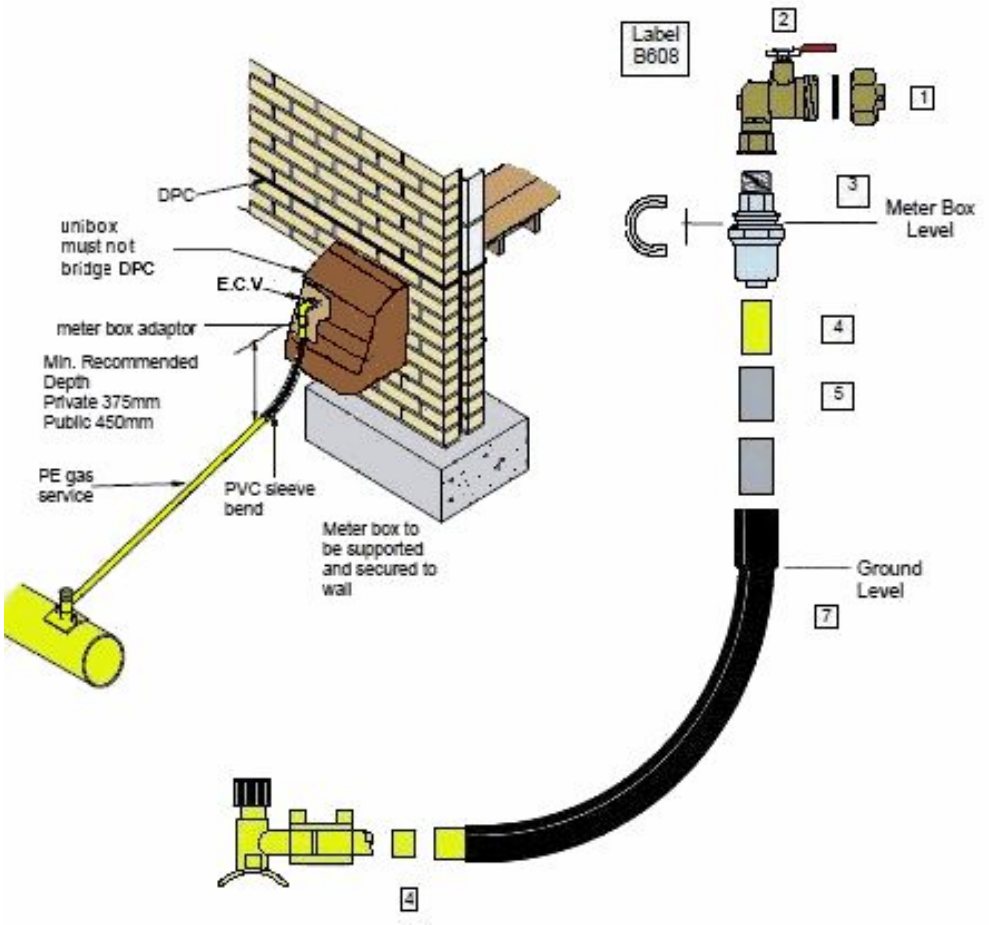


Figure 75-Service to Unibox meter box

No	Item
	Service information Label (B608)
1	**Emergency Control Valve Cap & washer.**
	1 ″x BS 746 Brass Cap c/w Washer
2	**Emergency Control Valve**
	¾ ″BSPF x 1″ BS 746 M Unibox (Ball) Emergency Control Valve
3	**Meter Box Adaptor**
	20 mm x ¾″ Unibox
	25 mm x ¾ ″Unibox
	32 mm x ¾″ Unibox
4	**20/25/32 mm Pipe**
5	**GRP Sleeving**
7	**PVC Preformed Bend**

Table 34-Service to Unibox meter box material list

5 LP PE SERVICE TO SEMI-CONCEALED METER BOX

5.1 General requirements

1. Semi-concealed meter boxes may be installed by the developer or installed by the operative as part of the service installation.
2. The meter box must be fixed to the exterior using the kit supplied.

5.2 Installation

1. Check that the box is always fitted on level ground and fixed securely to the wall.
2. Where the property is on a concrete raft, a cut out section must be provided by the developer/owner.
3. A minimum excavation size of 0.5m by 0.5m is required to accommodate the meter box.
4. You must not leave exposed pipework entering the semi-concealed meter box.
5. Services must terminate with a meter box adapter
6. Protect the service within a GRP / PVC preformed bend below ground.
7. Refer to Appendix H for meter box dimensions and fitting directions.

E 5 Work Instruction Servicelaying – Low Pressure service to semi-concealed meter box Page 2 of 2

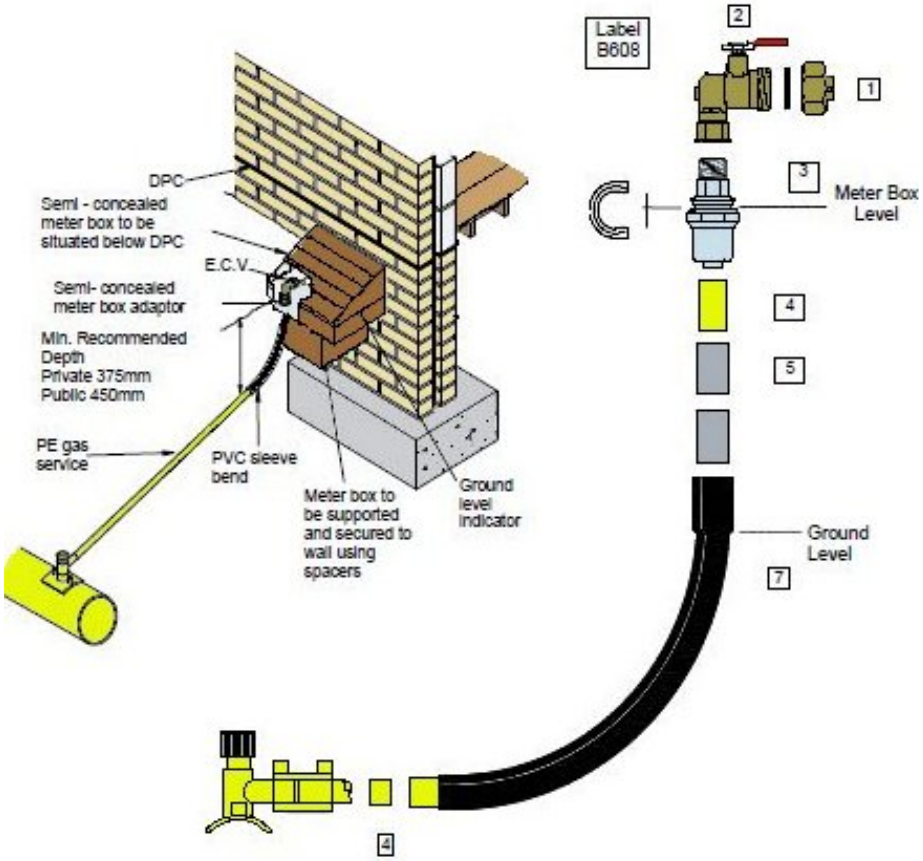


Figure 76 - Service to semi-concealed meter box

No	Item
	Service information Label (B608)
1	**Emergency Control Valve Cap & washer.**
	1 ″x BS 746 Brass Cap c/w Washer
2	**Emergency Control Valve**
	¾ ″BSPF x 1″ BS 746 M Semi-Concealed (Ball) Emergency Control Valve
3	**Meter Box Adaptor**
	20 mm x ¾″ Semi-Concealed
	25 mm x ¾ ″Semi-Concealed
	32 mm x ¾″ Semi-Concealed
4	**20/25/32 mm Pipe**
5	**GRP Sleeving**
7	**PVC Preformed Bend**

Table 35 - Service to semi-concealed meter box material list

You should read this section in conjunction with Section C.

6 LOW PRESSURE SERVICE REPLACEMENT

6.1 General Requirements

1. Where insertion is to be undertaken to the original meter position, checks must be made to ensure that the position is not an unacceptable Meter location (see Section E.1).
2. If the existing meter location is not suitable then a suitable alternative location must be agreed with the consumer and your Manager notified. (An Inset meter box is not allowed as an option in this case).
3. Inspect the condition of the host pipe for any damage or severe signs of corrosion.
4. Work out the pressure drop across the length of service in accordance with Section A5, Table 8 - Pressure Loss over Given Length and Diameter (Based on 32 kWh/^{3} scmh for existing Supplies).

6.2 Installation

1. Disconnect the host pipe in accordance with Section B14 and purge to 0% GIA, using approved purge hoses and fittings.
2. A flexible rod should be used to determine any bends in line of service to be inserted.

   Note: Recommended PE pipe diameters for insertion can be found in Section A5
3. Fit an insulation joint on to the service head adaptor in the correct orientation.
4. Ensure that the service head adaptor is fitted above floor level.
5. Inject an approved annular sealant into the inserted service to a position at least beyond the building line to protect against gas ingress and gas tracking.

   Note: Dependant on which dead insertion technique is used i.e. Yellow PE 80 pipe or Serviflex; the correct sealant must be used. Reference must be made to Section C3, which identifies the correct annular gap sealant to be used. Always follow the manufacturer's instructions and wear the recommended protective clothing (correct gloves / safety goggles) when handling potentially hazardous substances including sealants.

Where services terminate in basements, the same procedure can be applied as above, with the addition of a Service Isolation Valve installed externally in accordance with Section D3.

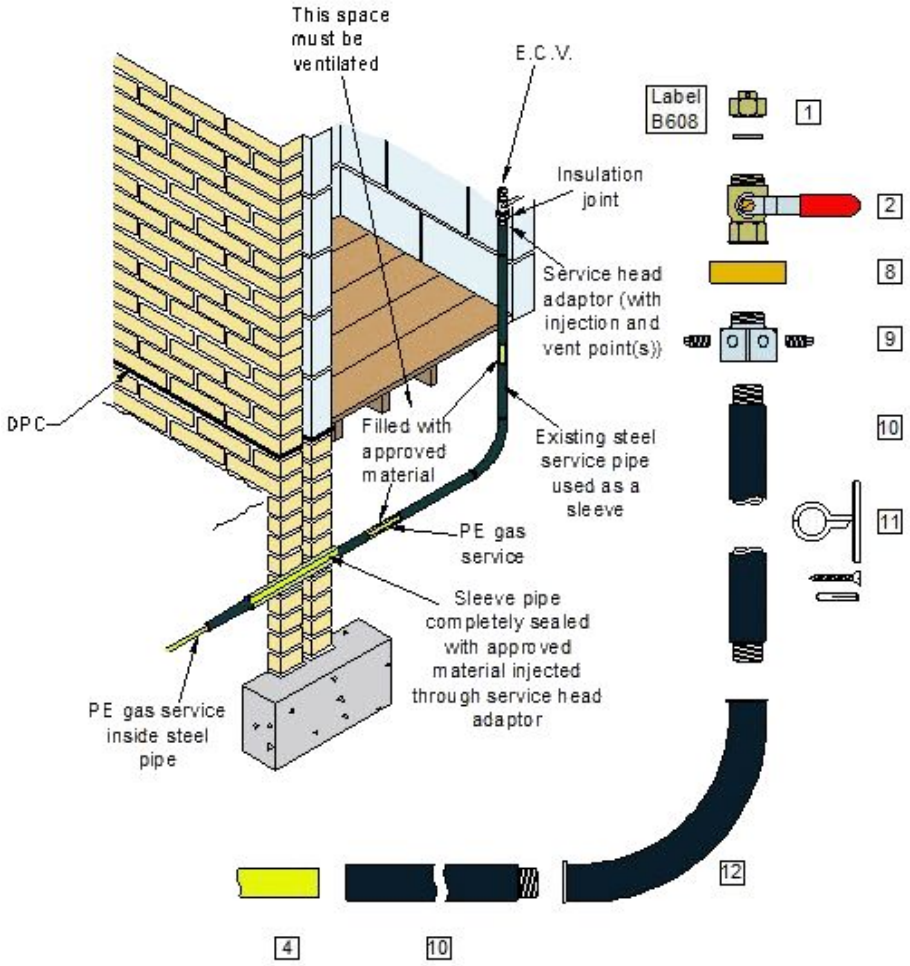


Figure 77 - Low Pressure service to internal position

No	Item
	Service information Label (B608)
1	**Emergency Control Valve Cap.**
	¾" BS 746 Brass cap c/w Washer
	1 "x BS 746 Brass Cap c/w Washer
2	**Emergency Control Valve or IJECV**
	¾ "BSPF x 3/4" BS 746 M c/w Handle (Ball)
	1" BSPF X ¾" BS 746 M c/w Handle (Ball)
	1" BSPF X 1" BS 746 M c/w Handle (Ball)
4	**PE Inserted pipe**
8	**Insulation Joints**
	¾" BSPF/BSPF Fire resistant
	1" BSPF/BSPF Fire resistant
	1 1/2" BSPF/BSPF Fire resistant
	2" BSPF/BSPF Fire resistant
9	**Service Head Adaptors**
	16mm X ¾" BSPM X ¾" BSPF
	16mm X ¾" BSPM X 1" BSPF
	20mm X ¾" BSPM X 1" BSPF
	20mm X ¾" BSPM X 1 1/4" BSPF
	25mm X ¾" BSPM X 1 1/4" BSPF
	25mm X ¾" BSPM X 1 1/2" BSPF
	32mm X 1" BSPM X 1 1/4" Flex F/P
	32mm X 1" BSPM X 2" Flex F/P
10	**Existing service pipe**
11	**Pipe Bracket**
	¾"
	1"
12	**Slow Bend**

Table 36 - Low Pressure Service to internal position material list

7 NEW INSTALLATION IN BASEMENT CELLAR

7.1 General Requirements

1. Ventilation is required when installing a gas service that terminates in a cellar.
   Note: Air bricks or floor vents must be free from any obstruction or blockage and the customer informed of the need to maintain the air flow at all times.
2. You must seal the gap between pipe sleeve and wall.
3. You must terminate the below ground entry fitting as close as is reasonably practicable at the inner face of the property wall.
4. You must install a service isolation valve in the line of the service.

7.2 Installation

1. You must secure the steel pipe inside the basement to the wall using steel pipe clips.

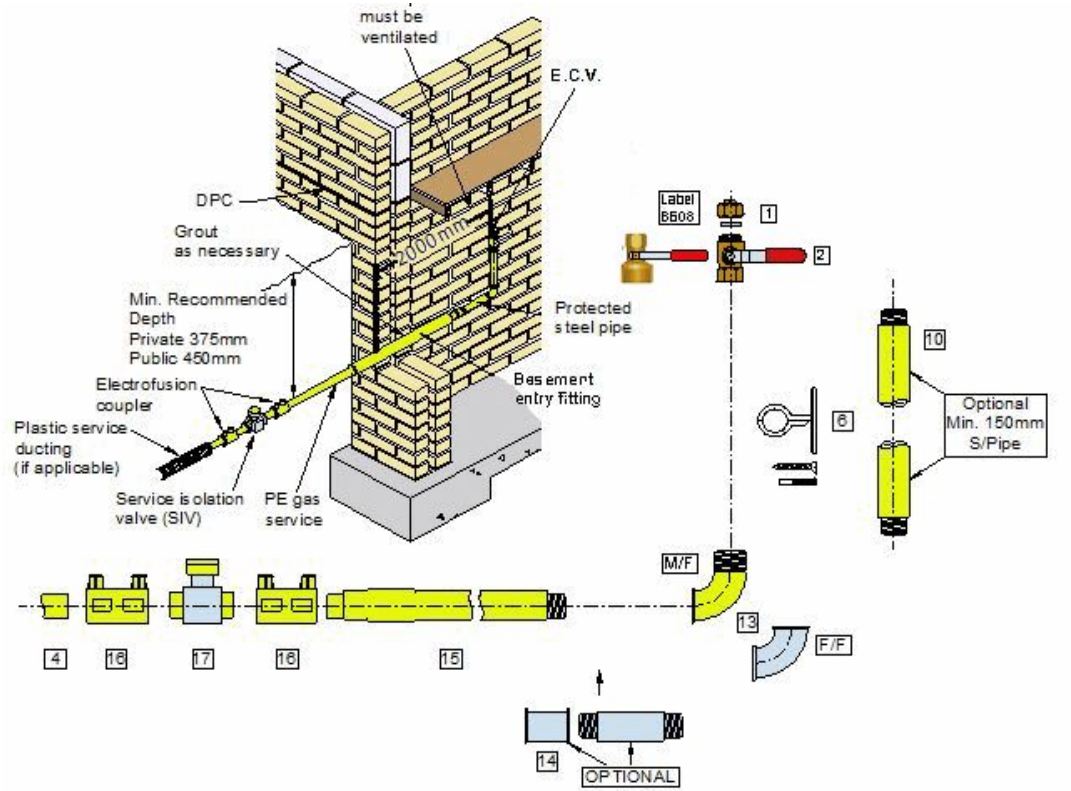


Figure 78 - LP PE service terminating in basement cellar (New Installation)

No	ITEM
	Service Information Label (B608)
1	**Emergency Control Valve Cap**
	¾″ BS 746 Cap c/w Washer
	1 ″BS 746 Cap c/w Washer
2	**Emergency Control Valve or Insulation Joint ECV**
	¾ ″BSPF x ¾ ″BS 746 M c/w Handle (Ball)
	1″ BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″ BSPF x 1″ BS 746 M c/w Handle (Ball)
4	**PE pipe 20/25/32 mm**
6	**Pipe Bracket**
	¾″ & 1″
10	**Galvanized Pipe (3 metre length) Optional**
	¾″ & 1″
13	**Galvanized Elbow**
	¾ ″BSPF / BSPF
	1″ BSPF / BSPF
	90º Elbow (M&F)
	¾ ″BSPM x ¾″ BSPF
	1″ BSPM x ¾″ BSPF
14	**Galvanized Socket Optional**
	¾″ BSPF / BSPF
	1 ″BSPF / BSPF
15	**Cellar Entry**
	25 mm x ¾″ BSPM x 500 mm
	32 mm x 1″ BSPM x 500 mm
16	**Electrofusion Coupler / Reducing Coupler**
	25 mm (40v)
	32 mm (40v)
	25 x 20 mm (40v)
	32 x 25 mm (40v)
17	**25 /32 mm Service Isolation Valve (SIV).**

Table 37 - LP PE service terminating in basement cellar (New Installation) material list

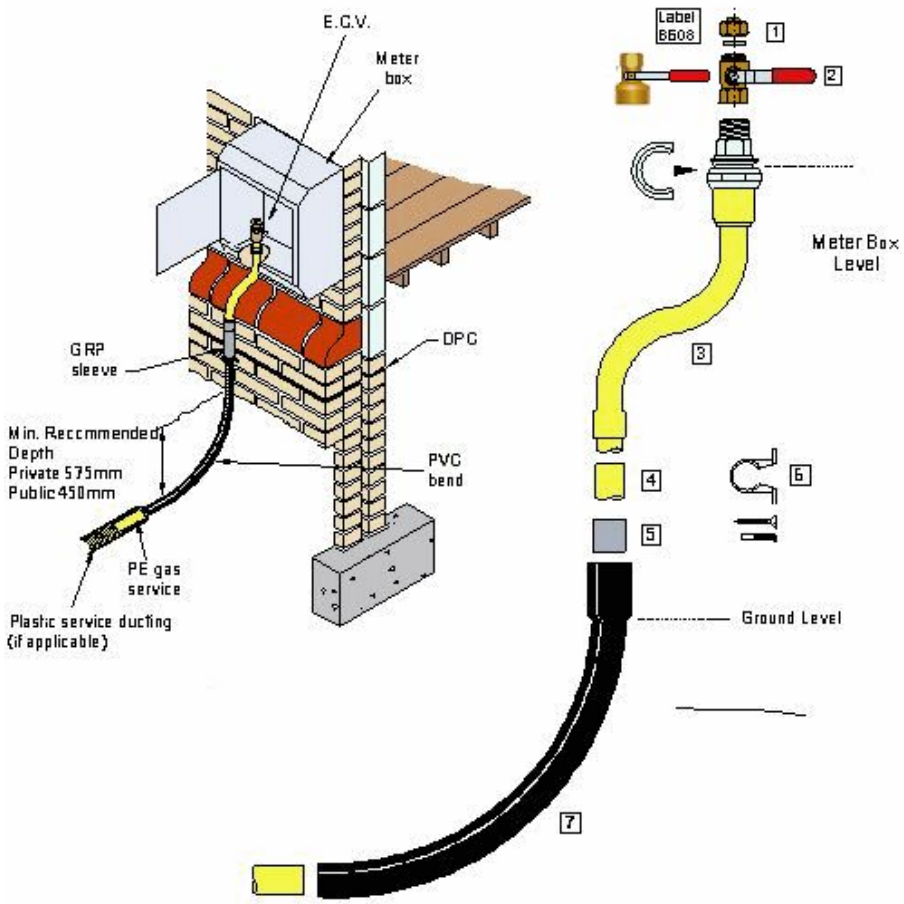
8 LOW PRESSURE ABOVE GROUND ENTRIES

8.1 General Requirements

1. You must seal the gap between the house entry tee and the wall.
2. Select the correct size house entry tee, you must not cut to size
3. Install the house entry tee a minimum of 2 brick courses above the DPC.
4. Check that the coating of the house entry tee has not been damaged while installing the fitting.
   Note: Damaged coating may result in future corrosion.
5. You must always fit a Service Isolation Valve on 63mm factory fitted house entry tee.
   Note: 63mm tees do not contain integral plugs.

8.2 Installation

1. You must use the correctly sized core drill to drill holes in the external and internal brickwork for house entry tees.
2. Diameter hole to be drilled though brick wall construction:
   - 35mm diameter hole for 20/25mm services,
   - 45mm diameter hole for 32mm services and
   - 80mm diameter hole for 63mm services.
3. Where a corbelled wall is present use a House entry tees.
   Note: The base of the house entry point must not be less than two courses above the top of the corbelled wall to allow the corbelled fitting to be fitted in accordance with



Note: Where the building construction involves a concrete raft, and there is not the recommended depth of cover between the concrete raft and proposed finished ground level (375mm), the developer must provide a slot or vertical channel in the raft to allow safe installation of the gas pipe.

SGN will not be responsible for breaking out the concrete rafts footings to provide a slot for the service pipe.

4. You must use Internal retaining washer's house entry tees to prevent movement of the tee away from the external wall.
   Note: Typical layout is shown is Figure 79 for sizes up to and including 32mm and Figure 80 for 63mm.
5. Hold the fitting on the plain section of pipe adjacent to the threaded end when tightening the ECV / elbow to the house entry fitting.
   Note: Due care should be taken not to damage protective coating on tee body when using Stillsons or grips when tightening fittings.
6. The GRP sleeving must be extended along the length of the service pipe and terminate below ground level.
   Note: This is because 63mm factory entry tees do not have a PVC radius bend.

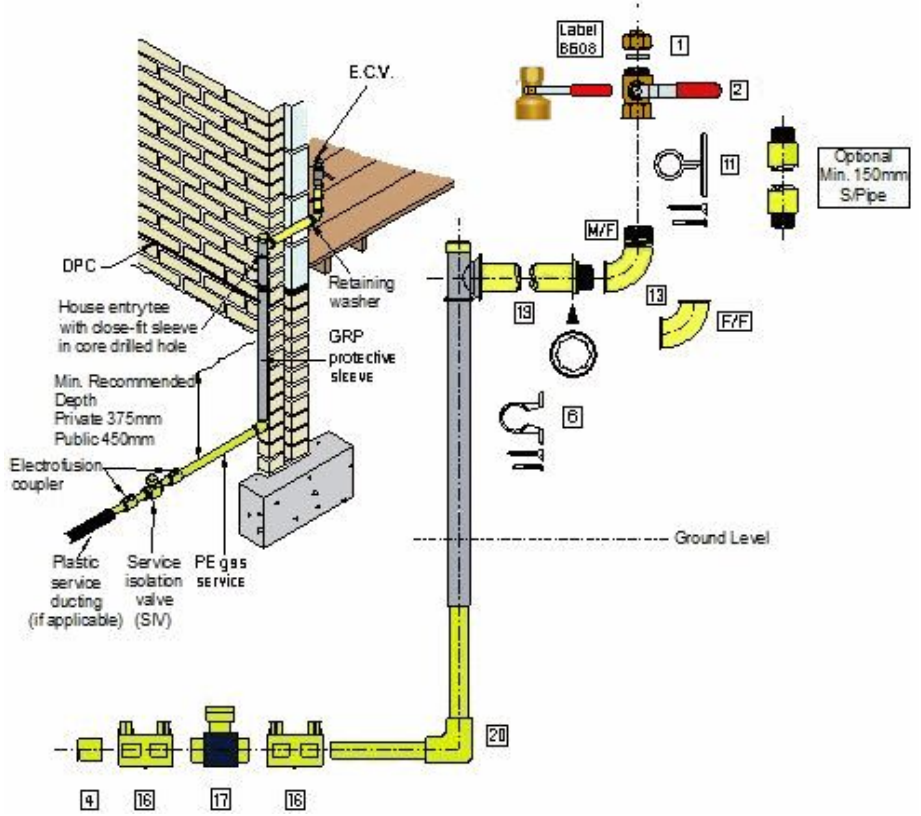


Figure 79 - LP Service using above ground entry tee

No	Item	
	Service Information Label (B608)	
1	**Emergency Control Valve Cap**	
	¾″ BS 746 Cap c/w Washer	
	1″ BS 746 Cap c/w Washer	
2	**Emergency Control Valve** or Insulation Joint ECV	
	¾″ BSPF x ¾″ BS 746 M c/w Handle (Ball)	
	1″ BSPF x ¾″ BS 746 M c/w Handle (Ball)	
	1″ BSPF x 1″ BS 746 M c/w Handle (Ball)	
	1 ½″ BSPF x 2″ BS 746 M c/w (Ball)	
4	PE pipe 20/25/32/63 mm *	
5	**GRP Sleeving (1 & 3 Metre Length)**	
6	**Pipe Clip for GRP Sleeving**	
	GRP Sleeving for 20mm PE pipe	
	GRP Sleeving for 32mm PE pipe	
11	**Pipe clip**	
13	**90° Elbow (M&F)**	
	¾″ BSPF x ¾″ BSPF	
	1″ BSPF x ¾″ BSPF	
16	**Electrofusion Coupler**	**Reducing Coupler**
	25mm (40v)	32 X 25 mm
	32mm (40V)	32 X 20 mm
	63mm (40v) *	
17	**Service Isolation Valve (SIV)**	
	25 mm	
	32 mm	
	63 mm	
20	**90 ° PE Elbow**	

Table 38 - LP Service using above ground entry tee material list

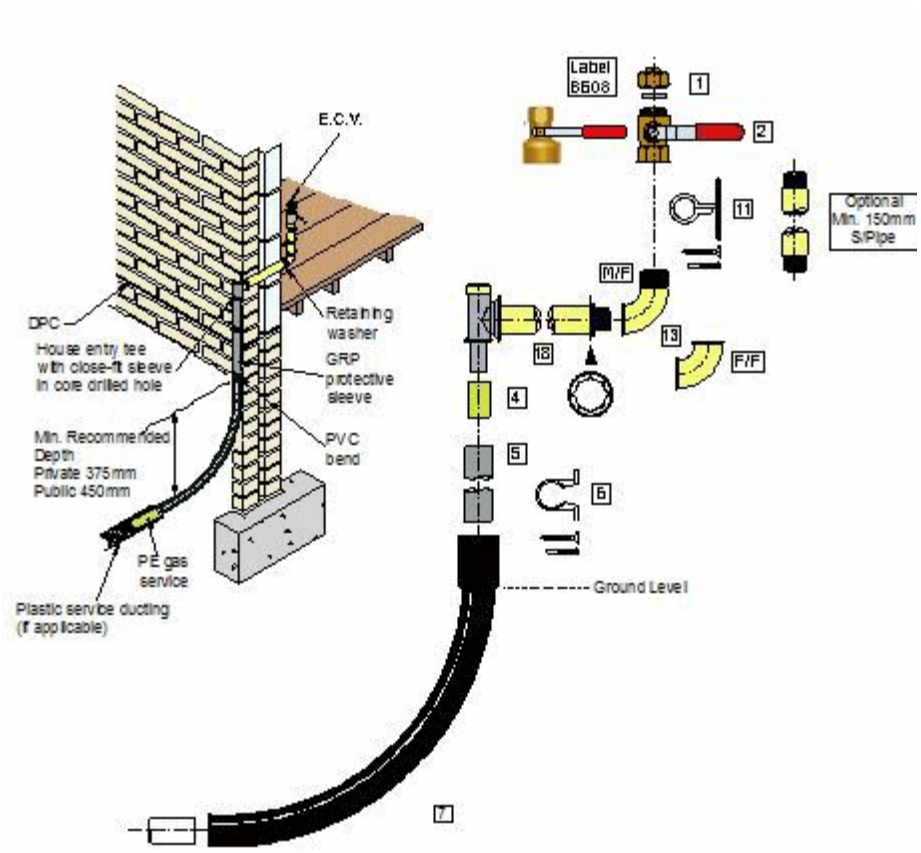


Figure 80 - LP Service using above ground entry tee using swept bend

No	Item
	Service Information Label (B608)
1	**Emergency Control Valve Cap**
	¾″ BS 746 Cap c/w Washer
	1″ BS 746 Cap c/w Washer

No	Item	
2	**Emergency Control Valve** or Insulation Joint ECV	
	¾″ BSPF x ¾″ BS 746 M c/w Handle (Ball)	
	1″ BSPF x ¾″ BS 746 M c/w Handle (Ball)	
	1″ BSPF x 1″ BS 746 M c/w Handle (Ball)	
	1 ½″ BSPF x 2″ BS 746 M c/w (Ball)	
4	PE pipe 20/25/32/63 mm *	
5	**GRP Sleeving (1 & 3 Metre Length)**	
6	**Pipe Clip for GRP Sleeving 25mm & 32 mm**	
7	**PVC Preformed Bend**	
11	**Pipe clip**	
13	**90º Elbow (M&F)**	
	¾″ BSPF x ¾″ BSPF / 1″ BSPF x ¾″ BSPF	
16	**Electrofusion Coupler**	**Reducing Coupler**
	25mm / 32mm (40V)	32 x 25 mm
	63 mm (40 v)	32 x 20 mm
17	**Service Isolation Valve (SIV).**	
	25mm / 32 mm / 63 mm	
18	**Above Ground House Entry Tee**	
	20 mm x ¾″ x 155 mm BSPM	
	20 mm x ¾″ x 345 mm BSPM	
	20 mm x ¾″ x 500 mm BSPM	
	20 mm x ¾″ x 610 mm BSPM	
	20 mm x ¾″ x 900 mm BSPM	
	32 mm x 1″x 345 mm BSPM	
	32 mm x 1″x 610 mm BSPM	
19.	**Factory Fitted House Entry Tee**	
	63 mm x 2″ BSMP x 150 mm (Electrofusion) *	
	63 mm x 2″ BSMP x 345 mm (Electrofusion) *	
	63 mm x 2″ BSMP x 500 mm (Electrofusion) *	
20	**90º PE Elbow**	

Table 39 - LP service using above ground entry tee and swept bend material list

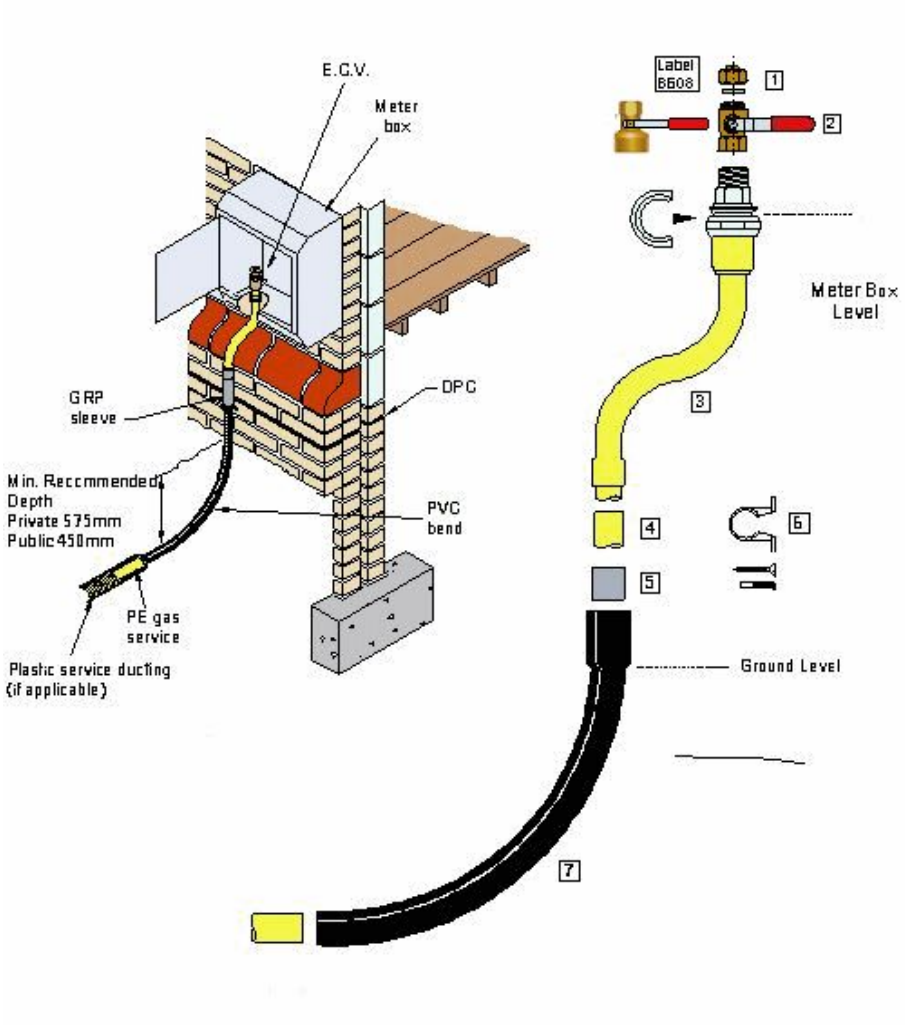


Figure 81- LP PE service to above ground entry (Corbelled walls)

No	Item
	Service Information Label (B608)
1	**Emergency Control Valve Cap**
	¾″ BS 746 Cap c/w Washer
	1″ BS 746 Cap c/w Washer
2	**Emergency Control Valve** or Insulation Joint ECV
	¾″ BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″ BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″ BSPF x 1″ BS 746 M c/w Handle (Ball)
3	**Corbelled meter box fitting**
	20 mm x ¾″ BSPF
	25 mm x ¾″ BSPF
4	**PE pipe 20 mm/25 mm/32 mm**
5	**GRP Sleeving (1 & 3 Metre Length)**
6	**Pipe Clip for GRP Sleeving**
	GRP Sleeving for 20 mm PE pipe
	GRP Sleeving for 32 mm PE pipe
7	**PVC Preformed Bend**

Table 40 - LP PE service to above ground entry (Corbelled walls) material list

9 METERS IN GARAGE

9.1 General Requirements

1. When you lay a service internally below ground you must be insert it in an approved steel sleeve or a prefabricated garage entry fitting.
2. You must position the ECV so that:
   a) damage is avoided e.g. garage doors, vehicle entry etc.
   b) the ECV cannot be accidentally operated (opened or closed) by the garage door.
3. You must construct all above ground pipe work in steel and secured to the wall.

9.2 Installation

1. You must take care to ensure that the service pipe is securely fitted to the wall.
   Note: Using the correct size pipe clips and position the meter clear of the doors at high level.
2. Where entry is by below ground method, you must use a preformed bend transition fitting.
   Note: Typical layouts are shown in Figure 82 and Figure 83
   Figure 82 illustrates a service entry at low level, but a high-level service entry is the preferred option, due to less risk of interference damage.
   Figure 83 illustrates a service entry below ground. The below ground entry fitting (bend) should be installed at the construction stage of the building prepared by the developer (this is usually undertaken at the planning stage by prior agreement with the developer.)
3. When a below ground entry bend is used, check that the sleeved PE pipe is clear of the building line.
   Note: No PE pipe must enter the building.
4. Under no circumstances must the fitting be cut.
   Note: Below ground entry fitting (bend) are available in various lengths.
5. When tightening the ECV / elbow to the house entry fitting, hold the fitting on the plain section of pipe below the threaded end.
   Note: Take care not to damage protective coating on tee body when using Stillsons or grips when tightening fittings.

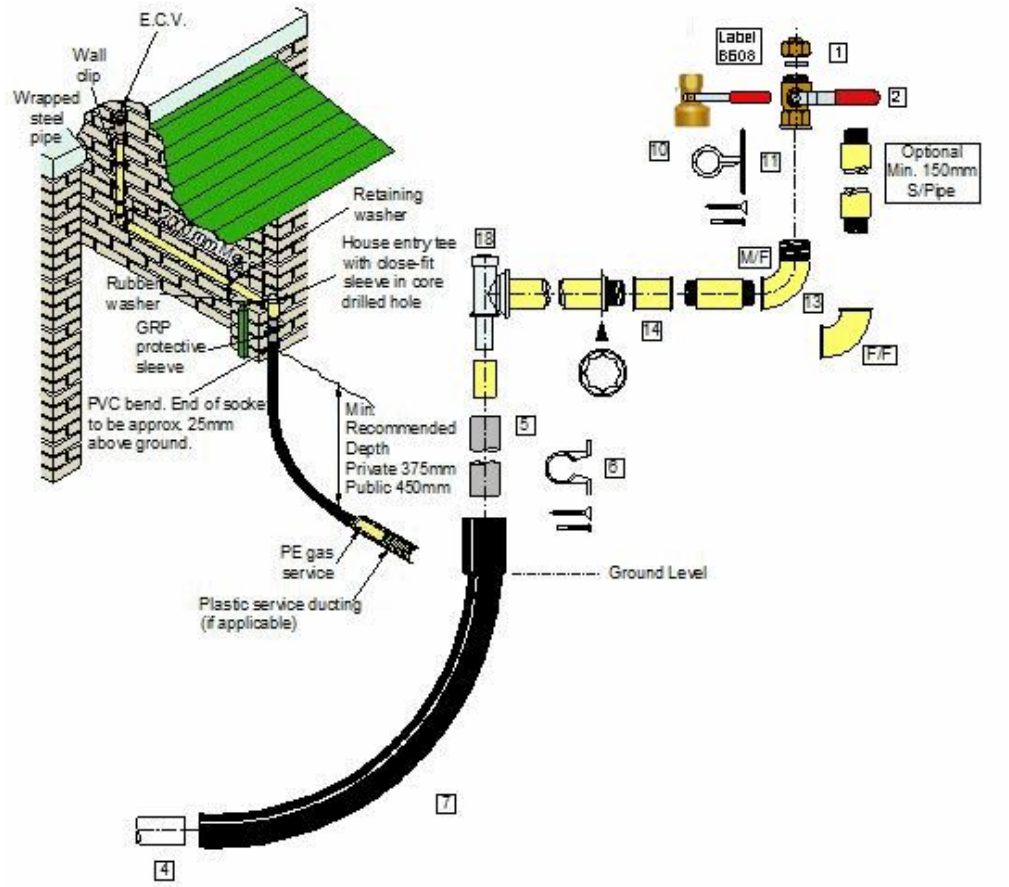


Figure 82 - LP service to garage (existing building)

No	Item
	Service Information Label (B608)
1	**Emergency Control Valve Cap** or Insulation Joint ECV
	¾″ BS 746 Cap c/w Washer
	1″ BS 746 Cap c/w Washer
2	**Emergency Control Valve**
	¾″ BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″ BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″ BSPF x 1″ BS 746 M c/w Handle (Ball)
4	PE pipe 20 /25/32 mm
5	**GRP Sleeving**
6	**Pipe Clip for GRP Sleeving**
7	**PVC Preformed Bend**
8	**Insulation Joint**
	¾″- BSPF/ BSPF Fire Resistant
	1″- BSPF/ BSPF Fire Resistant
	1 ½ ″ – BSPF/ BSPF Fire Resistant
	2″ BSPF/ BSPF Fire Resistant
10	**Galvanised/Steel Pipe**
11	**Steel bracket for pipe**
13	90° Elbow (M&F) & (F&F)
	¾″ BSPF x ¾″BSPF
	1″ BSPF x ¾″ BSPF
14	**Galvanised socket**
	¾″ BSPF / BSPF
	1″ BSPF / BSPF

Table 41 - LP service to garage (existing building) material list

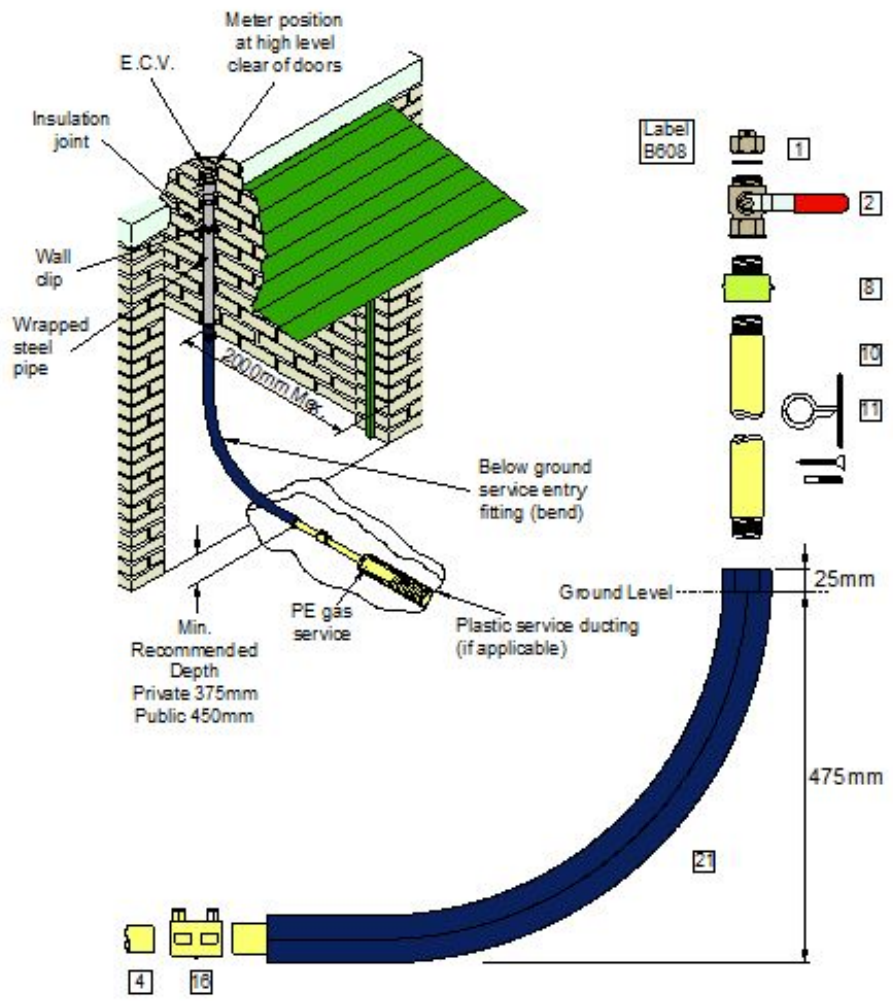


Figure 83 - LP service garage (New build)

No	Item
	Service Information Label (B608)
For items 1 to 8 see Table 41	
10	**Galvanised/Steel Pipe**
	1″
11	**Steel bracket for pipe**
13	90° Elbow (M&F) & (F&F)
	¾″ BSPF x ¾″BSPF
	1″ BSPF x ¾″ BSPF
14	**Galvanised socket**
	¾″ BSPF / BSPF
	1″ BSPF / BSPF
16	**Electrofusion coupler**
	20/25/32 mm
18	**Above Ground House Entry Tee**
	20 mm x ¾″ x 155 mm BSPM
	20 mm x ¾″ x 345 mm BSPM
	20 mm x ¾″ x 500 mm BSPM
	20 mm x ¾″ x 610 mm BSPM
	20 mm x ¾″ x 900 mm BSPM
	32 mm x 1″x 345 mm BSPM
	32 mm x 1″x 610 mm BSPM
21	**Below Ground Entry fitting (bend)**
	¾″ x 20 mm sizes 0.5m x 0.5m
	½″ x 25 mm sizes 1m x 0.5m
	¾″ x 25 mm sizes 1m x 0.5m
	1″x 32 mm sizes 1m x 0.5m

Table 42 - LP service garage (New build) material list

10 SERVICE TO BELOW GROUND ENTRY

10.1 General Requirements

1. The service should enter the premises in accordance with Figure 84.
2. The horizontal sleeve section should terminate in a 500mm square hole in the floor of the premise
3. The below ground entry fitting (bend) must be clear from the building line to allow connection to the PE service pipe.
4. Under no circumstances must the preformed steel bend be cut.
5. The gap between the steel bend and the wall must be sealed.
6. This entry type must only be installed where a customer has requested it, and has agreed to arrange for a qualified tradesman to complete the building works necessary to allow SGN to complete the installation of the pipework only.
7. Under no circumstances must SGN be responsible for excavation within a property to facilitate this installation.

10.2 Installation

1. A typical layout is shown is Figure 84.

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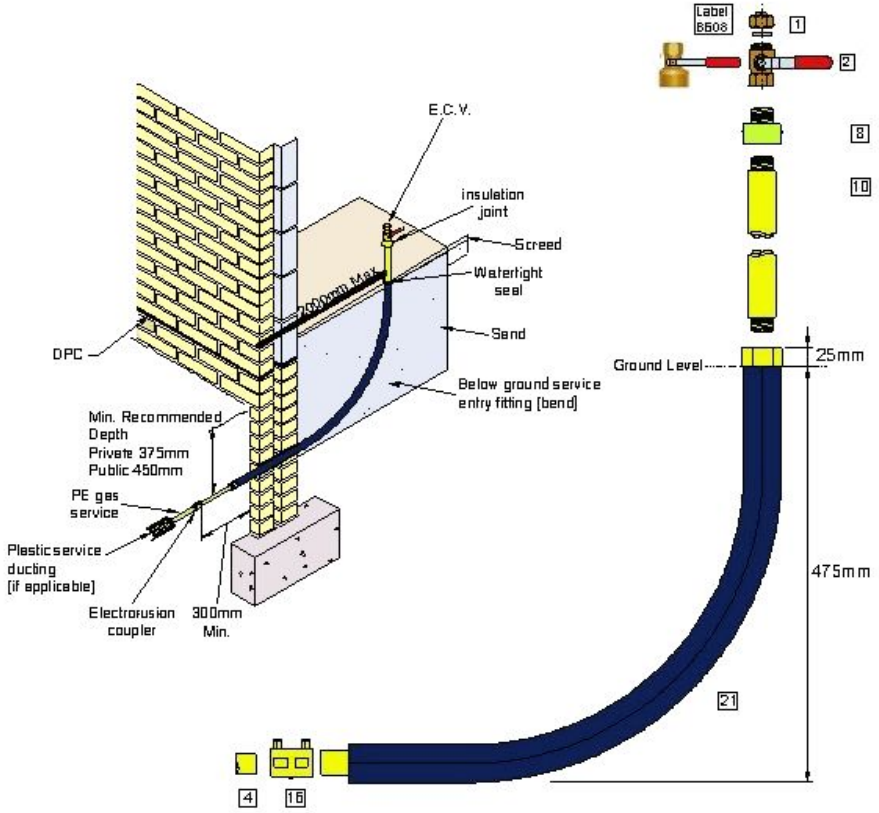

Figure 84 - LP Service to Below Ground Entry (Solid Floor)

No	Item
	Service Information Label (B608)
1	**Emergency Control Valve Cap**
	¾″ BS 746 Cap c/w Washer
	1″ BS 746 Cap c/w Washer
2	**Emergency Control Valve** or Insulation Joint ECV
	¾″ BSPF x ¾″BS 746 M c/w Handle (Ball)
	1″ BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″ BSPF x 1″ BS 746 M c/w Handle
4	**PE Pipe**
	20 /25 /32 mm
8	**Insulation Joints**
	¾″ BSPF/BSPF Fire Resistant
	1″ BSPF/BSPF Fire Resistant
10	**Galvanized Pipe (3 metre length)**
	¾″
	1″
16	**Electrofusion Coupler**
	20 /25 /32 mm
21	**Below Ground Entry fitting (Bend)**
	¾″ x 20 mm sizes 0.5m x 0.5m ½″ x 25 mm sizes 1m x 0.5m ¾″ x 25 mm sizes 1m x 0.5m 1″x 32 mm sizes 1m x 0.5m

Table 43 - LP Service to Below Ground Entry (Solid Floor) material list

11 PROTECTION FROM VANDALISM

11.1 General requirements

1. Where there is a serious threat of vandalism to an external service entry, or if you are carrying out remedial work following interference damage, preference should be given to providing as follows: -
   a) an internal meter position or where this is not possible,
   b) steel pipe must be used as shown in Figure 85 & Figure 86.

2. When tightening the ECV / elbow to the house entry fitting, the fitting should be held on the plain section of pipe below the threaded end.

3. Stillsons or grips should not be used to hold the tee piece on the outside the building.

11.2 Installation

1. Make the transition of the PE service pipe to the steel pipe above ground using a transition fitting.
   Note: This can be fixed against the wall just above ground surface level.
2. Use pipe clips to support the steel pipe above ground.
   Note: Figure 86 illustrates the house entry tee with a screwed BSP thread to allow the steel riser to be connected.

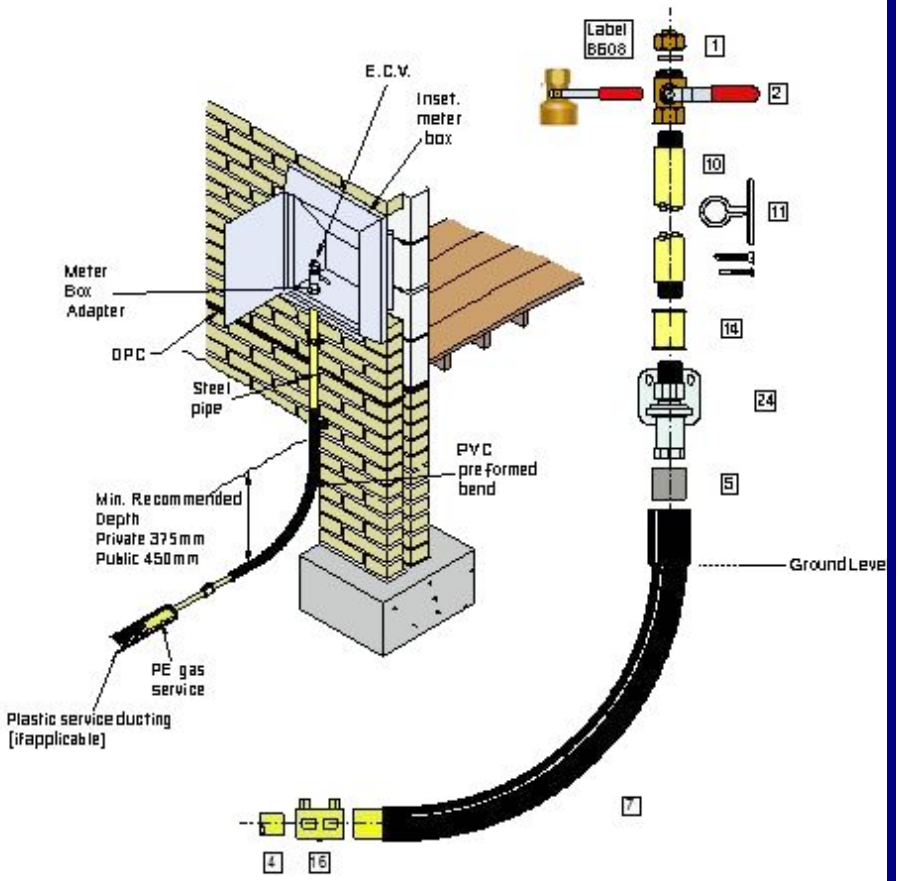

Figure 85 - PE service to inset meter box

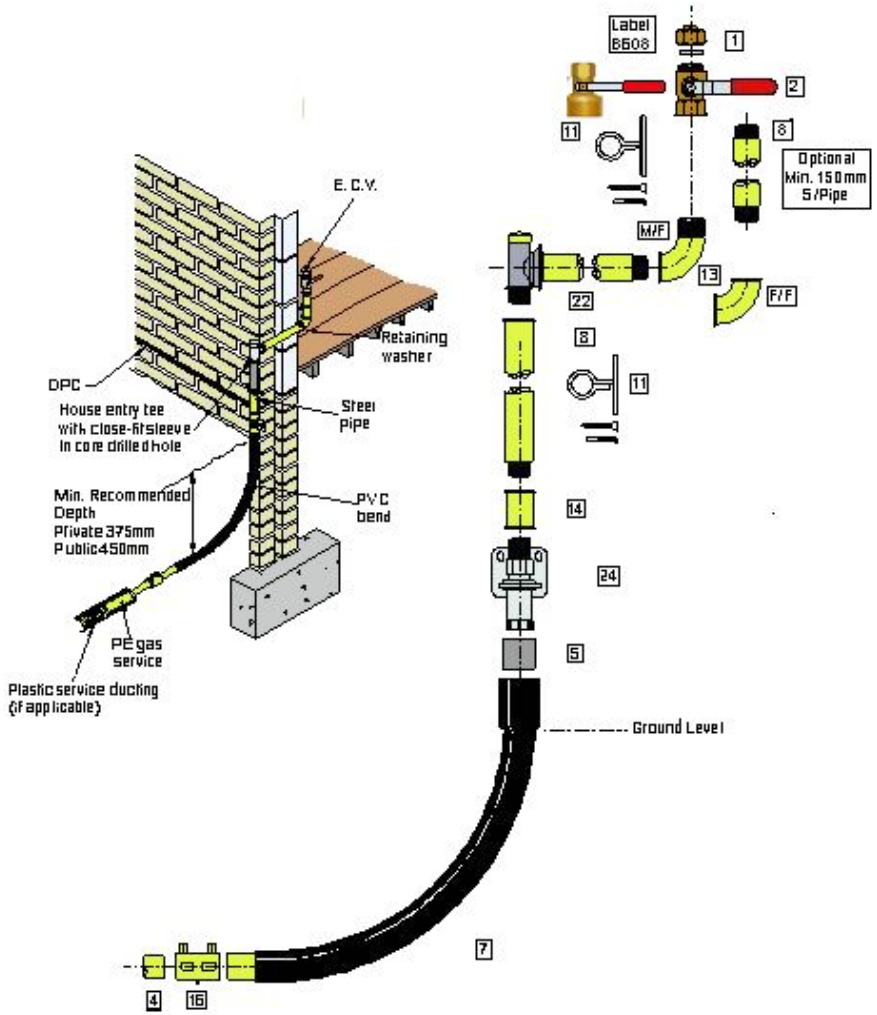

Figure 86 - PE service to above ground entry position

NO	ITEM
	Service Information Label (B608)
1	**Emergency Control Cap**
	¾″ BS 746 Brass Cap c/w Washer
	1″ BS 746 Brass Cap c/w Washer
2	**Emergency Control Valve**
	¾″ BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″ BSPF x ¾″ BS 746 M c/w Handle (Ball)
	1″ BSPF x 1″ BS 746 M c/w Handle (Ball)
4	**PE pipe 20 /25/32 mm**
5	**GRP Sleeving**
	GRP Sleeving for 20 mm PE pipe
	GRP Sleeving for 32 mm PE pipe
7	**PVC Preformed Bend**
8	**Insulation Joint**
	¾″- BSPF/ BSPF Fire Resistant
	1″- BSPF/ BSPF Fire Resistant
	1″ BSPF x 1″ BS 746 M c/w Handle (Ball)
10	**Galvanised pipe (3 metre)**
11	**Pipe clip**
13	90° Elbow (M&F) & (F&F)
	¾″ BSPF x ¾″BSPF
	1″ BSPF x ¾″ BSPF
14	**Galvanised socket**
	¾″BSPF x ¾″ BSPF
	1″ BSPF x ¾″ BSPF
16	**Electrofusion coupler**
	20/ 25 /32 mm
22	**Above ground house entry tee**
24	**Transition fitting**

Table 44 - Material list for figures 84 and 85

12 MP SERVICE TO SURFACE MOUNTED METER BOX

12.1 General Requirements

1. A service excess flow valve (SEFV) must be installed at the outlet of the electrofusion tapping tee (Section D4) for domestic services up to and including 32 mm diameter.
2. If a SEFV is not to be used, for example commercial type properties, then a service isolation valve must be installed in accordance with Section D2.
3. The meter box must be located on the external wall to the property.
4. The tip of the relief vent pipe must not be located closer than 1.0 m to any opening into a property and must be at least 1.5 m away from any electrical equipment, in accordance with Figure 87.

12.2 Installation of meter box

1. Reference must be made to Appendix H for installation of meter boxes.
2. The meter box should contain a set of labels (Section E18) that indicate that:
   a) the ECV must be slowly turned on
   b) identifies the position of the vent pipe
   c) prohibits the removal of the rear knock out and identifies the pipe exit point.

12.3 Installation of the service regulator

1. Only an OFGEM Approved Meter Installer (OAMI) may work on the system downstream of the Emergency Control Valve.
   Note: The MP regulator is now part of the meter installation.

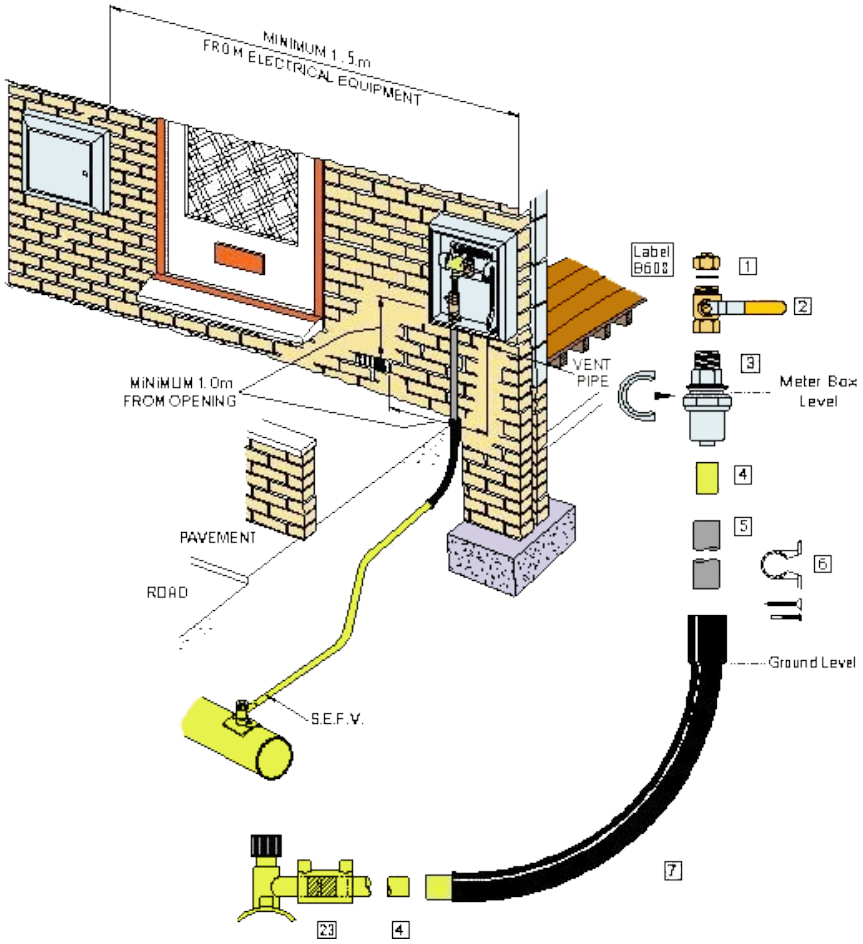

Figure 87 - MP PE service to surface mounted meter box

NO	ITEM
	Service Information Label (B608)
1	**Emergency Control Cap**
	¾″ BS EN 10806 Brass Cap c/w Washer
	1″ BS EN 10806 Brass Cap c/w Washer
2	**Emergency Control Valve**
	¾″ BSPF x ¾″ BS EN 10806 M c/w Handle (Ball)
	1″ BSPF x ¾″ BS EN 10806 M c/w Handle (Ball)
	1″ BSPF x 1″ BS EN 10806 M c/w Handle (Ball)
3	**Meter Box Adaptor**
	20 mm x ¾″ BSPM
	25 mm x ¾″ BSPM
	32 mm x ¾″ BSPM
	32 mm x 1″ Galv. BSPM
4	**20/25/32 mm PE Pipe**
5	**GRP Sleeving (1 & 3 metre length)**
6	**Pipe Clip for GRP Sleeving**
	GRP Sleeving 38 mm
	GRP Sleeving 38 mm
7	**PVC Preformed Bend**
23	**SEFV**
	32 mm SEFV

Table 45 - MP PE service to surface mounted meter box material list

13 MP SERVICE TO INSET METER BOX

13.1 General Requirements

1. Only purposed designed MP cavity/recess meter box must be used.
2. The meter box must be located on the external wall to the property. (see Figure 88 and Table 46).
3. It must be positioned between 500mm and 1500mm above finished ground level.
   Note: Check ground levels to confirm the correct depth of the service can be achieved after completion of civil works by the developer.
4. The location of the tip of the relief vent pipe must not be located closer than 1.0 m into a property and a minimum distance of 1.55 m away from any electrical equipment, see Appendix H.
   Note: The vent tip is usually positioned at the outlet of the meter box where the installation pipe leaves the box, not the service pipe. This is installed when the meter and regulator are fitted.

13.2 Installation of meter box (visual checks)

1. Reference must be made to Appendix H for installation of meter boxes.
2. The meter box should contain a set of labels that indicate that:
   a) the ECV must be opened slowly
   b) identifies the position of the vent pipe
   c) prohibits the removal of the rear knock out and identifies the pipe exit point.

   Note: The labels mentioned a and b are usually contained in the MP Meter installation kit, so will usually be installed by the meter worker.
3. The door on the meter box must have high and low-level air vents that is equivalent to 2% of the floor area.
4. A visual inspection should be carried out before installing the service
5. pipe:
   a) There must **not** be any holes or spigot constructed, (or subsequently made) in the box that could allow gas to enter any cavity or into the property. There must not be any holes in the back of the housing for any purpose, for example the routing of Mains Equipotential Bonding (MEB) wires.
   b) Neither installation pipework nor MEB cable must enter the property directly from the meter box for example the installation pipework and MEB must exit the meter box before entering the property – see Appendix H.
   c) The meter box must not be secured by a method that involves drilling holes into the box, for example securing with hammer fix screws is not allowed.
   d) A service must not be installed into an inset meter box with its main body damaged, such that there is a risk that gas may enter the cavity or property.
6. If you cannot keep to any of the general or visual check requirements, you must not install the service into the box.
7. Self-adhesive labels must be positioned inside the meter box as indicted in Section E11.

13.3 Service installation

1. The Servicelaying will be in accordance section C.
2. On domestic installations (up to 6m3hr), a Service Excess Flow Valve (SEFV) must be installed at the outlet of the electrofusion tapping tee.
3. Where gas flow exceeds 6m3hr, a SEFV must **not** be installed. Instead, a Service Isolation Valve (SIV) must be installed accordance with Section D3.
4. Test and commission the service in accordance with Section F1.
5. Complete the service information label in accordance with Section E18.

13.4 Installation of the service regulator

1. Only an OFGEM Approved Meter Installer (OAMI) may work on the system downstream of the Emergency Control Valve.
   Note: The MP regulator is now part of the meter installation.
2. A service excess flow valve (SEFV) must be installed at the outlet of the electrofusion tapping tee.

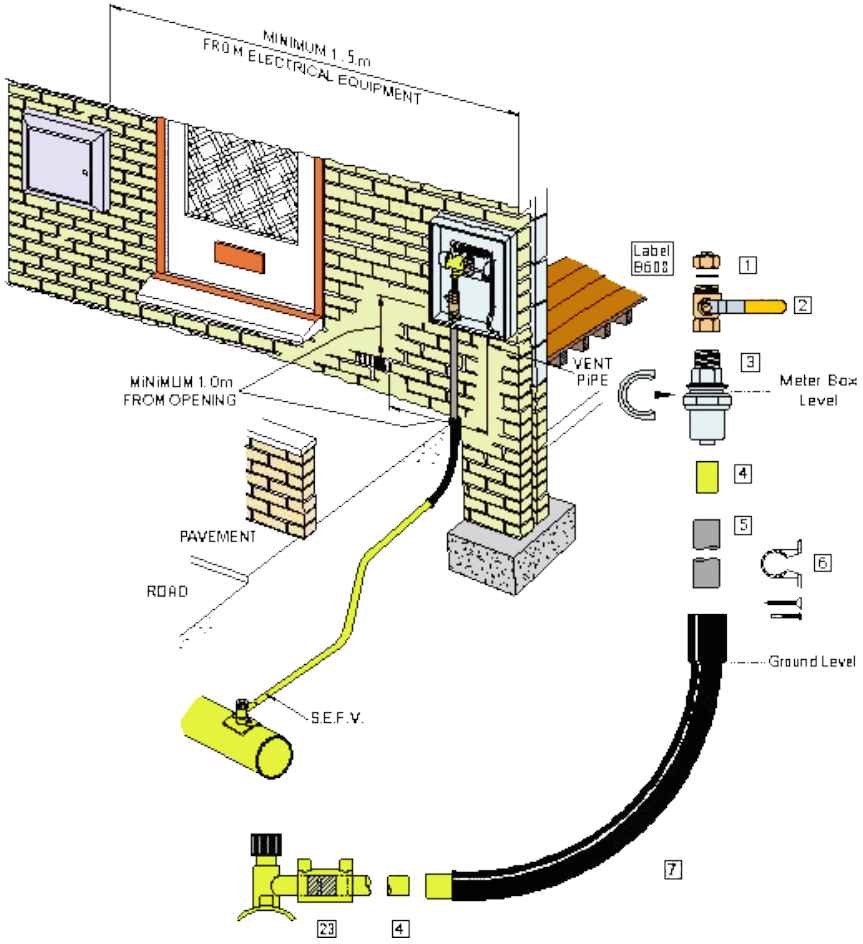

Figure 88 - MP service to inset meter box

NO	ITEM
	Service Information Label (B608)
1	**Emergency Control Cap**
	¾″ BS EN 10806 Brass Cap c/w Washer
	1″ BS EN 10806 Brass Cap c/w Washer
2	**Emergency Control Valve**
	¾″ BSPF x ¾″ BS EN 10806 M c/w Handle (Ball)
	1″ BSPF x ¾″ BS EN 10806 M c/w Handle (Ball)
	1″ BSPF x 1″ BS EN 10806 M c/w Handle (Ball)
3	**Meter Box Adaptor**
	20 mm x ¾″ BSPM
	25 mm x ¾″ BSPM
	32 mm x ¾″ BSPM
	32 mm x 1″ Galv. BSPM
4	**20/25/32 mm PE Pipe**
5	**GRP Sleeving (1 & 3 metre length)**
6	**Pipe Clip for GRP Sleeving**
	GRP Sleeving 38 mm
	GRP Sleeving 38 mm
7	**PVC Preformed Bend**
23	**SEFV**
	32 mm SEFV

Table 46 - MP service to inset box materials list

14 MP PE SERVICE TO UNIBOX METER BOX

14.1 General requirements

1. You must install a service excess flow valve at the outlet of the top tee in accordance with Section D4.
2. The meter box must be located on the external wall to the property and the regulator must be installed in the Unibox meter box.
3. You must locate the tip of the relief vent pipe no closer than 1.0 m to any opening into a property and at least 1.5 m away from any electrical equipment, in accordance with Figure 89.
4. You must ensure the end of the vent pipe cannot be buried.

14.2 Installation

1. Figure 90 shows the layout.

14.3 Installation of the service regulator

2. Only an OFGEM Approved Meter Installer (OAMI) may work on the system downstream of the Emergency Control Valve.
   Note: The MP regulator is now part of the meter installation

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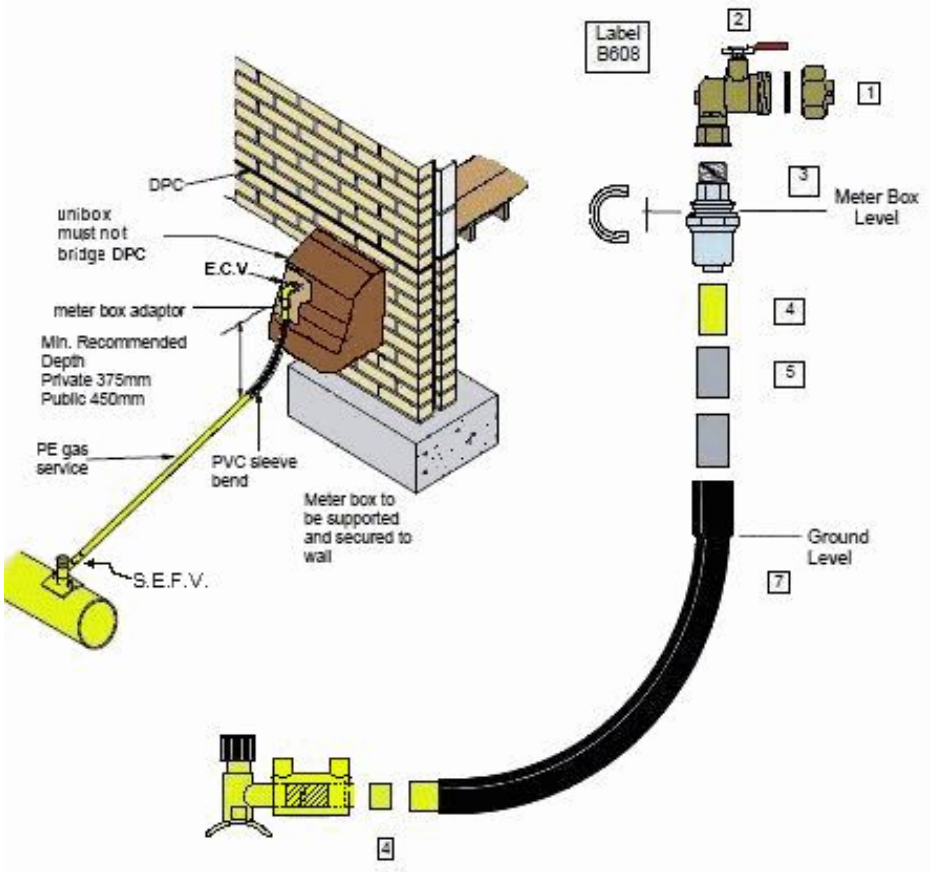


Figure 89-MP PE service to Unibox meter box

No	Item
	Service Information Label (B608)
1	**Emergency control valve cap & washer.**
	1″ x BS EN 10806 Brass Cap c/w washer
2	**Emergency Control Valve**
	¾″ BSPF x 1″ BS EN 10806 M Unibox (Ball) Emergency Control Valve
3	**Meter Box Adaptor**
	20 mm x ¾″ Unibox
	25 mm x ¾″ Unibox
	32 mm x ¾″ Unibox
4	**20/25/32 Pipe**
5	**GRP Sleeving**
7	**PVC Preformed Bend**
23	**SEFV**
	32 mm SEFV

Table 47-MP PE service to Inibox meter box materials list

15 MP PE SERVICE SEMI-CONCEALED METER BOX

15.1 General requirements

1. You must install a service excess flow valve at the outlet of the top tee in accordance with Section D4.
2. The meter box must be located on the external wall to the property and the regulator must be installed in the semi-concealed meter box.
3. You must locate the tip of the relief vent pipe no closer than 1.0 m to any opening into a property and at least 1.5 m away from any electrical equipment, in accordance with Figure 90.
4. You must ensure the end of the vent pipe cannot be buried.

15.2 Installation

1. Figure 90 shows the layout.

15.3 Installation of the service regulator

2. Only an OFGEM Approved Meter Installer (OAMI) may work on the system downstream of the ECV.
   Note: The MP regulator is now part of the meter installation

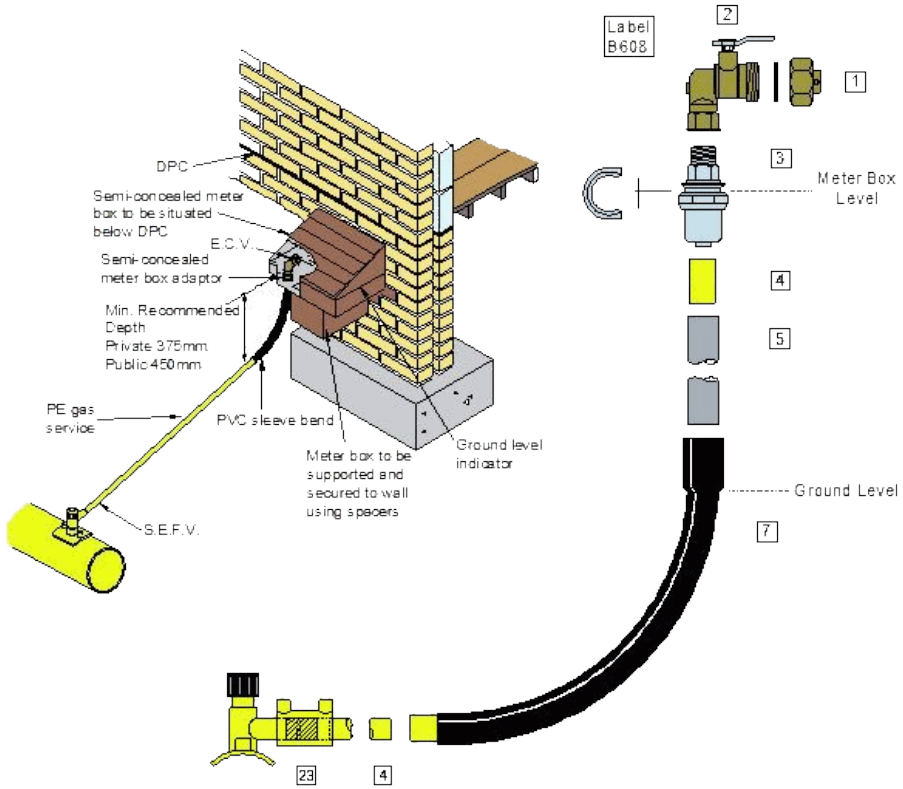


Figure 90 - MP PE service to semi concealed meter box

No	Item
	Service Information Label (B608)
1	**Emergency control valve cap & washer.**
	1″ x BS EN 10806 Brass Cap c/w washer
2	**Emergency Control Valve**
	¾″ BSPF x 1″ BS EN 10806 M Semi-Concealed (Ball) Emergency Control Valve
3	**Meter Box Adaptor**
	20 mm x ¾″ Semi-Concealed
	25 mm x ¾″ Semi-Concealed
	32 mm x ¾″ Semi-Concealed
4	**20/25/32 Pipe**
5	**GRP Sleeving**
7	**PVC Preformed Bend**
23	**SEFV**
	32 mm SEFV

Table 48 - MP PE service to semi concealed meter box materials list

16 MP BOUNDARY SERVICE REGULATOR

16.1 General Requirements

1. MP services require a pressure regulator to provide a low-pressure (below 75 mbar) outlet supply.
   Note: Service regulators must meet the requirements of SGN/SP/E/28.
2. The regulator must be installed and commissioned by a competent operative and in accordance with the manufacturer's instructions.
3. A service excess flow valve (SEFV) must be installed at the outlet of the service tee see Section D4.

16.2 General - Regulator housing requirements

1. Service regulator kiosks supplying domestic premises must be sited outside any building or housings and be installed in the open.
2. The regulator and housing must be sited no less 3 metres from an occupied building but as close to the property boundary as possible on private ground.
3. Fixed ventilation is provided through the walls or roof of the regulator kiosk and this must not be blocked, restricted or sealed.
4. Ventilation provided must not be less than 2% of the floor housing area.
5. When reviewing the location of the housing which near to the public highway the following should be considered: -
   i. Accessibility of site,
   ii. Proper means of safe access and egress for maintenance, inspection and emergencies,
   iii. The avoidance of undue risk of accidental damage to the installation, such as vehicle impact,
   iv. The possibility of flooding, subsidence or other naturally occurring hazards,
   v. Avoid below ground installations where traffic hazards and parking make maintenance difficult,
   vi. Known planned alterations or extensions to buildings which would affect the installation,
   vii. Avoidance of below ground installations where traffic hazards and parking make maintenance difficult.
   viii. Service regulators supplying domestic premises must be sited outside any building and be installed in the open, in surface mounted or inset mounted boxes or housing such as a GRP Kiosk.
   ix. The avoidance of hazardous or potentially hazardous conditions and of any gas venting from regulator relief valves entering property through open windows, airbricks, balanced flues or similar openings in the structure.
   x. Clearance from underground or above ground apparatus and large trees.
6. Where the regulator building, construction involves a concrete raft, and there is not the recommended depth of cover between the concrete raft and proposed finished ground level (375mm), a slot or vertical channel in the raft must be provided by the developer to allow safe installation of the gas pipe.
   Note: SGN will not be responsible for breaking out the concrete raft footings to provide a slot for the service pipe.
7. PVC bends must not be cut to allow for reduced depth.
   Note: PE pipes should protrude above the finished surface level and the correct depth and bend radius of the pipe must be maintained.
8. PE pipe must not extend above ground level into any boundary regulator housing.

16.3 Installation

1. Check the regulator assembly for obvious signs of damage (contact your Manager if damage is found).
2. Check the assembly is free from debris or other foreign matter, e.g. Swarf, PTFE or jointing compound.
3. PE steel transition fittings must be used on the inlet and outlet to the regulator in accordance with Figure 91.
4. Mark the finished surface level of the installation onto the entry and outlet pipework as per manufacturers' instructions.

5. Carefully lower the assembly into your excavation and make sure that it is vertical and level.
6. Backfill and compact around the assembly to finished level.
7. Place the concrete pre-cast kiosk base over the installed regulator and check for level.
8. Fit the kiosk onto the base and check for level. Alter level if required.
9. Disconnect the service regulator to facilitate the inlet and outlet pipework pressure tests in accordance with Section F2.
10. Where gas to the property(s) is not required immediately, the ECV must be capped off and secured.
11. A trained and competent operative must carry out testing & commissioning of the regulator.
12. The low-pressure service to the property must be completed in accordance with the appropriate section of this work instruction.
13. Check the outlet pressure is correct at the ECV prior to leaving site.

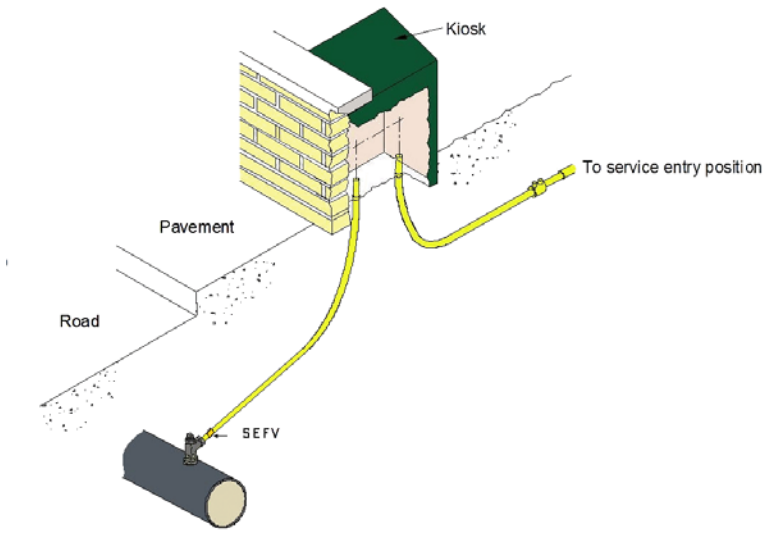


Figure 92 - typical layout for boundary regulator kiosk general view

16.4 PE Service Protection from Vandalism

See Section E17_vandalism

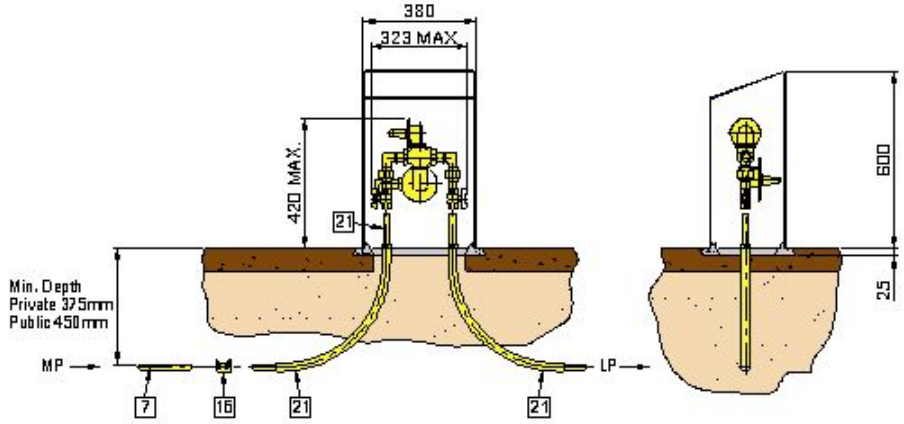


Figure 91 - typical layout for boundary regulator

No	Item
	Service Regulator
7	**PE Service Pipe 25 /32 mm**
16	**Electrofusion coupling 25 /32 mm**
21	**PE ST Transition fitting**
	¾″ x 20 mm sizes 0.5m x 0.5m ½″ x 25 mm sizes 1m x 0.5m ¾″ x 25 mm sizes 1m x 0.5m 1″x 32 mm sizes 1m x 0.5m

Table 49 - Boundary Regulator material list

17 INTERMEDIATE PRESSURE SERVICES

17.1 New Services

1. The proposed Intermediate Pressure (I.P.) service termination and regulator position will have been decided at the design stage and detailed in the Approved Design including the position of the regulator housing and hazardous areas.
2. Note must be taken of the positions of ventilators, boiler flue terminals and potential sources of ignition that may affect the siting of the regulator**.**

17.2 General - Regulator housing requirements

1. Service regulators supplying domestic premises must be sited outside any building or housings and be installed in the open.
2. The regulator housing must be sited in accordance with the size of the inlet pipe proximity distance stated in SGN/WI/ML/1 Table 11 or Table 12 and in all cases no less 3 metres.
3. IP domestic services must not be installed:
   - within 3 metres of a building.
   - in an inset meter box.
   - In a bolt meter box, which is fixed to an occupied building
   - under the footing of the building.
   - under the base of a load-bearing wall or
   - under a floating raft.
   - I.P services must not enter any premises or terminate at the building line.
4. When reviewing the location of the housing which near to the public highway the following should be considered: -
   i. Accessibility of site,
   ii. Proper means of safe access and egress for maintenance, inspection and emergencies,
   iii. The avoidance of undue risk of accidental damage to the installation, such as vehicle impact,
   iv. The possibility of flooding, subsidence or other naturally occurring hazards,
   v. Avoid below ground installations where traffic hazards and parking make maintenance difficult,
   vi. Known planned alterations or extensions to buildings which would affect the installation,
   vii. The avoidance of hazardous or potentially hazardous conditions and of any gas venting from regulator relief valves entering property through open windows, airbricks, balanced flues or similar openings in the structure.
5. Where the regulator building, construction involves a concrete raft, and there is not the recommended depth of cover between the concrete raft and proposed finished ground level (375mm), a slot or vertical channel in the raft must be provided by the developer to allow safe installation of the gas pipe.
   Note: Note: SGN will not be responsible for breaking out the concrete raft footings to provide a slot for the service pipe.
6. PVC bends must not be cut to allow for reduced depth.
   Note: PE pipes should protrude above the finished surface level and the correct depth and bend radius of the pipe must be maintained.
7. PE pipe must not extend above ground level into any boundary regulator housing.

17.3 IP Service to Regulator Housings

17.3.1. General Requirements

1. Pipe work must be sleeved through the wall entry and the sleeve sealed.
2. Where Governor Riser Transition fittings are used, the fittings must be firmly set into a concrete base to provide a firm anchoring point.
3. Always fit a Service Isolation Valve on a governor riser transition fitting, as there is no integral valve within the fitting.
4. Where the regulator housing is removable, a safe method of lifting the housing should be fitted, i.e. lifting eyes.

Your manager will arrange for a hazardous area drawing to be produced.

Note: Dangerous Substance and Explosive Atmospheres Regulations (DSEAR) requires these drawing for all installations. The extents of the hazardous areas identified in the drawing will influence the location of the housing in relation to its proximity to properties or potential ignition sources.

17.4 IP Service- Service Regulator

17.4.1. General Requirements

1. I.P services require a regulator to provide a low-pressure (below 75 mbar) outlet supply or for some purposes a medium pressure 2bar outlet supply.
2. Fixed ventilation is provided through the walls or roof of the regulator kiosk and this must not be blocked, restricted or sealed. Ventilation provided must not be less than 2% of the floor housing area.
   Note: The ventilation should be achieved by purpose designed, non-adjustable louver type ventilators and/or loose doors/lids.
3. For boxes and housing that do not comply with these requirements your Operational Manager must be consulted for the ventilation requirements.
4. The installation must be sited on private property (see 17.2 for further information on the siting of the housing).
   Note: A note must be taken of the approved design with respect to the hazardous area drawings and the position of appliance terminals, flues and ventilation grills.
5. The hazardous zone classification with the meter box/housing must be deemed to be a zone 2.
6. The regulator must be located on a suitable base constructed in accordance with the approved design or a base supplied by the manufacturer of the regulator.
7. The regulator must be installed and commissioned by a competent operative in accordance with the manufacturer's instructions.

17.4.2. Installation

1. Check the regulator assembly for obvious signs of damage.
   Note: Contact your Operational Manager if damage is found.
2. Check the assembly is free from debris or other foreign matter, such as Swarf, PTFE or jointing compound.
3. PE below ground-preformed bends must be used on the inlet and outlet to the regulator in accordance with Figure 94.
4. Mark the finished surface level of the installation onto the entry and outlet pipe work as per manufacturer's instructions.
5. Disconnect the service regulator to facilitate the inlet and outlet pipe work pressure tests in accordance with Section F2.
6. Where gas to the property(s) is not required immediately, the outlet pipe work from the regulator must be capped off and secured.
7. All fittings must be of flanged or welded design.
   Screwed threads are not permitted except on the low-pressure outlet pipe work.
8. Position the assembly in the excavation, vertical and level, backfill and compact to finished level.
9. Place the concrete pre-cast kiosk base over the installed regulator and check for level.
10. Where the base is a bespoke design for the regulator it must be cast in place in accordance with the approved design and allowed to cure for a period of 7 days.
11. Fit the kiosk onto the base and check for level. Adjust level if required.
12. A trained and competent operative must carry out testing & commissioning of the regulator.
13. The outlet pressure must be checked at the ECV prior to leaving site if the low-pressure service is connected and commissioned.

17.5 Completion

1. Where the regulator is not installed at the same time as the service is laid, make sure that the inlet valve is left in the closed position and blanked on completion of commissioning with an approved blank flange.
2. Service Labels must be completed, displayed and attached to the service pipe.
3. The outlet from the regulator must be completed in accordance the appropriate section of this work instruction.

17.6 IP PE Service Protection from Vandalism

17.6.1. General Requirements

Where there is a serious threat of vandalism to an external IP service entry to a regulator housing, or as part of the remedial work following interference damage, steel pipe must be used.

17.6.2. Installation

1. The transition of the PE service pipe to the steel pipe below ground may be made using a flanged transition (PECAT) fitting. Screwed fittings are not acceptable for pipe work at pressures above 2bar. Alternatively, the use of a special governor riser fitting is recommended.
2. The steel pipe above ground should be supported.

17.7 Typical installation – Steel main connection

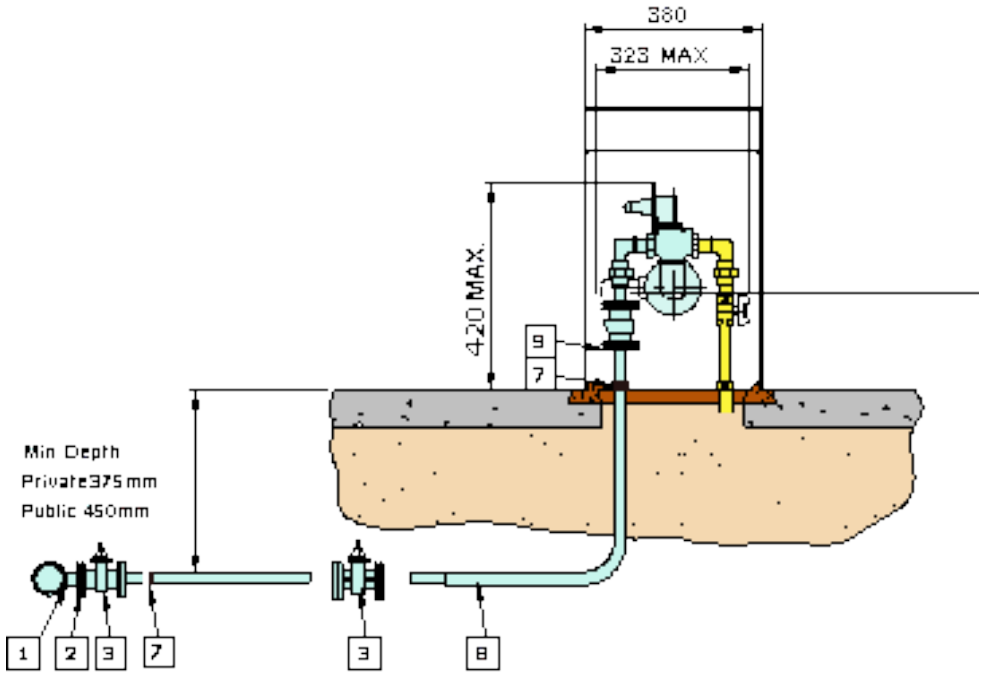


Figure 93 - Steel IP service - boundary service regulator

Item No	Description	Specification
1	Weldolet	SGN/SP/F/1
2	Slip on Flange	GIS/F7 PN16 BS4504
3	Valve	SGN/SP/V/6 or GIS/V/7: Part 1
7	Insulation Joint	GIS/E17 Part 2
8	25mm Pipe	GIS/L2
9	Blank Flange	GIS/F7 PN16 BS4504

Table 50 - Steel IP service material list

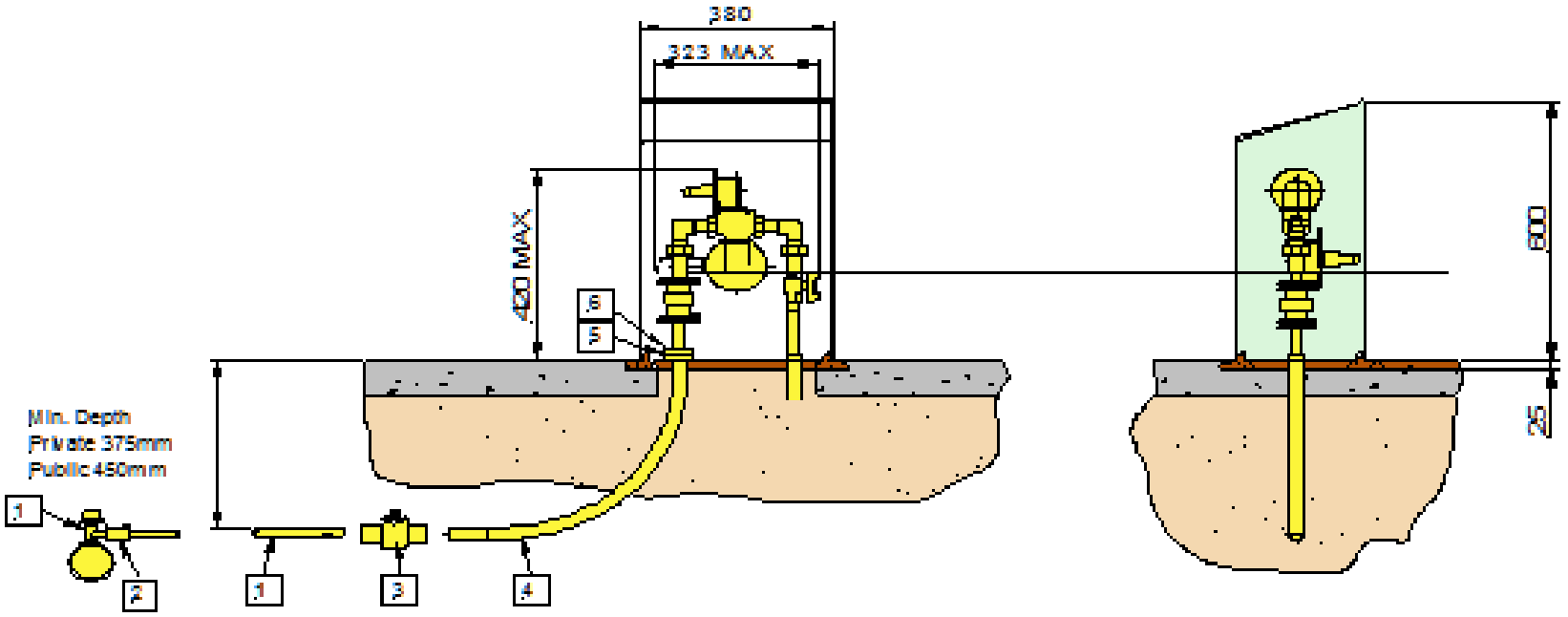


Figure 94 - PE IP PE service (MOP) 5.5bar Boundary service regulator

Item No	Description	Specification
1	Top Tapping Tee	GIS/PL2: Part 4 Class C
2	Electro fusion Coupler	GIS/PL2: Part 4 Class C
3	PE Ball Valve	GIS/V7: Part 2
4	MDPE Pipe	GIS/PL2: Part1
5	PECAT Fitting	GIS/PL2: Part 6 Class C
6	Blank Flange	PN16 BS1092

Table 51 - PE IP PE Service MOP (5.5bar) material list

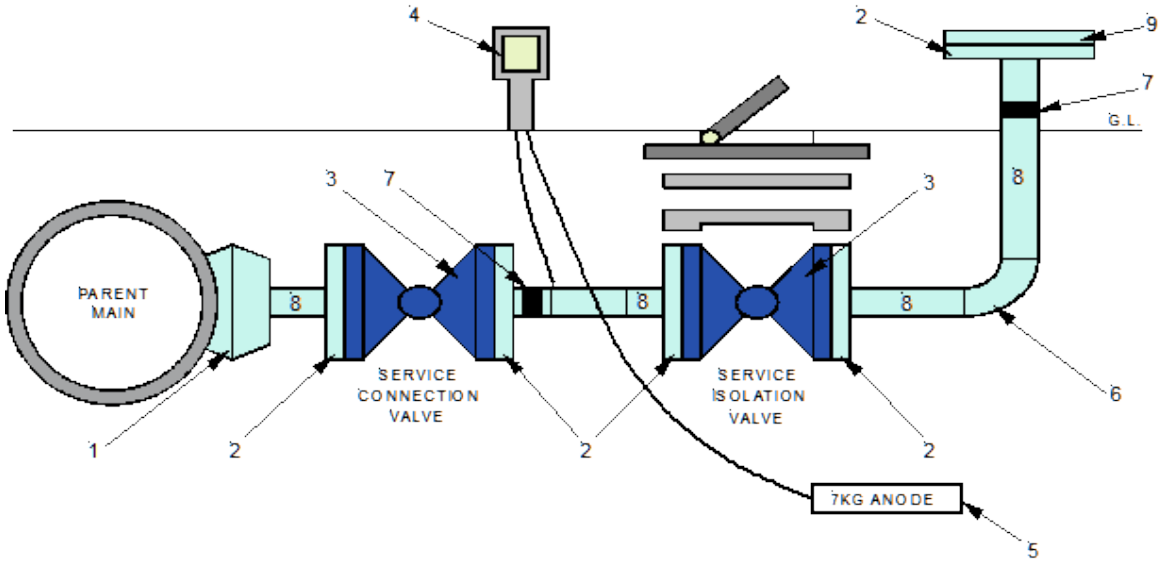


Figure 95 - Steel service from a steel main MOP 7bar

Item No.	Component	Specification
1	Weldolet	SGN/SP/F/1
2	Slip on Flange	GIS/F7 PN16 BS1092
3	Valve	SGN/SP/V/6-1 or GIS/V7:1
4	Test Post	Refer to SGN/PM/ECP/2
5	7KG Anode	Refer to SGN/PM/ECP/2
6	90° Elbow	GIS/F7
7	Insulation Joint	GIS/E17 Part 2
8	25mm Pipe	GIS/L2
9	Blank Flange	GIS/F7 PN16 BS4504

Table 52 - Steel service form a steel main MOP 7bar material list

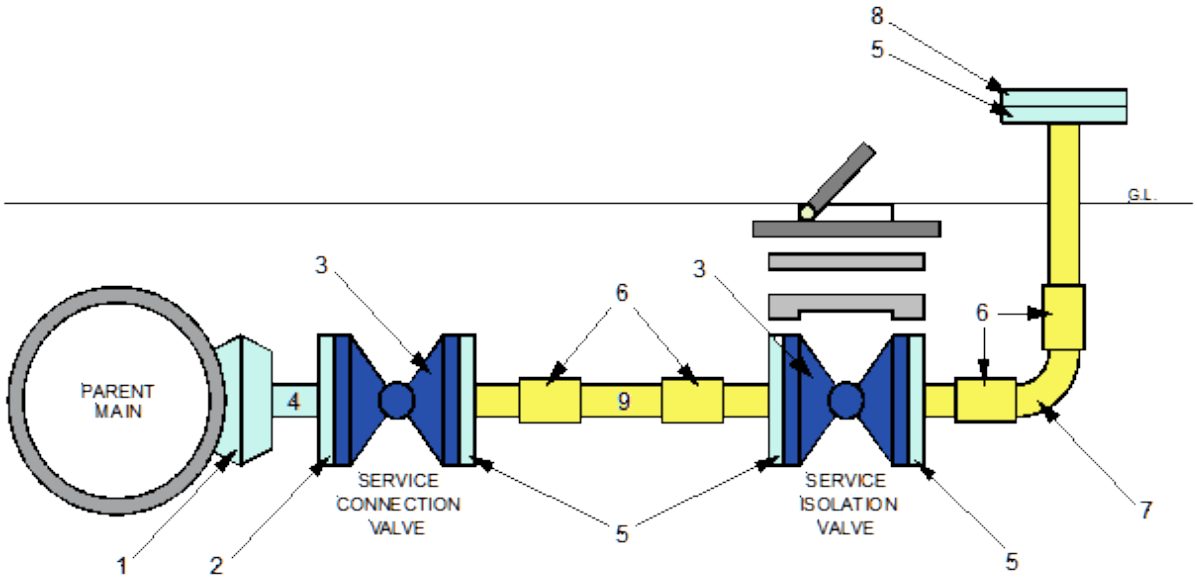


Figure 96 - Steel main to PE100 service

Item No.	Component	Specification
1	Weldolet	SGN/SP/F/1
2	Slip on Flange	GIS/F7 PN16 BS1092
3	Valve	SGN/SP/V/6-1 or GIS/V7:1
4	Pipe	GIS/L2
5	PECAT Fitting	GIS/PL2: Part 6 Class C
6	Electrofusion Coupler	GIS/PL2: Part 4 Class C
7	90° PE Elbow	GIS/PL2: Part 6 Class C
8	Blank Flange	GIS/F7 PN16 BS1092
9	HDPE Pipe	GIS/PL2: Part 8

Table 53 - Steel to PE 100 service material list

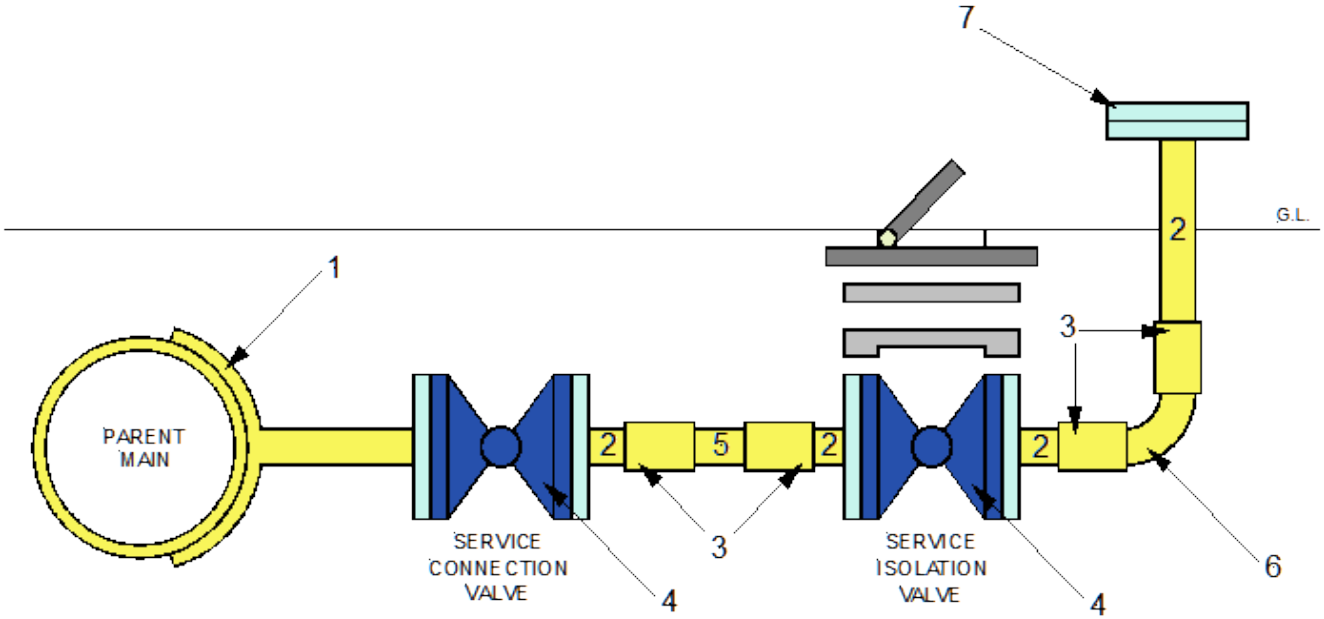


Figure 97 - PE main to PE100 service

Item No.	Component	Specification
1	Branch Saddle	GIS/PL2: Part 4 Class C
2	PECAT Fitting	GIS/PL2: Part 6 Class C
3	Electrofusion Coupler	GIS/PL2: Part 4 Class C
4	Valve	SGN/SP/V/6-1 or GIS/V7:1
5	HDPE Pipe	GIS/PL2: Part 8
6	90° PE Elbow	GIS/PL2: Part 6 Class C
7	Blank Flange	GIS/F7 PN16 BS4504

Table 54 - PE main to PE100 service material list

18 SERVICE INFORMATION LABELS

18.1 General requirements

1. When you install an Emergency Control Valve (ECV) you must also complete and install the following: -

- Labels as shown in Figure 98 at the end of all new and replacement gas services.
- The service information label (B608) must be completed on site at the time of the installation of the service pipe and attached to the inlet side of the ECV; the mandatory information is detailed in Figure 99.

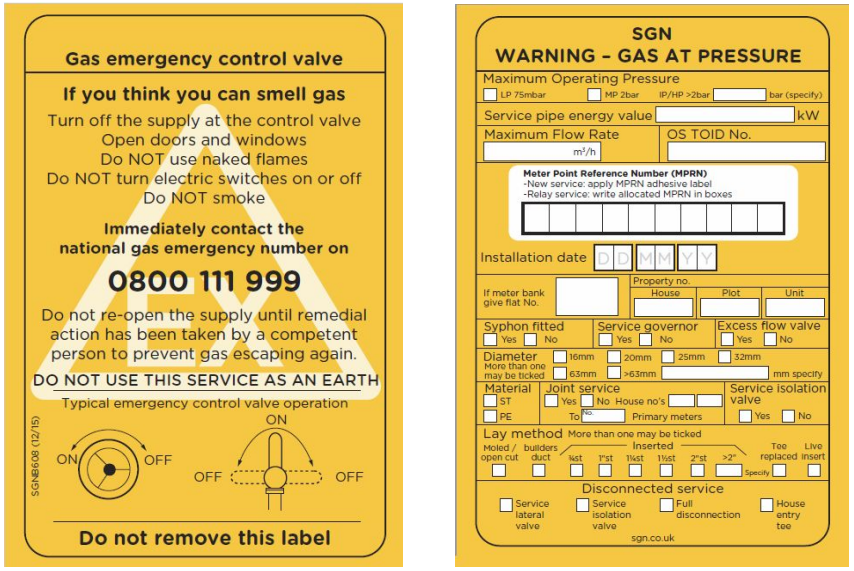


Figure 98 - Emergency Control Valve and Service Information Label

- Label information will depend on the type of service activity being undertaken: -
  a) New build
  b) Information in boxes 1-5 in Figure 99 will be completed and provided as part of the job pack issue. You must complete the remaining information.
  c) Replacement
  d) You will need to complete any of the information not provided as part of the job pack.

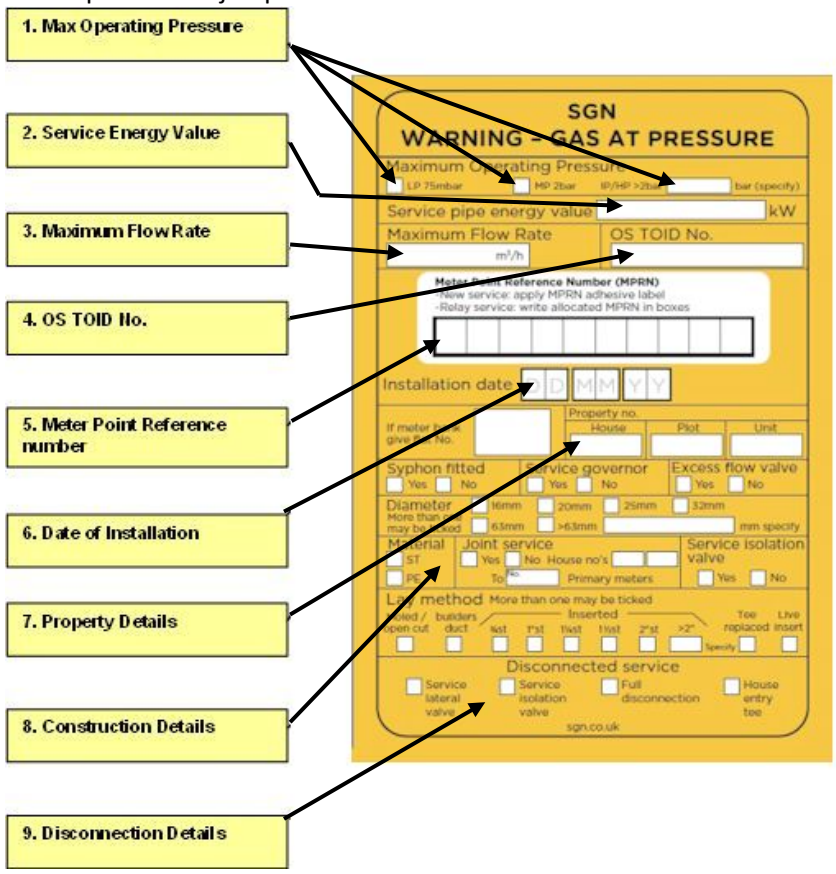


Figure 99 - Example 1 of ECV and Service Information Label

E 18 Work Instruction Servicelaying – Service Information Labels example 1 Page 2 of 3

1. You should complete the following information in the fields on the service label by either tick boxes or entering information.
2. Maximum Operating Pressure: (Tick box)

   - LP Services operating up to 75mbar
   - MP Services operating between 75mbar and 2 bar

3. Service Energy Value: (Enter information).
   Nominal Energy capacity KW of the gas service, calculated as part of the design of the service. This will be issued as part of the job instruction.
4. Maximum Flow Rate: (Enter Information)
   Design Capacity in m^3 of the gas service, calculated as part of the design of the service. This will be issued as part of the job instruction.
5. OS TOID No. – Ordnance Survey Topographical Identifier: (Enter Information)
   Ordnance Survey system for referencing geographical data. For future use.
6. Meter Point Reference Number (MPRN): (Enter Information)
   Note: All new services must have a MPRN, and will be allocated and registered at the time of installation.
   In the case of replacement services, the MPRN will be found on the meter.

Figure 100 - Meter Point Reference Number (MPRN) Label

7. Place this label (Figure 100) over the relevant section on the information label titled Meter Point Reference Number.
8. Date of Installation: (Enter Information)
   Complete on site at the time of installation in the format below.

   DD/MM/YY

9. Property Details: (Enter Information)
   House Number, flat number, plot number or unit number.

10. Construction Details: (Tick box)
    Tick boxes to indicate the following information
    - method of lay, if the following has been installed;
      i. Service Syphon
      ii. Service Governor
      iii. Service Isolation Valve
      iv. Service Excess Flow Valve

    - The diameter and material of the service.
    - If the service is a dual service and the number of primary meters installed.
    - Lay Method.

11. Disconnection Details: (Tick box)
    - Tick box to indicate the means of service disconnection:
    - Service Lateral
    - Service Isolation Valve
    - Full Disconnection
    - House Entry Tee

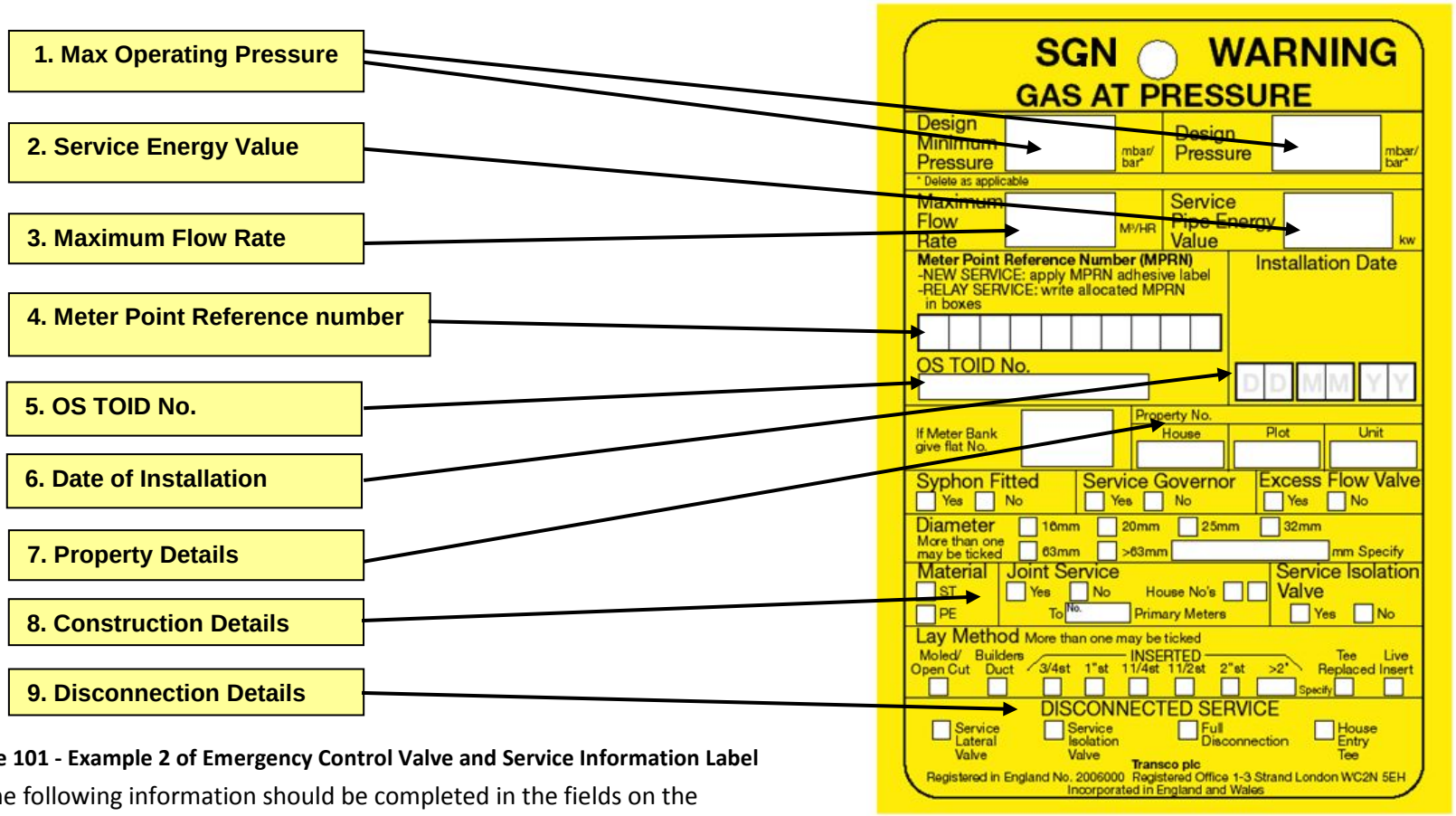


Figure 101 - Example 2 of Emergency Control Valve and Service Information Label

1. The following information should be completed in the fields on the service label by either tick boxes or entering information. Information for blocks 1 & 2 will be provided with the works documentation.
2. Design Pressure (Tick box)
   LP Services operating up to 75mbar
   MP Services operating between 75mbar and 2 bar
   IP services above 2 bar and up to 7bar.
3. Service Energy Value: (Enter information).
   Nominal Energy capacity KW of the gas service, calculated as part of the design of the service. This will be issued as part of the job instruction.
4. Blocks 3 -9 should be completed as per example 1.

19 SERVICE TESTING - GENERAL

19.1 General

1. Table 55 - Service Testing Requirements, identifies the pressure testing requirements for Low, Medium and Intermediate Pressure (LP/MP/IP) services.
2. You must carry out Pressure testing for:
   - Any service diverted,
   - Any service alteration
   - New Service
   - Renewed Service
   - To prove a service is sound as required in accordance SGN/PR/EM/74A.
   - Connections using branch or encirclement fittings.
3. For services, you should pressure test from the mains connection back to the Emergency Control Valve (ECV).
4. During a pressure test you must leave the ECV in the open position.
5. During testing, do NOT subject a service to any shock loading, for example when backfilling.
6. Carry out a visual check to ensure that there are no other live gas services within the premises prior commissioning the new service.
7. A service laid to replace existing supplies should not be commissioned until the old service, or that part of the old service, which is unique to the premises, is cut off and permanently isolated (see Section B14 Service Cut offs).
8. Having commissioned the new service, record the pressure at the ECV on the service information label.

Type of System	Working Pressure	Testing Pressure	Test Duration	Pressure Loss	Type of Test Gauge
Service	Low Pressure	100 mbar	5 mins	Nil	Water based Manometer (U Gauge) or Electronic Tester
Service	Medium Pressure	3bar	5 mins	Nil	Electronic Tester
Service	Intermediate Pressure *	7bar	5 mins	Nil	Electronic Tester
Encirclement Fitting	Low Pressure	350 mbar	5 mins	Nil	Water based Manometer or Electronic Tester
Encirclement Fitting	Medium Pressure	3bar	5mins	Nil	Electronic Tester
Encirclement Fitting	Intermediate Pressure *	7bar	5 mins	Nil	Electronic tester

Table 55 - Service Testing Requirements

Note: IP services > 4.6bar MOP must also be hydrostatically tested to 1.5 times MOP, e.g. 5.5bar MOP to 8.25bar and 7 bar MOP to 10.5bar.

19.2 Record of Pressure test

A record of each pressure test [including failed tests] must be made immediately before any new, diverted, altered, renewed or transferred service is commissioned. The detail to be recorded for each test is shown below:

- Property address
- Work Completed - Relay / Transfer / Alteration / New
- Date test carried out
- Time test applied
- Time test removed
- Duration
- Test pressure (& if MP, the test instrument serial number)

- Whether service passed test (i.e. pass / fail)
- Name of competent person completing test
- In the case of a paper record, the signature of competent person, confirming test and purge carried out to correct procedure
- A pay number (SGN staff) / Resource number (Contractor) when completing service test records or SGN replacement service job cards

19.3 Method of Recording

The method of recording will depend on the activity of work being undertaken. The full details are listed below must be recorded for each pressure test.

19.3.1. For Repair activity

You must complete a Pressure test records in Syclo (see Appendix P) for detailed information]. Where access to Syclo is, unavailable operatives must complete the Service Test Record shown in Appendix P. The record must be passed to the operational depot, which must update the work order in Maximo and retain the Service Test Record in the depot.

19.3.2. For Connections and Replacement activities

You must complete the SGN Service Card shown in Appendix Q. The record must be passed to the operational depot/back office administration function to the work order in Maximo. The SGN Service card must be retained in the relevant project file for the life of the asset.

19.4 In addition to the above operatives may choose to keep temporary records of each service pressure test using the SGN Service Pressure Test note book [reference SGN661, see Appendix P].

Note: This is a convenient pocket size note book that can be used to satisfy the requirement to record the result of the pressure test before the service is commissioned.

When an operative chooses to use the note book, the information must be subsequently recorded using one of the methods detailed in Section 19.3.1, 19.3.2.

Note: It is not necessary to use the notebook if the details of the pressure test are recorded in Syclo or on the Service Test Record / SGN Replacement Service job card before commissioning the gas service.

The notebook enables a formal temporary record to be created; it is not necessary for SGN to store these temporary records, but they must be available for inspection up and until the permanent record [i.e. Syclo/ Service Test Record/Service Replacement job card] has been completed.

19.4.1. Back Office Administrative Function

1. Back office administrative staff are responsible for updating pressure test records into Maximo where records are not completed directly in Syclo. Where pressure test records are provided for input into Maximo [either by Repair, Connections or Replacement activities], incomplete records must be returned to the relevant team manager to ensure the missing information is completed and returned for system capture.

2. A tracking process should be put in place by back office administrative staff to ensure that all records are fully updated and returned.

19.5 Equipment checks

Managers will assess the operatives' pressure testing equipment to ensure that it is fit for purpose. This test will be carried out at the same time as the individual's competency assessment for pressure testing (CAS No DN-7D)

20 TESTING PROCEDURE

You must comply with the requirements of Section F1

20.1 Service testing equipment - Low Pressure Service

1. Typical service test equipment setup used for all low-pressure service testing is shown in Figure 102 - Tapping Tee Testing Setup & Figure 103 - ECV Testing Setup.

   Note: The water gauge can be replaced by an electronic gauge.

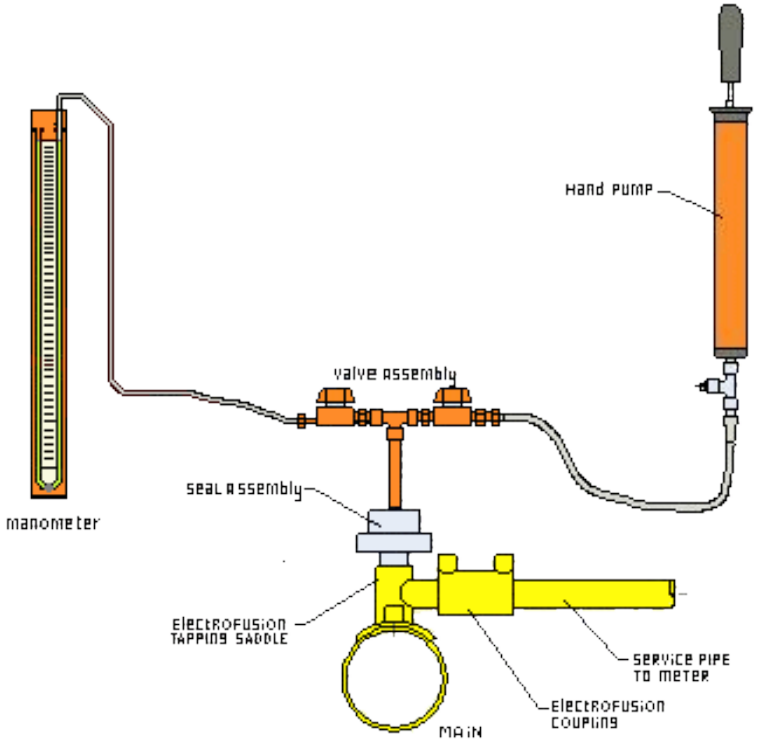


Figure 102 - Tapping Tee Testing Setup

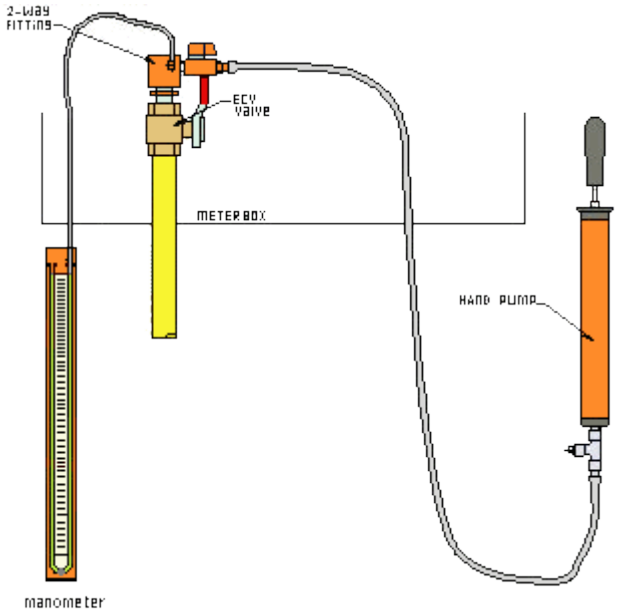


Figure 103 - ECV Testing Setup

No	ITEM
1	Manometer – Water or Electronic Gauge
2	Hand pump
3	Universal test equipment

Table 56 - Service Testing Materials List

20.2 Service Testing Procedure – Low Pressure

For low rise premises supplying up to 2 ECV's, the service should be tested as follows:

1. The full service must be tested.
2. The test equipment must be attached to either to the ECV (Figure 103) or the mains service tee as shown in Figure 102.
3. Securely blank or cap the end of the service at opposite point to where the testing equipment has been attached.
4. Open the valve on the connection from the pump and to the Manometer.
5. Introduce air slowly using a hand pump through the test apparatus attached. (see Figure 103).
6. Close the valve to the hand pump when the pressure on the gauge has reached a minimum of 100 mbar in accordance with Table 55 - Service Testing Requirements.
7. No temperature stabilisation period is required.
8. The test period must be 5 minutes and no perceptible pressure loss is allowed.
9. Do not position any pressure gauges in direct sunlight as this can influence the accuracy of the pressure reading.
10. Test all exposed fittings and joints with leakage detection fluid and rectify leaks as necessary.
11. If the test is applied from: -
    a) the ECV:
        i. close the ECV
        ii. disconnect the pressure gauge to reduce the reading to zero.
        iii. Apply leakage detection fluid to bore of valve.
        iv. Fit cap to ECV,
        v. slowly open valve and check for leakage.
        vi. Close ECV.
    b) the mains connection
        i. open the ECV
        ii. check cap for leakage.

Note: the ECV must be replaced if leakage is found, when testing bore of valve or external cap and the complete service test.

12. On completion of a successful test, close the ECV.
13. Record the test results as required in Section F1 immediately.
14. You must release the test pressure from the end of the service opposite to where the test apparatus was connected to prove the whole service was tested and free from blockages.
15. Take care when venting pressurised air, avoid contact with exposed skin (hands/face) as this could cause injury.
16. You must purge and commission the service(s) immediately after testing in accordance with Section F3.
17. Complete job documentation including the Service Information label.

20.3 Service Testing Procedure - Medium Pressure

1. You must test MP services from the main to the inlet valve, which must be open and capped.
2. The inlet valve will either be: -
    a) If fitted to a Meter Box Regulator - ECV
    b) If fitted to a Boundary Regulator - pressure regulator inlet isolation valve. (PRIIV).
3. You should install the test equipment on the mains connection. See Figure 104.
4. Slowly introduce air into the service via a hand or foot pump.
5. A test pressure of 3 bar in accordance with Table 55 must be applied.
6. No temperature stabilisation period is necessary.
7. You must maintain the test for a period of 5 minutes, no pressure loss is allowed.
8. Test all exposed fittings and joints with leakage detection fluid and rectify leaks as necessary.
9. On completion of a satisfactory test, you must close the inlet valve of the service governor.

10. You must release the test pressure from the opposite end to where the test equipment was installed to prove the whole service was tested and free from blockages.
11. Take care when venting pressurised air, and avoid contact with exposed skin as this could cause injury.
12. For Boundary regulators, the Low-Pressure side of the installation must be tested in accordance with Section F2.1 - Low Pressure Service.

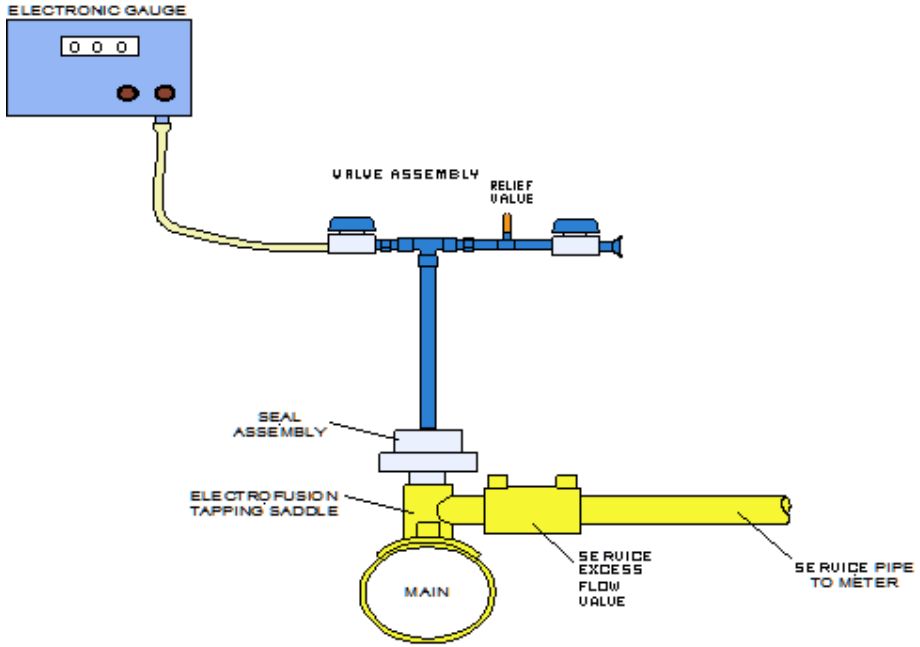


Figure 104 - Example – MP Test set up

20.4 Service Testing procedure - Intermediate Pressure service

1. The IP service must be tested from the main to the inlet valve of the service governor, which must be open and blanked/capped.
2. The inlet valve will be the pressure regulator inlet isolation valve. (PRIIV)
3. The test equipment should be installed on the mains connection. See Figure 105.
4. Slowly introduce air into the service via a hand or foot pump or nitrogen using a regulated supply.
5. No temperature stabilisation period is necessary.
6. The test pressure and test period is defined in accordance with Table 55 for services of 4.6bar MOP.
7. If the MOP exceeds 4.6bar, a hydrostatic test is required or a pneumatic test at 1.5 times the Design Pressure is required.
8. A pneumatic pressure test may be applied to small-bore pipe work above 2bar subject to a risk assessment considering location, length and diameter.
9. The test should be limited to a maximum (internal) volume of 50 litres of exposed pipe work and tested in accordance with the Table 55.
10. You must maintain the test for a period of 5 minutes, no pressure loss is allowed.
11. Test all exposed fittings and joints with leakage detection fluid and rectify leaks as necessary.
12. All exposed fittings and joints not included within the test should be checked with leakage detection fluid after the installation is purged and commissioned.
13. On completion of a satisfactory test, the inlet valve of the service governor must be closed.
14. You must release the test pressure from the opposite end to where the test equipment was installed to prove the whole service was tested and free from blockages.
15. Take care when venting pressurised air/nitrogen, avoid contact with exposed skin (hands/face) as this could cause injury
16. The Low-Pressure side of the installation must be tested in accordance with Section F2.1 - Low Pressure Service.

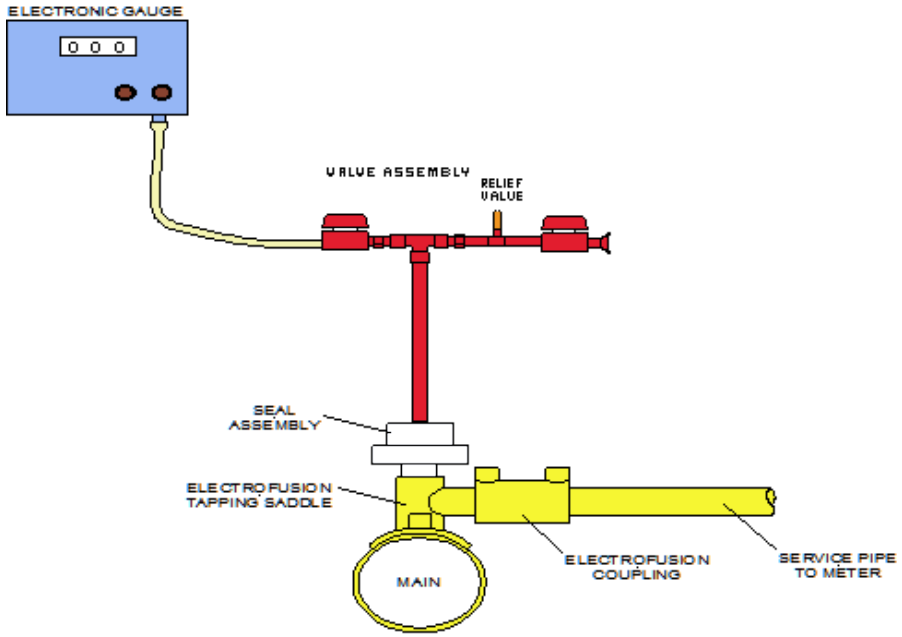


Figure 105 - Example IP test setup for PE pipe

20.5 Pressure Testing of Fittings & Equipment

20.5.1. General Requirements

The test volume of branch saddles is small in comparison to testing pipes. Experience has shown that the pressure can fluctuate by up to 25mbar due to temperature and creep effects.

1. The pressure test can be undertaken with or without the drilling machine connected.
2. A Permit to Work, Routine or Non-Routine Operations may be required for testing operations. Seek guidance from your Operational Manager
3. You may test the branch connections with the drilling machine as one operation. If so you must complete the parts of Sections B10.1 and B10.2 for connecting the drill below before continuing.
4. You must make sure that all personnel engaged on testing work, or any work associated with testing, are aware of the possible consequences of the fitting failing under test pressure conditions.
5. You must take all necessary precautions:
   - before pressurisation;
   - during pressurisation;
   - during depressurisation and before dismantling the equipment;
   - after depressurisation and during dismantling the equipment.
6. Restrain and support all fittings and associated equipment against movement during the test.
7. The full number of appropriate studs or bolts provided for blanking flanges must always be used.
8. Before pressurisation commences make a final visual check that the test section is secure.
9. Prominently display near the excavation warning notices that pressure testing is in progress.
10. Whilst the pressure is being raised no unauthorised person must enter the test area or interfere with the pipe work.

Note: The same equipment should be used for test on and off readings.

20.5.2. Pressure Test Procedure

1. The valve, if part of the installation must be left in the open position.
2. Fit test flange and testing assembly to outlet of valve.
3. The test standpipe must incorporate a pressure relief set to operate at 10% above the test pressure.
4. Pressurise using a hand or foot pump into the fitting through apparatus attached to the under-pressure tee / branch saddle or the drilling machine attachment.
5. An air compressor must not be used due to the potential to over pressurise.

6. The pressure in the installation should be increased to 350 mbar for LP mains and 3bar for MP mains.
7. On MP/IP mains the air should be introduced in 0.5 bar increments.
8. Test the fitting with an approved leak detection fluid to provide an early indication if the fitting is leaking.
9. Wash the fitting with clean water after using leakage detection fluid.
10. The connection to the branch saddle or drilling machine must be isolated and a stabilization period in accordance with Table 42 must be allowed.
11. Covering the installation will minimise the effects of temperature.
12. Take precautions to be sure that items such as mobile telephones and radios are not operated near digital test instruments, as the pressure indications may become erratic.
13. After the stabilisation period in Table 55, take the first reading using approved test instrument.
14. During the pressure test no person must be in the excavation.
15. After the test period duration (15 minutes) has elapsed take a second reading using the same test instrument.
16. There should be no loss in pressure see Table 55.
17. If the test is passed you can commence fitting the drilling equipment,
18. Mechanical under pressure tee Section B10, or PE Tapping Tees Section D2.
19. If the test is unsuccessful try to determine the cause.

20.5.3. LET BY VALVE TEST

1. If a valve is fitted, initial let by test on the valve must be conducted after the under-pressure fitting, valve and machine has been pressure tested.
2. Close the valve and release the test pressure between the valve and the test flange or drilling machine in a controlled manner.
3. Check that the gauge is reading zero and watch the pressure for 1 minute.
4. There must be no increase in pressure on the gauge.
5. If there is an increase in pressure on gauge, the valve is passing.
6. The valve must be opened and shut to check that there is no debris in the valve housing and the 'let by test' must be repeated.
7. Further investigations on the valve housing must be made.
8. If the valve cannot hold a 'let by test' then the valve must be replaced with another valve and the whole pressure test process and let by test repeated.
9. On completion of a successful pressure and let by test open the valve and release the pressure in a controlled manner.
10. Recheck the valve opens and closes correctly.
11. The results of the test must be recorded on a test certificate and passed to your Operational Manager.
12. Remove the test apparatus and fit a blank flange to the branch saddle outlet unless the drilling operation is to begin immediately.
13. For medium pressure mains, the blank flange must incorporate a pressure relief facility.

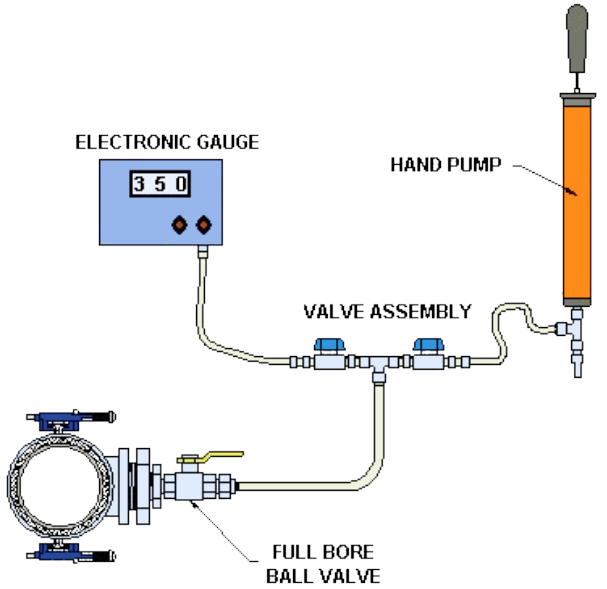


Figure 106 - Typical test setup LP & MP

20.5.4. Inconclusive Pressure Test

1. If the pressure drop is greater than the maximum allowed the test must be repeated with a longer test time of 30minutes.
2. The pressure drop must not exceed 25mbar.

20.5.5. Failed Pressure Test –Mechanical Under Pressure Tees.

1. If leakage is detected from the installed fitting then the fitting must either be refitted, joints/bolts tightened or the fitting replaced.
2. If the leakage is evident from another source the drilling machine, then this must be rectified and another pressure test undertaken.

20.5.6. Failed Pressure Test –Branch Saddle Tees

1. If leakage is detected from the installed fitting, then the fitting must not be used.
   Note: **DO NOT REHEAT PE FITTINGS.**
2. The fitting must be left in place and the spigot must be cut near the base of the branch saddle to prevent any future connection onto the fitting.
3. If the leakage is evident from another source such as flanges or drilling machine, then this must be rectified and another pressure test undertaken.

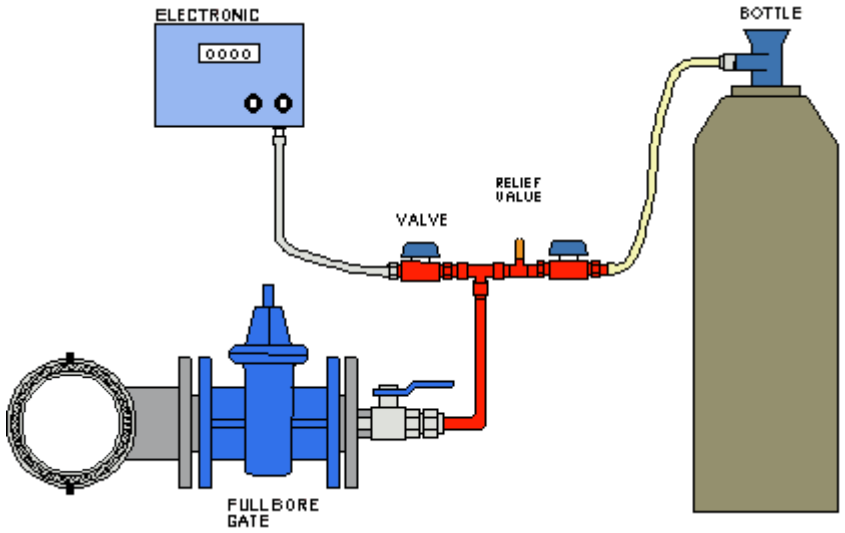


Figure 107 - Example IP split tee testing set up

21 PURGING AND COMMISSIONING

21.1 Low Pressure

1. Connect a flexible purge hose fitted with a flame trap to the emergency control valve (ECV).
2. Position the hose outlet outside the premises and away from:
   - any openings into the property such as windows, window vents, doors, airbricks etc.
   - away from any possible sources of ignition e.g. Flue outlets.
3. Position a team member near to the outlet of the purge hose and the ECV.

   Note: They MUST be able to communicate with the team member/leader positioned at the mains connection.
4. Fully open the ECV to allow a gas purge to be undertaken.
5. The service must be commissioned by one of the following:
   - PE connections- drill the main with the integral cutter and withdraw it into the top of the tapping tee;
   - Metallic connections - withdraw the integral plug into the top of the service tee;
6. Maintain the purge until: -
   a) Two successive tests confirm 90% gas in air (GIA) at the outlet of the purge hose using a Gascoseeker or other approved gas detection instrument; or
   b) When the service has been purged with natural gas for one second for each metre length of service pipe not greater than 32 mm diameter, and four seconds for each metre length for a 63mm diameter service.
7. When purging is complete, close the ECV.
8. Remove the purge hose removed.
9. Securely tighten the cap on the tapping tee and apply leak detection fluid applied.

   Note: If a meter is not to be immediately connected, the ECV must be securely capped and sealed with the valve in the 'closed' position.
10. If a cap has been fitted to the ECV, open the ECV and check the cap for soundness with leak detection solution.
11. Close ECV and secure the handle to make it inoperable.
12. Where a dual supply is to be purged, the above procedure must be carried out for both 'legs' of the dual service.

21.2 Medium and Intermediate Pressure

Following testing the service you must immediately purge and commission the service up to the inlet valve of the service governor.

1. Connect a flexible purge hose fitted with a flame trap to the outlet of the service valve.
2. Position the hose outlet outside the premises such that the release of gas will not enter any property through windows, doors, air bricks etc. and away from possible sources of ignition.
3. Position a team member near to the outlet of the purge hose and the inlet valve of the service governor

   Note: They MUST be able to communicate with the team member/leader positioned at the mains connection.
4. The inlet valve of the service governor must be fully opened.
5. Purge the service by undertaking one of the following:
   - PE connections- drill the main with the integral cutter and withdraw it into the top of the tapping tee;
   - Metallic connections - withdraw the integral plug into the top of the service tee; or drive the steel punch for some IP connections
   - Open the standpipe/offtake valve (welded steel connections).

6. Maintain the purge until:
   a) Two successive tests confirm 90% gas in air (GIA) at the outlet of the purge hose using Gascoseeker or other approved gas detection equipment;

   Or

   b) When the service has been purged with natural gas for
      i. one second for each metre length of service pipe not greater than 32 mm diameter,
      ii. four seconds for each metre length for a 63mm diameter service.
7. When the purge is complete, close the inlet valve of the service governor and allow the service to pressurise.
8. You must now prove the operation of the SEFV.
9. Quickly open the inlet valve to the service governor and gas allowed to vent through the purge hose. Gas flow should decrease, which will confirm the successful operation of the SEFV.
10. If there is no reduction in gas flow, failure of the SEFV is indicated.
    Note: The service should be isolated and the SEFV replaced. **A further pressure test must then be undertaken on the service.**
11. If you confirm that the SEFV has operated, close the inlet valve to the service governor to allow the SEFV to reset automatically.
    Note: The time required to reset will vary according to the length of service and operating pressure.
12. If a meter is not to be immediately connected, close ECV and secure the handle to make it inoperable.
13. In situations where a boundary MP regulator has been installed, always check that the minimum operating pressure is recorded at the ECV.
14. Always confirm the operating pressure requirements with the competent person (if boundary regulator installed) before completing service information label.
15. Where a cap has been fitted to the inlet valve of the service governor, the cap must be checked for soundness with leak detection solution.

22 DECOMMISSIONING A SERVICE

1. Before de-commissioning a service, disconnect any meters connected to that service follow the procedure shown in Appendix O .
2. Meters with rigid connections or a capacity greater than 6m^3/h should be removed by suitably qualified staff in accordance with current metering procedures.
3. After disconnecting the service, carry out a cut off in accordance with Section B14.
4. With the service pipe plugged at the main fix a flexible vent pipe to the ECV.
5. Open the ECV to purge the service to air.
6. Close the ECV and cap the ECV.
7. Where possible disconnect and or remove the existing standpipe without causing any damage to the fabric of the building and seal the standpipe entry.

   Note: Where the existing standpipe cannot be removed without damaging the fabric of the building, the standpipe should be left in situ and capped off and labelled to indicate service disconnected.

23 RECOMMISSIONING SERVICES

23.1 Recommissioning of service following Gas Safety (Installation & Use) Regulations 1998 Cut Off.

1. Use this procedure when re-commissioning services which have been isolated using the house entry tee's shut off device, i.e. Gas safety cut off under the GS (I&U) Regulations 1998, where services are disconnected/isolated following the removal of a primary gas meter.

23.1.1. Testing/Recommissioning of House Entry Tees

1. Check the ECV is in the closed position
2. Remove the ECV cap.
3. Install test equipment onto the ECV (Figure 103 - ECV Testing Setup).
4. Open the ECV and monitor for 'let by' across the closed house entry tee. See Section F5 21.1.3. There must be no pressure increase on the gauge.
5. If there is a pressure increase, remove the house entry tee cap and check the shut off device to ensure that it is fully closed.
6. If not fully closed, replace the HET cap and repeat above. If the HET shut off device is fully closed the HET must be replaced.
7. Remove house entry tee top cap or plug to gain access to the house entry tee's shut off device.
8. Lift the house entry tee's shut off device up to the fully open position.
9. Use approved leak detection fluid to test all joints and check the ECV for external leakage.
10. Conduct a 'let by' test on the ECV by:
    - Closing the ECV
    - Disconnect the pressure gauge and reduce the pressure to zero.
    - Reattach the pressure gauge to monitor for 'let by' across the closed valve for 1 minute.

    Note: There must be no pressure increase. If the pressure increases replace the ECV and repeat the service test.
11. Use an approved gas detector to test the entry and exit points of the house entry tee through the wall.
12. There should be no visible signs of leakage and a reading of 0 % LEL must be obtained from all joints for the test to be acceptable.
13. If leakage is noted, the service must be re-laid in accordance with Section C.
14. Purge the service in accordance with Section F3.
15. Replace house entry tee cap/plug and test cap using approved leak detection fluid.
16. Replace the cap on the ECV and label service with service information label in accordance with Section E18.

23.1.2. Testing/Recommissioning of Service Isolation Valves

1. Establish the effectiveness of the "service isolation valve" seal using a pressure gauge connected to the outlet of the ECV.
2. Check service isolation valve is closed.
3. Vent pressure to zero, close vent.
4. Connect test equipment as in Figure 103 to ECV.
5. Test integrity of service isolation valve using a let by test as accordance with Section F 5.1.3.
6. Monitor the pressure in the service for five minutes.
   Note: No pressure increase is permissible.
7. Test 1 - Test the service for 5 minutes at 20 mbar.
   Note: No pressure loss or gain allowed.
8. Test 2 - Test the service for 5 minutes at 100 mbar.
   Note: No pressure loss is allowed.
9. Conduct a 'let by' test on the ECV by closing the ECV and disconnecting the pressure gauge to reduce the pressure to zero.
10. Reattach the gauge to monitor for 'let by' across the closed valve for 1 minute.
    Note: There must be no pressure increase. **If there is pressure increase you must replace the ECV and repeat the service test.**

11. Any pressure loss detected or failure of the let by test, the service should be relayed and tested.
12. Use an approved gas detector to test the entry and exit points of the house entry tee through the wall.
13. Use an approved gas detector to test the entry and exit points of the service to the property.
14. There should be no visible signs of leakage and a reading of 0% LEL must be obtained from all joints for the test to be acceptable.
15. Purge the service in accordance with Section F3.
16. Replace the cap on the ECV and label service with service information label in accordance with Section E18.

23.1.3. Let-By Testing

Use this procedure for the Recommissioning and Decommissioning of services when the meter is being removed or is removed.

House entry tee

1. Remove the ECV cap.
2. Test the HET Cap on the above ground entry with approved leak detection fluid to ensure the stopper is not passing.
3. Connect the test equipment onto the outlet of the ECV.
4. Open the ECV and monitor the pressure in the water gauge until a stable reading is obtained.
5. Monitor pressure on the water gauge.
6. Allow 1 minute for stabilisation.
7. Monitor the water gauge for a further 2 minutes to ensure that there is no pressure gain.
8. If there is no pressure gain after 2 minutes, then the test is successful.
9. If there is a pressure gain, then test is unsuccessful and further investigations must be made on the cause of the test failure.
10. Carry out a final soap test on all joints or connections.

Service isolation valve

1. Remove the ECV cap.
2. Connect the test equipment to the outlet of the ECV.
3. Open the ECV and monitor the pressure in the water gauge until a stable reading is obtained.
4. Close the SIV.
5. Monitor the pressure on the water gauge.
6. Allow 1 minute for stabilisation.
7. Monitor the water gauge for further 2 minutes to ensure that there is no pressure gain.
8. If there is no pressure gain after 2 minutes, then the test is successful.
9. If there is a pressure gain, then test is unsuccessful and further investigations must be made on the cause of the test failure.
10. Carry out a final soap test on all joints or connections.

24 SERVICE LIVE/DEAD CHECKS

Frequently checks are requested to investigate a service pipe to confirm its status (whether it is live or dead).
This section outlines the procedure to follow.

24.1 Service Pipes with ECV fitted and operational.

Where an ECV is fitted to a service pipe and is operational.

1. Check all metallic surfaces with a Volt Stick in accordance with SGN/PR/EL/15003.
2. Make sure that the ECV is in the off position.
3. Mark the standpipe and the ECV to enable detection of standpipe movement.
4. Securely holding any standpipe with an adjustable tool remove the cap end.
5. Attach a pressure gauge suitable for the mains operating pressure to the ECV.
6. Slowly open the ECV and monitor the pressure (if any).
7. If the gauge does not register a pressure.
   a) Close the ECV and remove the gauge.
   b) Securely cap the ECV.
   c) Check for service valves, house entry tees and other potential reasons (e.g. water blockage) to identify why the service is turned off.
   d) If the service can be restored by removing water, arrange for this to be done.
   e) If the service is steel or meets other requirements of SGN/PM/PRM/1 for replacement. Then it must be replaced.
   f) If the service is to current standards the service must first be tested then it can be restored by opening a valve or house entry tee,
   g) Test the service from the ECV to the point of isolation.
   h) If the test is successful commission the service.
8. If the gauge registers a pressure,
   a) Close the ECV.
   b) Remove the gauge and fix a flexible vent to the ECV and position the vent outside the property.
   c) Make sure that the location of the vent is away from any sources of ignition.
   d) Open the ECV whilst a colleague attends to the vent, allow the vent to operate for 1 minute.
   e) Confirm or otherwise the continuous venting.
   f) Close the ECV.
   g) Remove the vent and cap the ECV.
   h) Record on the work documents/IT systems
   i) If venting was continuous a live service found.
   j) Or if venting was not continuous a dead service.
9. Check to see if there has been any pipe movement.
10. If the pipe has been moved it must be isolated immediately
11. Check for leakage.
12. Clear site.

Note: Steel services must be re-laid.

24.2 Service Pipes without ECV fitted.

Where a request is made to check the condition of a service without an ECV fitted, arrangements must be made to fit an ECV by either:

Note: Caps on service pipes without an ECV MUST NOT be removed to check the service pipe status (Live or Dead).

a) Isolation of the service by:
   i. Service valve.
   ii. House entry tee.
   iii. Cutting off the service.
b) If the service is suitable use the CaPEX tool. (see procedure SGN/PR/TE/H1.1 and process chart Figure 108

Note: The CaPEX tool can only be used on ¾" and 1" services operating up to 75mbar and in situations where more than 4 premises are off the service pipe.

F6 Work Instruction Servicelaying - LIVE / DEAD CHECKS

Where 4 or less premises are off the service contact must be made with the consumers to arrange access at a convenient time to complete the work

1. Having isolated the service and fitted an ECV follow the procedure in Section 24.1 to confirm the condition of the service pipe.
2. The newly fitted ECV must be left capped.

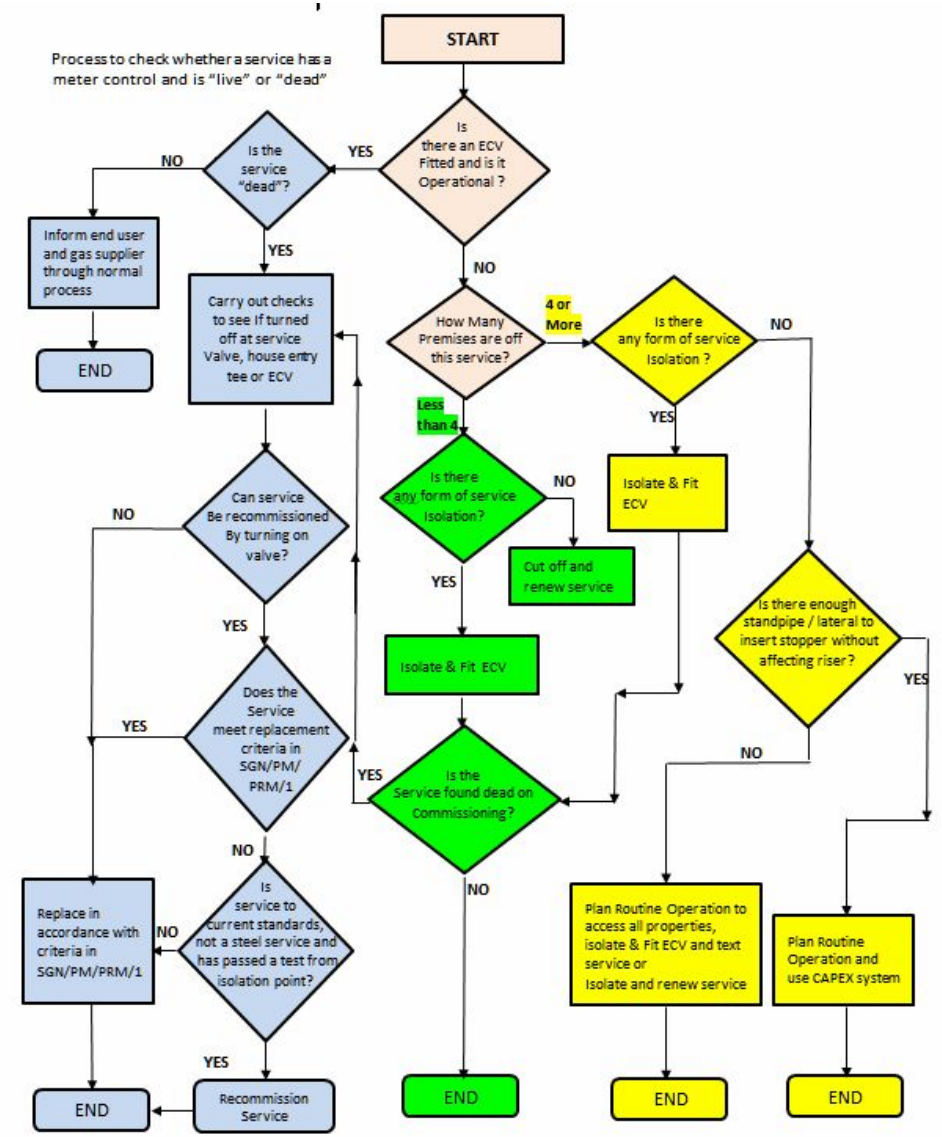


Figure 108- Dealing with plugged & capped standpipes

Appendix A	References & Definitions	Page 1 of 5

A.1. INTERNAL DOCUMENTS

This Work Instruction refers to the documents listed below

SGN/PM/DIS/3.6	-	Management Procedure for Lifting Operations
SGN/PM/DR/2	-	Management Procedure for Recording and Maintenance of Non-Maintained Pipe Asset Records
SGN/PM/ECP/2	-	Management Procedure for Cathodic Protection of Buried Steel Systems
SGN/PM/LC/18	-	Management Procedure for Leakage Survey
SGN/PM/MSL/1 Part 2	-	Management Procedure for Mainlaying Specialist Activities
SGN/PM/MSL/1 Part 1	-	Management Procedures for Mainlaying and Servicelaying
SGN/PM/PRM/1	-	Management Procedure for Distribution Pipe Risk Management
SGN/PM/PS/5	-	Management procedure for the Management of New Works, Modifications and Repairs
SGN/PM/SER/3	-	Procedure for Monitoring and Disconnection of Gas Services Following Primary Gas Meter Removal as Required Under the Gas Safety (Installation and Use) Regulations
SGN/PM/SHE/15	-	Management Procedure for Manual Handling
SGN/PM/SHE/76	-	Management Procedure Safety, Health and Environment Management of Contractors.
SGN/PM/SW/3	-	Management Procedure for Use of Mechanical Plant in Close Proximity to Utility Apparatus
SGN/PM/TMP/3	-	Management Procedure for Installation Pipework
SGN/PR/DIS/5.100.3	-	Work Procedure for Installation of Pressure Survey Monitoring Points Using Catheter Technique

A1 – INTERNAL DOCUMENTS continued

SGN/WI/EL/15001	-	Work Procedure for the Fitting of TCB's at Domestic Premises
SGN/PR/EL/15002	-	Work procedure for MEB relocation
SGN/PR/EL/15003	-	Work Procedure for Electrical Safety using Volt Stick
SGN/PR/EM/72	-	Work Procedure for Dealing with Gas Escapes and Other Emergencies
SGN/PR/EM/74A	-	Work Procedure for Locating and Repairing Gas Escapes on the Network Operating at Pressures Not Exceeding 7 bar - Part A
SGN/PR/EM/74B	-	Work Procedure for Locating and Repairing Gas Escapes on the Network Operating at Pressures not exceeding 7 bar Part B- Repair Techniques.
SGN/PR/P/19	-	Work Procedure for the Installation of Grouted Tees on Transmission Pipelines in Service
SGN/PR/RL/2	-	Work Procedure for Network Risers and Lateral Pipework – New Construction, Replacement and Alteration
SGN/PR/TE/H1.1	-	Work Procedure for Cap and Plug Exchange Tool (CaPEX)
SGN/PR/SW/1	-	Work procedure for Excavations
SGN/PR/TE/P6.2	-	Work Procedure for the use of Mini-Excavators and Trailers
SGN/SEI/557	-	Instruction and Guidance on the Use of PVC Shoring
SGN/SP/CE/12	-	Specification for The Design, Construction and Testing of Civil and Structural Works. Part Twelve: Pipeline Protection Slabs
SGN/SP/CW/5	-	Specification for Field Applied External Coatings for Buried Pipework and Systems
SGN/SP/DAT/6	-	Specification for Standard Sizes of Carbon and Carbon Manganese Steel Pipe for Operating Pressures Greater Than 7 Bar
SGN/SP/E/28	-	Specification for New Governor Installations with Inlet Pressures not Exceeding 100 bar
SGN/SP/E/56	-	Specification for Ancillary Pipeline Equipment
SGN/SP/ECE/3	-	Specification for Transportable Electricity Generator Sets, Including Generators Combined with Compressors.
SGN/SP/F/1	-	Specification for Carbon and Carbon Manganese Steel Forgings and Forged Components for Operating Pressures Greater than 7 bar
SGN/SP/F/4	-	Specification for Hot Tap and Stopping off Connections (for Operating Pressures 7 bar to 70 bar inclusive)

A1 – INTERNAL DOCUMENTS continued

SGN/SP/NP/10	-	Specification for Defining Pipes as Mains Services or Risers
SGN/SP/NP/14	-	Specification for the Design of System Extensions, Connections and Services to Below 7 Bar Scotia Gas Networks' Systems.
SGN/SP/P/1	-	Specification for Welding of Steel Pipe Operating at Pressures Not Greater Than 7 bar
SGN/SP/P/9		Specification for the Welding of Fittings to Pipelines Operating Under Pressure (Supplementary to BS 6990).
SGN/SP/PA/10	-	Specification for New and Maintenance Painting at Works and Site for Aabove Ground Pipeline and Plant Installations.
SGN/SP/SER/8	-	Specification for Service Terminations
SGN/SP/V/6-1	-	Specification for Steel Valves for Use with Natural Gas at Normal Operating Pressures Above 7 Bar Part 1 - 100mm Nominal Size and Above
D4	-	Safety at Street works and Road Works
SGN/WI/DIS/4.2.2	-	Work Instruction for Anchorage of Systems Operating up to 7 bar – Operatives
SGN/WI/EL/15005	-	Work Instruction for the use of Radio Detection Locators
SGN/WI/ML/1	-	Work Instruction for Pipe System Construction - Module 1 - General Requirements
SGN/WI/ML/2	-	Work Instruction for Pipe System Construction - PE Mainlaying up to and including 180mm Diameter at Pressures up to and including 7 bar.
SGN/WI/SHE/81	-	Work Instruction for Undertaking Work on Asbestos Mains
SGN/WI/SMP/501	-	Work Instruction for Undertaking Tightness Testing and Purging of Small Natural Gas and LPG Installations in Accordance with IGEM/UP/1B Edition 3
SGN/WI/SW/2	-	Work Instruction for Safe Working in the Vicinity of Pipelines & Associated Installations operating >7barg

A.2. EXTERNAL DOCUMENTS

API 5L	-	Specification for Line Pipe
BS 21	-	Specification for Pipe Threads for Tubes and Fittings where Pressure-Tight Joints are Made on the Threads (Metric Dimensions)
BS 746	-	Specification for Gas Meter Unions and Adaptors
BS 751 part2	-	Sealing Materials for Metallic Threaded Joints in Contact with 1st, 2nd and 3rd Family Gases and Hot Water. Non-Hardening Jointing Compounds
BS 751 part 3	-	Sealing Materials for Metallic Threaded Joints in Contact with 1st, 2nd and 3rd Family Gases and Hot Water. Unsintered PTFE Tapes
BS EN 682	-	Elastomeric seals. Materials Requirements for Seals used in Pipes and Fittings Carrying Gas and Hydrocarbon Fluids
BS EN 1090-1	-	Execution of Steel Structures – Part 1: Requirements for Conformity Assessment of Structural Components
BS 1092-1	-	Flanges and their Joints. Circular Flanges for Pipes, Valves, fittings and Accessories, PN Designated Steel Flanges
BS 4962	-	Specification for Plastics Pipes and Fittings for Use as Subsoil Field Drains
BS EN 1555	-	Plastics Piping Systems for the Supply of Gaseous Fuels. Polyethylene (PE). Fittings
BS EN 10806	-	Specification for Dimensions of Hydraulic Connectors and Adaptors
BS ISO 3183	-	Petroleum and Natural Gas Industries. Steel Pipe for Pipeline Transportation Systems
BS ISO 7121	-	Steel Ball Valves for General-Purpose Industrial Applications
GDN/PM/SCO/1	-	Gas Distribution Networks Management Procedure for the Safe Control of Operations
GDN/PM/SCO/2	-	Gas Distribution Networks Management Procedure for the Safe Control of Operations, Issue of Permits to Work and Forms of Authority on The Network
GDN/PM/SCO/4	-	Gas Distribution Networks Management Procedure for the Safe Control of Operations The Control of Non-Routine Gas Supply Operations
GDN/PM/SCO/5	-	Gas Distribution Networks Management Procedure for the Safe Control of Operations The Control of Routine Gas Supply Operations
GIS/ECE/1	-	Specification for Electrofusion Control Boxes

A2 - EXTERNAL DOCUMENTS - CONTINUED

GIS/E17 part 2	-	Specification for insulating joints Part 2 - Joints operating at pressures not greater than 7 bar
GIS/F7	-	Specification for steel welding pipe fittings 15mm to 450mm inclusive nominal size for operating pressures not greater than 7 bar
GIS/F12	-	Specification for Grouted Tee Connections for Metallic Mains Operating at Pressures up to 7 Bar
GIS/L2	-	Specification for Steel pipe 21.3mm to 1 219mm Outside Diameter for Operating Pressures up to 7 bar (Supplementary to BS EN 10208-1)
GIS/PL2: Part1	-	Specification for Polyethylene Pipes and Fittings for Natural Gas and Suitable Manufactured Gas. Part 1: General & PE Compounds for Use in PE Pipes and Fittings.
GIS/PL2: Part2	-	Specification for Polyethylene Pipes and Fittings for Natural Gas and Suitable Manufactured Gas. Part 2: Pipes for Use at Pressures up to 5.5 bar
GIS/PL2: Part 3	-	Specification for Polyethylene Pipes and Fittings for Natural Gas and Suitable Manufactured Gas. Part 3: Butt Fusion Machines and Ancillary Equipment
GIS/PL2: Part 4	-	Specification for Polyethylene Pipes and Fittings for Natural Gas and Suitable Manufactured Gas. Part 4: Fusion Fittings with Integral Heating Element(s)
GIS/PL2: Part 5	-	Specification for Polyethylene Pipes and Fittings for Natural Gas and Suitable Manufactured Gas. Part 5: Electrofusion Ancillary Tooling
GIS/PL2: Part 6	-	Specification for Polyethylene Pipes and Fittings for Natural Gas and Suitable Manufactured Gas. Part 6: Spigot End Fittings for Electrofusion and/or Butt Fusion Purposes
GIS/PL2: Part 7	-	Specification for Polyethylene Pipes and Fittings for Natural Gas and Suitable Manufactured Gas. Part 7: Squeeze-off Tools and Equipment
GIS/PL2: Part 8	-	Specification for Polyethylene Pipes and Fittings for Natural Gas and Suitable Manufactured Gas. Part 8: Pipes for Use at Pressures up to 7 bar
GIS/V7: Part 1	-	Specification for Distribution Valves Part 1: Metal Bodied Line Valves for use at Pressures up to 16 bar and Construction Valves for use at Pressures up to 7 bar
GIS/V7: Part 2	-	Specification for Distribution Valves – Part 2 Plastic Bodied Valves of Sizes up to 180mm Suitable for Operation at Pressures not Exceeding 5.5 Bar
GIS/V7: Part 3	-	Specification for Distribution Valves. Part 3 - Brass Bodied Manually Operated Ball and Taper Plug Valves not Exceeding 5 bar Maximum Operating Pressures
HSG47	-	Health and Safety Executive Guidance - Avoiding Danger from Underground Utilities

A.3. THE DEFINITIONS APPLYING TO THIS WORK INSTRUCTION

Anchorage	-	Fixing of pipe ends, bends, valves and tees to prevent movement.
Annulus	-	The space between a carrier pipe (old gas main) and the new pipe.
Bagging Off	-	The technique of stopping off the flow through a main, by inserting and inflating bags in the main.
Butt Fusion	-	A method of jointing PE pipes and fittings, where the two pipe ends are heated and brought together to be fused without the use of a separate fitting
Bypass	-	A configuration of pipes and valves used to provide temporary continuity of gas supplies during a flow stop operation
Carrier Pipe	-	The existing pipe into which another pipe is inserted.
Competence	-	A competent person having the ability, appropriate training, knowledge and experience to supervise and/or carry out the work being undertaken in a safe and proper manner.
Dead Insertion	-	Installation of a replacement pipe into an existing pipe, whilst the host pipe is dead and not in use.
Electro Fusion	-	Method of jointing PE pipes, using fittings having integral heating coils.
Flow stop	-	The technique of stopping the flow of gas in a live gas main.
Gauging	-	Method of checking for size and suitability of the pipe into which insertion is to take place.
Host Pipe	-	A pipe into which another live pipe has been inserted
Live Insertion	-	Installation of a replacement pipe into an existing pipe, whilst the host pipe remains live and in use.
Operational Manager (First line)	-	A direct subordinate of an Operational Manager (Senior), responsible for “day to day” activities undertaken by operatives.
Operative	-	All persons engaged in the construction, testing, commissioning and decommissioning of mains and related plant must be competent to carry out such work. Operatives must not attempt to undertake any activity for which they have not been trained, assessed and certified as competent. When working in the highway at least 1 operative must hold a current NRSWA operative card.
Rider	-	A configuration of pipes and valves used to purge a section of main to gas
SDR	-	Standard dimension ratio: The ratio of the outside diameter of a PE pipe to the minimum specified wall thickness.
Slip Lining	-	Insertion of a new pipe by pulling or pushing it into the existing decommissioned pipe.
Squeeze Off	-	Squeezing a pipe to close the bore and stop the flow of gas.
SSRA	-	Site Specific Risk Assessment

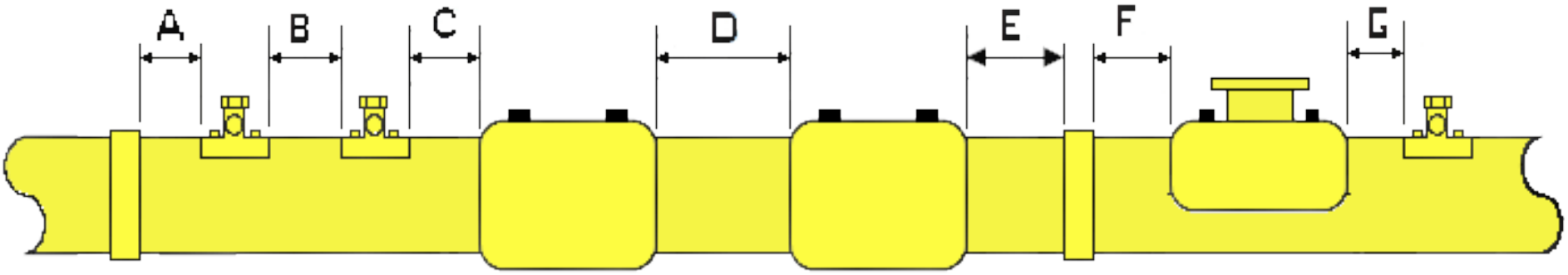


Figure B1 – PE minimum fitting separation distances for PE pipes

REF	Description	Pre-1976 (1)	Post-1976
A	Butt weld to Tapping Tee	250mm	50mm or Z
B	Tapping Tee to Tapping Tee	100mm	50mm or Z
C	Tapping tee to Coupling	100mm or W	50mm or Z
D	Coupling to Coupling	4 X o/s dia	50mm or Z
E	Coupling to Butt Weld	4 X o/s dia	50mm or Z
F	Butt Weld to Branch saddle	250mm	250mm
G	Branch saddle to Tapping Tee	250mm	250mm

Table B1- Separation Distances

[1] - For all pipe manufactured before 1976 and all imperially sized PE pipes including DuPont Aldyl-A, Muntz Barwell, Hoechst and others operating at up to and including 2bar.

W = 100mm or the minimum distance required to fit an alignment clamp, whichever is the greater.

Z = 50mm or the minimum distance required to fit an alignment clamp,

Note: When placing fittings alongside each other the first fitting must be allowed to cool for the complete cooling cycle prior to any adjacent fitting being electro fused.

1. Measurements are edge to edge of fittings and/or joints.
2. Where the date of manufacture for a pipe cannot be determined then the use the dimension must be assumed as pre-1976 for that date.
3. Alignment clamps must not be fitted over butt joints.

Fittings must not be placed closer than the distances shown in Figure B2

	Fittings	Pre-1976 PE pipe	Post 1976 Pipe –PE 80 and PE 100 SDR 17.6 and SDR 21
A	saddle to saddle	100mm	50mm
B	saddle to E/Fusion socket or butt joint	250mm	50mm
C	E/Fusion socket to socket, socket to butt joint or butt to butt	4 X d	50mm + The Width of the alignment clamp. Alignment clamp must not be fitted over the butt fusion joint
D	squeeze off to any joint or fitting	3 X d	2.5 X d
E	Squeeze off to squeeze off	6 X d + Fitting	5 X d + Fitting
NOTE: Dimensions for Branch saddle fittings use the Pre-1976 figures.			

Table B2 – Squeeze off distances

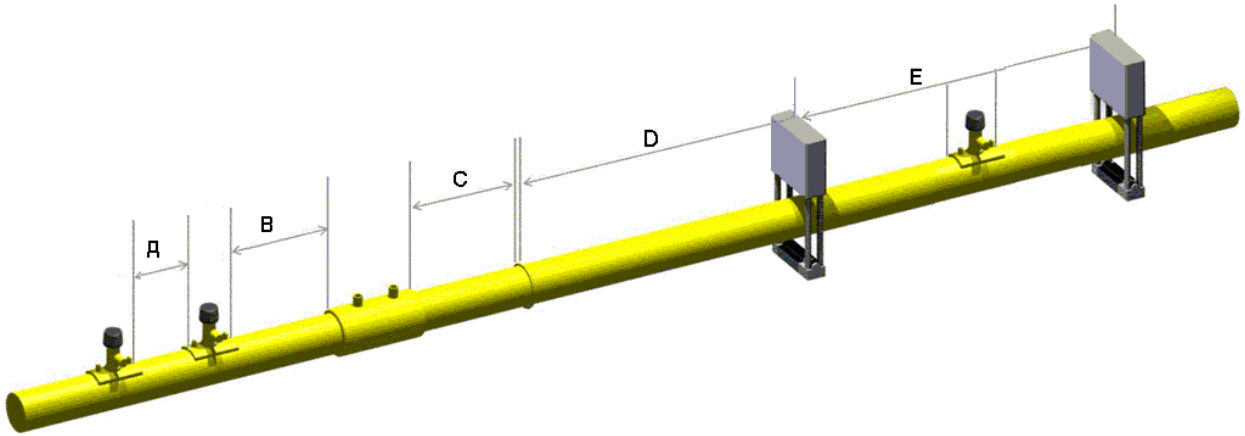


Figure B2 – Squeeze off distances

Appendix C | Preparation of PE pipe for Electrofusion connection | Page 1 of 5

This Appendix covers the preparation of PE pipe for the electrofusion technique.

C.1 PREPARATION FOR JOINTING

1. You must take precautions against adverse weather conditions.
   Note: These severe wind chill effects (such as provision of jointing tents and the temporary sealing of pipe ends).
2. You must take precautions when carrying out pipe jointing if the air temperature is below -5 °C or above 40°C
   - At or below -5 °C, you should only carry out fusion in a heated tent.
   - At or above 40°C, you must allow extra cooling time prior to removal of the pipe clamps.

   Note: In addition, in such extremes of temperature, written advice should be sought from the equipment and pipe manufacturer before commencing fusion jointing under such conditions.
   Pipes made from dissimilar polymers must be joined only by electrofusion or mechanical methods.

C.2 PIPE JOINTING

Pipes must be joined by one of the procedures detailed in Appendix D or E. Butt is the preferred method.

1. Check that each pipe is marked by the pipe manufacturer:
   - GAS;
   - Polymer type, typically. A, S or X;
   - Size that is outside diameter and SDR each fitting must be marked:
   - Size that is outside diameter and SDR;
   - SDR, for fittings of outside diameter greater than 250 mm;
   - Fusion time(s);
   - Cooling time.
2. You must only make joint using dry pipe and fittings.
3. DO NOT touch a fusion surface which has been cleaned by trimming/scraping or removal of the peelable layer.
4. Support and clamp the pipe to prevent it being moved during the heating, fusion and cooling phases.
5. Support long pipes to avoid misalignment due to sagging.
6. Do not carry out pressure testing until the complete system has cooled down to ambient temperature.

C.3 GENERAL

1. Existing Electrofusion fittings are normally suitable for multi-layer pipes of SDR 21 rating and many are rated for SDR 26 pipe.
2. You should check their suitability with the fittings supplier.

C.4 SUMMARY CAUSES OF PE JOINTS FAILURE

Most joint failures fall into the following categories:

- Contamination of joint
- Alignment clamps not fitted or not fitted correctly
- Re-rounding tools not used where pipe shows ovality
- Using incorrect tool or poorly maintained tool to scrape the pipe
- Excessive scraping of the pipe
- Under scraping of the pipe
- Pipe ends not cut square
- Incorrect fusion time
- Inadequate pressure applied to the joint during the jointing process
- Joint stressed during cooling as a result of not using an alignment clamp.

C.5 PE POLYMERS AND MATERIALS

Various polymers have been used in the manufacture of PE pipes; these are commonly known as "A", "S" or "X". Information of which polymer the pipe is made from should be found on the pipe legend written on the pipe wall. Pipes of the same polymer, diameter and wall thickness can be joined by the butt fusion technique.

1. If you are joining pipes which are of different types, you must use Electrofusion or Flanged methods for jointing.
   Note: The industry now uses only metric pipes but imperial pipes will still be encountered (identified from the pipe legend on the pipe wall). Early imperially sized PE pipes, known as DuPont Aldyl-A that were tan in colour can be found in diameters from ¾" to 8".

2. Imperial pipes must be joined using electrofusion or mechanical fittings.
   Note: The range of PE pipes is quite wide as is the range of SDR's available.

C.6 THE STANDARD DIMENSIONAL RATIO (SDR)

1. The SDR is calculated by dividing the specified outside diameter of the pipe by the minimum specified wall thickness.
2. The common range of SDRs used for PE gas pipes are: 11, 13.6, 17.6, 21 and 26, (the higher the SDR value the thinner the pipe wall thickness) and hence the lower operating pressure rating.

C.7 MATERIAL GRADES

1. In the United Kingdom Gas Industry, PE pipe is currently available in two grades of pipe, PE 80 (Medium Density) and PE100 (High Density).
2. PE 80 is a single layer pipe but PE 100 is available as a multilayer pipe with various brand names depending on the manufacturer. The inner core of the pipe can be white or black.

Note: Pipes can be co-extruded (one pipe with two layers) or with a peelable outer layer.

C.8 FUNDAMENTALS OF PE PIPE JOINTING

1. You must not install PE pipes in underground locations where the temperature of the ground surrounding the pipe is expected to exceed 20°C.
2. You must not install live PE pipe above ground unless fitted into a purpose designed sleeve to protect it from sunlight.
   Note: The pipe manufacturer will stipulate acceptance of the sleeving system.
3. You should take precautions when carrying out pipe jointing when the air temperature is below -5°C or above 40°C.
4. You must use a heated tent when fusion jointing at or below -5°C.
5. When fusion jointing at or above 40°C, extra cooling time must be allowed prior to removal of alignment clamps.
   Note: In addition, in such extremes of temperature, written advice should be sought from the equipment and pipe manufacturer before commencing fusion jointing under such conditions.
6. You must make PE pipe jointing a continuous process, pipe preparation must be followed by immediate fusing and then cooling; there should be no delay in fusing once the pipe has been prepared.
7. Check the manufacturer's instructions for correct preparation of pipes.
8. Key points:
   - When fusing pipes by either Butt or Electrofusion keep all pipe joints and fittings dry.
   - Once surface preparations have taken place do not touch the surface.
   - You must support the pipe and fittings with approved restraining clamps throughout the fusion and cooling process.
   - You must allow the complete system to cool down to ambient temperature before to pressure testing.
   - Always maintain the dimensions given in Appendix B when jointing PE pipe.
   - This will help to maintain the integrity of the system.
   - Fittings MUST be kept in their protective bags to prevent contamination and minimise further oxidation until immediately ready for fitting and fusing.
   - Fittings that have been removed from their protective bag for an extended period before fusing or where the protective bag has been damaged or punctured must not be used.
9. Maintain fusion proximity distances and squeeze off proximity distances as stated in Appendix B.
10. The fusing of saddles and top tees across butt fusion joints is not allowed.
    These distances are required to make sure that:
    a. The heat introduced into the pipe when fusing is taking place does not affect the 'heat affected zone' of adjacent fittings/joints
    b. To provide sufficient room for the pipe to be properly scraped/peeled
    c. To enable inspection of the pipe surface to make sure there are no gouges that could act as leak path from fittings
    d. When squeezing off any adjacent joint/fitting is not affected by the stresses introduced into the pipe which could cause the joint/fitting to fail.
11. Pipe and fittings must be supported with approved alignment clamps throughout the fusion and cooling process.
12. The complete system must be allowed to cool down to ambient temperature prior to pressure testing.
    Note: Reheating of fittings is not allowed, unless specifically permitted by the manufacturer.
13. If there is any evidence that the joint is substandard, then the joint must be cut out and your Operational Manager informed.

14. Existing Electrofusion fittings are normally suitable for multi-layer pipes of SDR 21 rating.
15. Fittings for use on SDR 26 should be checked for suitability with the fittings supplier.
16. Only approved PE Branch saddles can be used for Swage lined pipes and pipes with an SDR of 26, as the fusing process may melt through the pipe wall.
17. PE 80 pipe and PE CAT adapters can be joined to PE 100 pipe using electrofusion couplings.

    Fittings used on the PE system should be manufactured to GIS/PL2: Part 4 and be BSI kite marked or approved by SGN Engineering Policy.
18. Where non-standard PE pipe is encountered contact your Operations Manager before work is started. They will agree a method of work.

C.9 EQUIPMENT

You must check that:

- the control box you are using for electrofusion jointing meets the requirements of GIS/ECE/1 and is connected to a 110 V mobile district supply conforming to SGN/SP/ECE/3 or a combined electrofusion control and power unit conforming to GIS/ECE/1 may be used.
- any extension cables, if required, are of the correct power rating
- extension leads are fitted to the power input side of the electrofusion control box.
- the power rating of the extension cable is compatible with the power source.
- All electrofusion ancillary tooling complies with GIS/PL2: Part 5.
- The electrofusion control box has a data retrieval system fitted.

C.10 POWER SOURCE

1. Select the correct power source for each electrofusion control box.
2. Check that the generator is of sufficient quality and power for the electrofusion control boxes and fittings.
3. Use Table C1 to select the correct generator.

   Note:

   - ***There are differing requirements of 40Volt controllers according to whether they are transformer based or are of the 'transformer less' type.***
   - ***Transformer less units favoured because of their compact, lower weight, construction.***
   - ***However, because of the way they use power it is necessary to match them to a larger generator of much higher power output.***

Generator Continuous Power Rating (Minimum)	Electrofusion Control Box Type and Voltage	Maximum Fitting Current (Power)
3KVA	40V Transformer	62A (2.5kW)
6.5KVA	40V 'Transformer less'	62A (2.5kW)
6.5KVA	80V 'Transformer less'	62A (5kW)

Table C1 - Matching electrofusion control unit, power source (generator) and fittings

C.11 PIN SIZE

4 mm electrofusion pin sizes have been introduced on some PE fitting ranges. The traditional UK gas pin size is 4.7 mm.

1. Two types of terminal connection end adapters may be used to enable SGN's existing fixed 4.7 mm electrofusion leads to be used, a heavy-duty version (Stock Code: 220415 bag of 2) for multiple use, and a light duty version (Stock Code: 220416 single item) for single use.

Figure C1 – Terminal connections end adaptors

Most electrofusion leads will have fixed 4.7 mm terminal ends. However, some multi-fit type leads exist that can be used on both 4.7 mm and 4 mm pin fittings, without the need for a pin adapter.

2. You must check your electrofusion lead to see if they are fixed or a multi-fit type. Only leads with fixed 4.7 mm pin ends will require an adapter.
3. You must check the fitting label to see if it is 4mm pin fitting.
4. Under no circumstances must you try to use a fixed 4.7 mm electrofusion lead (without a pin adapter) to electrofuse a 4mm pin fitting.

Figure C2 – Typical fitting label

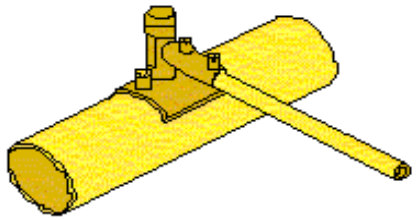
Appendix D	Electrofusion jointing of PE pipe and fittings	Page 1 of 11

D.1 ELECTROFUSION - PREPARATION

1. PE electrofusion fittings will usually be marked with a variety of information depending on the manufacturer as follows:
   a) Manufacturer's name
   b) Fusion heating time(s) & the power requirements, typically 40 Volts or 80 Volts
   c) Cooling time
   d) Material (PE80 or PE100)
   e) Range of pipe SDRs the fitting can be used on
   f) Dimensions, such as Pipe diameter range
   g) Batch Number and/or Product Code
   h) Bar Code
   i) The protective bags may have labels to indicate the type of fitting.
2. Fittings can either be black or yellow.
3. Check using an approved gas detector at the start and during the operation to confirm that gas readings are, and will remain below 20% L.E.L.
4. If a gaseous atmosphere exists or is suspected the electrofusion technique must not be used.
5. Do not take the electrofusion control box into the trench or a gaseous atmosphere.
6. Select a suitable location, which should be flat and dry,to carryout the operation.
7. If there is likely to be a problem with contamination due to Rain,Snow,air borne dust or wind chill, an appropriate shelter around the machine must be used.
8. Standing water should be removed from the trench.
9. **ALWAYS** use the correct size of electrofusion saddle and coupler on PE Mains.
10. Check that fittings remain in their protective bag until immediately prior to use.
11. **DO NOT** scrape any surface containing a heating element.
12. Select a suitable location for the connection.
13. For distances between fittings refer to Appendix B
14. Clean the jointing area of the pipe to remove all dirt and debris with a clean, damp, non-synthetic cloth or paper toweling.
15. If using soapy water this must be washed off with clean water and dried.
16. Inspect the pipe for any defects or damage. See SGN/WI/ML/2 Section B1.
17. Check the PE pipe for ovality.
18. Use a re-rounding tool where necessary.
19. Check that the fitting fits correctly on the pipe and if not check to see if the fitting has been incorrectly labelled.
    Note: If the fitting has been incorrectly labelled place it back in the protective bag and follow the returns procedure, see Appendix K.
20. Alignment clamps should be used unless exceptional conditions exist.
21. Write the fusion and heating times for the fitting being fused on the fitting or the main near to where you are going to make the connection.
    Note: This will act as a cross-check and record of the joint.
22. Should the fusion stop in mid process, allow the fitting and pipe to cool down, cut off /out the fitting and start again.
    Note: DO NOT ATTEMPT TO RE-FUSE ANY FITTINGS.
23. Check the compatability of the electrofusion box, the generator and the fittings power requirements.
24. Always keep electrofusion fittings in their bags until the last possible moment.
25. Never touch the prepared surfaces or of surface of the tapping tee containing the electrical filament coils which have been prepared for the fusion process.

D.2 FUSION OF TAPPING TEES

1. The following tools and equipment must be available when undertaking electrofusion activities: -
   - Top loading clamp (Figure D2) (unless using under clamped fittings)
   - Scraping Tool & Marker pens
   - Electrofusion control unit & power source
   - Terminal Pin Adaptor's (if required) 4mm to 4.7mm
   - Print control unit (if fitted)
   - Gas detection equipment
   - PE Pipe cutters
   - Alignment Clamps 20 - 32mm
   - Tent/cover
2. Pipe used for electrofusion will be factory marked, every metre as follows: -
   - Gas
   - Polymer type i.e. A, S or X;
   - Size, (outside diameter) and SDR
3. Fittings used for electrofusion will be factory marked as follows: -



   - Fusion time (s);
   - Cooling time.

Figure D1 – Electrofusion Tapping Tee and Coupler

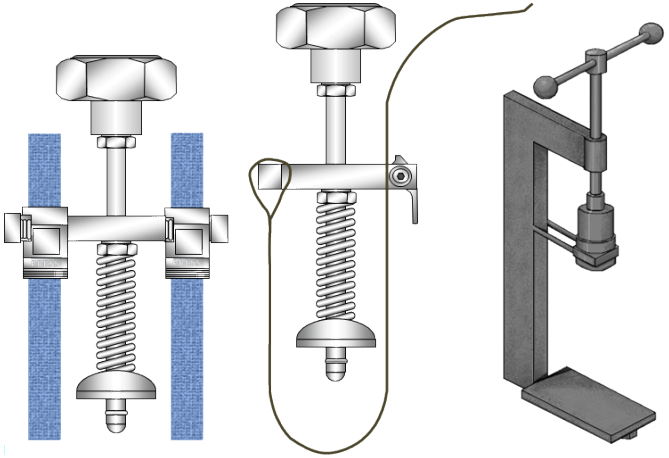


Figure D2 - Top-loading tools (straps and clamp)

Figure D3 - Under clamped service tee

D.3 ELECTROFUSION TAPPING TEE PREPARATION

1. Firstly prepare any pipe to be connected to the tapping tee.
2. Cut the pipe to length.
3. Check that the pipe ends are cut square.
4. Create a chamfered edge where required to aid fitting insertion onto the pipe end and the removal of all burrs and swarf from both inside and outside of the pipe.
5. Prepare the tapping tee loading tool for use, fit adapters if required.
6. Check that there is sufficient clearance around the pipe to fit the tool.
7. Clean and inspect the pipe as stated in general requirements.
   Note: If soapy water is being used, this must be washed off with clean water and the pipe dried.
8. With the fitting still in protective bag, place the fitting on the proposed installation point.
9. With a marker pen, roughly mark a line around the base area of the fitting plus 25mm excess all round (Figure D5).
10. For Multilayer/peelable pipe using the PET tool (Figure D4) to score through the skin around the outside of the marked area.
11. Only peel off the skin when ready to assemble the electrofusion fitting onto the pipe.

Figure D4 - Pipe Exposure Tool (PET)

12. For PE 80 pipe mark the area with diagonal lines (Figure D5).
13. This is the area to be scraped.

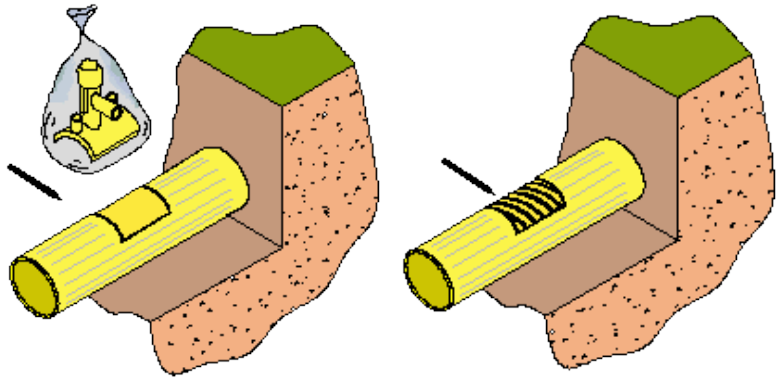
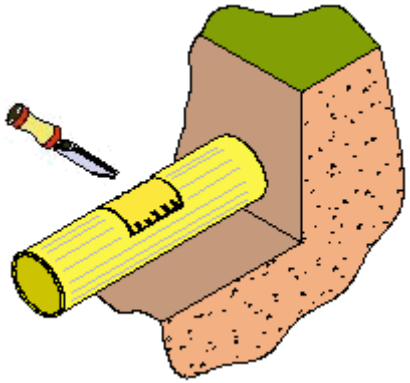


Figure D5a – Marking round fitting Figure D**5b** – **Hatching area to be scraped**

14. For PE 100 mulitlayer pipes mark the pipe as in 12 above
15. Using PET remove the outer layer (skin) of the pipe.
16. On PE 80 pipe thoroughly scrape the whole area outlined using a sharp approved scraper Figure D6.
17. Remove the fitting from its protective bag.
18. Leave the protective cover over the heating element on tapping tees and clean the outlet connection.
19. Mark spiral lines for a distance of half the proposed coupler length plus 25mm.
20. Scrape the outlet of the tapping tee spigot. Figure D7.



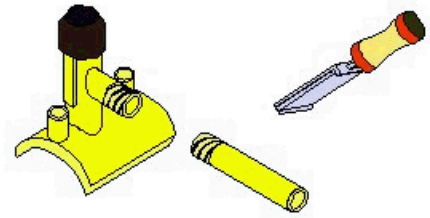


Figure D6 – Scraping of PE80 pipe Figure D7 – Scraping of spigot

Note:
Take care must not to handle or contaminate prepared surfaces or the surface of the tapping tee containing the electrical filament wires.
If the pipe (including multilayer pipe) is subsequently contaminated the only approved method for removing the contamination is to use a scrapping tool.
If the contamination is heavy, such as spoil/mud/liquid wipe off excess contamination with paper towelling or a non-synthetic cloth and ensuring the pipe is dry followed by scrapping.
DO NOT use alcohol wipes.

21. Remove the fitting cap and store carefully in the protective bag.

You may find it helpful to mark the heating and cooling times on the PE main adjacent to the fitting.

D.4 ELECTROFUSION TAPPING TEE FUSION PROCESS

1. Place the fitting into the top loading clamp.
2. Remove the protective cover from the base of the fitting.
3. Place the fitting and loading tool centrally over the scraped pipe or peeled pipe.
4. Assemble the loading tool on to the main.
5. Apply the correct loading pressure on the fitting (1.0 to 1.5 kN), this will displayed by the indicator on the tool. Figure D5.
6. Prepare tee outlet in accordance with Electrofusion Coupler Section, fit coupler and secure with restraining clamp.

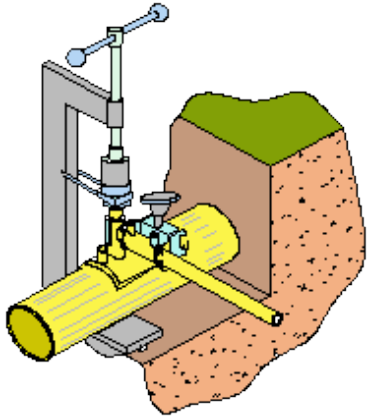


Figure D8 – Clamping fitting to main & coupler to tee/pipe

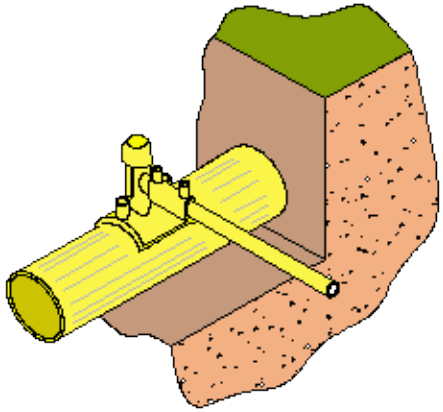
Figure D9 - Radius Quick tee

7. Connect the terminal leads from the control box to the electrofusion tapping tee. (Pin adaptors may be required)
   Note: Use only approved terminal connector leads.
8. For manual fittings, set the control box timer to the fusion time marked on the fitting and press start.
9. For automatic fittings check the time fitting corresponds with the time on the control box.
   Note: It is always important to check the time marked on the fitting even for automatic fusion time selection.
10. Inform all personnel that the electrofusion is about to start ask them to do nothing to disrupt the process.
11. Start the generator and connect the control leads to the generator.
12. Stand clear of the fitting when fusion is in progress.
13. Do not adjust the saddle loading during the fusion process.

14. When the control box indicates fusion is complete, check the fusion indicators have risen. Where this does not occur at the end of the fusion cycle, the fitting must be removed and discarded and a new joint made.

Note:

The fusion indictors or fusion wells only provide a guide to the fusion process having taken place. Where indicators have not popped up or where the fusion well(s) have not started to fill or there is significant difference between each side of the fitting, this indicates a probable poor joint, which must be cut off.



Note shown here is a coupler and straight piece of pipe. For MP 32mm domestic services a SEFV must be fitted.

Figure D10 – Completed connection

NOTE: Use of quick Tee will remove the requirement for the pipe clamp but not the Tapping Tee clamp

15. Carefully disconnect the terminal leads from the fittings taking care not to distrub the fitting.
16. Allow the joint to cool for the given cooling time.
17. Once the time has elapsed remove the top-loading tool Figure D10.
18. Fuse coupler in accordance with Electrofusion Coupler Section.
19. Pressure test pipe and fitting in accordance with Section F2.
20. If the pressure test is successful, turn down the integral cutter to cut a hole in the main.
21. If the pressure test shows failure of the tapping tee or saddle, cut off the fitting stack and select a new position for the new tapping tee not less than 100 mm away.
22. Repeat the preparation and fusion operation.

D.5 ELECTROFUSION COUPLER PREPARATION

1. Check the pipe for ovality, it can be common particularly on coils.
2. Where pipes show signs of ovality re-rounding clamps must be used for a minimum period of 10 minutes prior to pipe preparation and fusing taking place.

   Note: This will make sure it is possible to insert the pipe into the coupler with ease and without damage to the coupler.
3. Fit adapters shells if required.
4. Provide sufficient clearance around the main to fit the restraining clamp.
5. Clean the jointing area of the pipe with a clean, damp non-synthetic cloth or paper towelling.
6. If using soapy water this must be cleaned off with clean water and the joint area dried.
7. With the fitting still in its protective bag, place the fitting on to the pipe and, with a felt-tip marker pen, roughly mark a spiral line around the main.

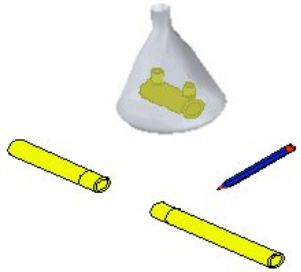


Figure D11 – Marking area to be scraped

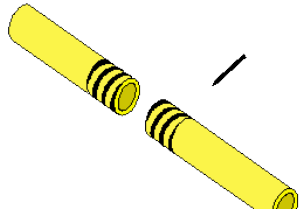


Figure D12 – Spiral marking of PE

8. Use the coupler and its centre register as a depth gauge and mark the pipe for one third of its circumference with a felt-tip marker pen.
9. The length to be scraped must be at least half the coupler length plus 25mm. This is the area to be scraped.
   Note: For fixed pipes always start with the underside of the pipe to avoid contamination. Always use an approved pipe scraper.
10. Repeat for second pipe to be joined. Figures D11 & D12.
    Note:
    DO NOT start to scrape the pipe unless you can immediately continue with the fitting and fusing of the coupler.
11. When joining two fixed end pipes together, for example following a cut out operation, at one end of the pipe mark it circumferentially a full length of the coupler plus 25mm.
    Note: This will enable the coupler to be fully inserted onto one side of the cut out and then withdrawn back over the other section of pipe without contaminating the heating element. For such operations remove the central stop inside the coupler.
12. You must cut pipe ends square using suitable tooling and any burrs removed.
    Note: A guillotine cutter will be acceptable for service pipe.
13. Prepare the pipe surface for the whole area outlined.
14. For standard (non peelable) PE, thoroughly scrape for a distance of 25 mm in excess of half the coupling length.
15. Adequate scraping is judged by removing a spiral line marked on the pipe with a felt-tip marker pen.
16. In the case of fittings with a moulded spigot, the entire spigot must be scraped.
17. It will be easier to scrape all pipe ends outside the trench, whenever possible, and then protect the pipe ends.
18. When pipe is to be scraped in the trench, a mirror should be used to confirm that the underside has been thoroughly scraped.
19. Where Peelable pipe is used, using the Pipe Exposure Tool (PET), score through the skin around the outside of the marked area on each pipe for a distance 25 mm in excess of half the coupling length.
20. Peel the skin off the pipe when ready to position the electrofusion fitting onto the pipe.
21. If the joint is not made immediately protect newly prepared surfaces from contamination.
    NOTE - Fusion will not occur if the pipe is inadequately scraped and this will lead to failure of the joint. Joint failure can also occur if small diameter pipes are scraped excessively.
    If the pipe is subsequently contaminated the only approved method for removing the contamination is to use a scrapping tool.
    If the contamination is heavy, such as spoil/mud/liquid it is acceptable to wipe off excess contamination with paper towelling or a non-synthetic cloth and ensuring the pipe is dry followed by scrapping.
    DO NOT use alcohol wipes.
    You may find it helpful to write the heating and cooling times on the PE main with a marker pen adjacent to the fitting.
22. Remove the fitting from its protective bag.
23. Take care not to handle or contaminate the surface of the fitting containing the heating coil or the sections of scraped pipe.
24. Place the fitting over the scraped area of main.
25. Slide the fitting on to the pipe until the centre register or the mark on the pipe is reached.
26. DO NOT force or hammer fittings on to the pipe.
27. Rotate the fitting so that the electrical connections are pinting upwards.
28. Check the main touches the central stop register in the coupler.
29. The fitting must be centralized between the pipe markings.
30. Mark the penetration depth on the side of the pipe at either end of the coupler.
    Note: This provides a visual warning if the fitting moves in relation to the mark prior to fusion taking place.

31. If the coupler(s) are to be installed in a cut out section “knock out” the central stop registers.
32. For a repair, cut out a length of pipe equal to at least four pipe diameters on each side of the damage. Cut a new length of pipe 5 mm shorter than the gap.
33. For connections, cut out a length of existing pipe 5 mm longer than the overall length of the new pipe/fitting to be installed.
34. Push the two couplers fully onto the newly prepared section of PE pipe.
35. With the section of pipe placed in the cut out area pull the couplers back over the prepared existing pipe and apply the restraining clamp.
36. Assemble the alignment clamp on to the pipe, visually check pipe alignment in all planes and where applicable check free rotation of the coupler to create a stress free joint (Figure D13).
37. Pipe clamps must be fitted for end restraint in all cases.
38. Check the penetration depth again.
39. You should not be able to move the coupler along the pipe.
40. Assemble the Alignment clamp.

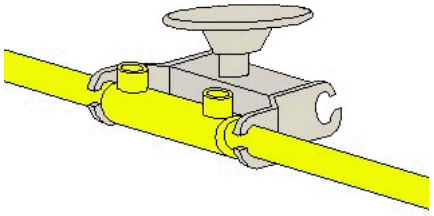


Figure D13 – Clamping/Aligning of the service pipe and fitting.

41. Pipes to be joined must be aligned and supported so that they are unstressed when assembled into the coupler body.

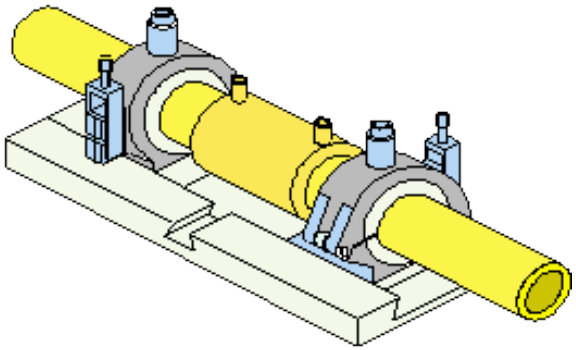


Figure D14 – PE Clamped prior to fusion larger sizes

D.6 ELECTROFUSION COUPLER FUSION PROCESS

1. Temporary end caps must be installed to avoid the fitting becoming chilled due to draughts passing through the inside of the pipe,
2. In wet or windy conditions a tent must erected over the Fusion area to avoid cooling and contaminating the fusion joints.
3. Connect the terminal leads from the control box to the electrofusion coupler.

   Note: Use only approved terminal connector leads.
4. Inform all personnel that the electrofusion is about to start ask them to do nothing to disrupt the process.
5. Start the generator.
6. For manual fittings, set the control box timer to the fusion time marked on the fitting and press start.
7. For automatic fittings check the time fitting corresponds with the time on the control box.
8. Stand clear of the fitting when fusion is in progress.
9. Do not adjust the restraining/alignment clamps during the fusion process.
10. When the control box indicates fusion is complete, make the quality checks.

11. Carefully disconnect the terminal leads from the fitting taking care not to disturb the fitting.
12. Allow the joint to cool for the given cooling time prior to removing the alignment clamps. Figure D15.

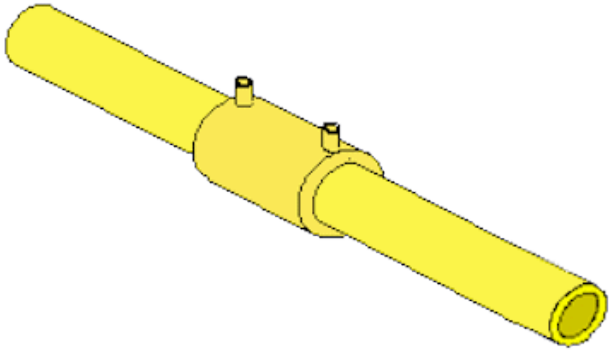


Figure D15 – Completed joint

D.7 QUALITY CHECKS

1. Check that the fusion indicators have risen or the melt wells have filled.
   Note: If the fusion indicators have not risen the joint must be removed and discarded and a new joint made.
2. Check that no melted material or wire has extruded from the ends of the fitting.
3. Check that the pipe has not moved during welding, fusion heating / cooling time.
4. Check for cleanliness around the joint area.
5. Check for evidence of scraping.
6. If a print facility is available, print out from the control box and check the result see Figure D17.
   If the power fails during the fusion process, DO NOT attempt to re-heat the fitting.
7. The tapping tee must be cut off at the stack.
   If the pressure test shows a failure of the tapping tee or coupler on the spigot.
8. Cut off the stack to prevent it any future use, and ensure the defective fusion/fitting is reported.
9. Select a new position for the new tapping tee, minimum of 50 mm from failed tee (Figure D16).

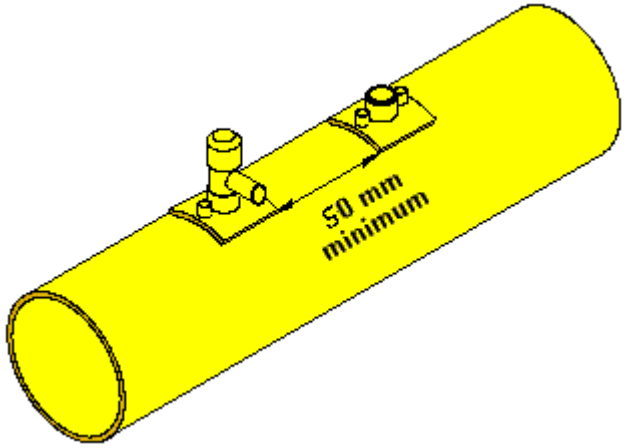


Figure D16 – Failed fusion arrangements

Note: For pre-1976 pipes the distance must be 250mm

Serial Number: 65Z102

Date: 20/05/2003 Time: 14:00:00

Ambient Temperature: 15.0°C
Joint No: 46
Operator code: ST
-- AUTOMATIC fitting --
Target Fusion Time: 80.0 seconds
Achieved Time: 80.0 seconds

Joint Status: COMPLETE

********** POWER PROFILE **********

Time (S)	Output Voltage (V)	Output Current (A)	Output Energy (kJ)
2.0	39.7	22.1	0.0
8.0	39.7	19.2	5.6
16.0	39.7	17.7	11.4
24.0	39.7	16.8	16.9
32.0	39.7	16.1	22.1
40.0	39.7	15.5	27.2
48.0	39.7	15.1	32.1
56.0	39.7	14.8	36.8
64.0	39.8	14.3	41.5
72.0	39.8	14.0	46.0
80.0	39.8	13.8	49.9

Figure D17 - Electrofusion Joint Record Print Out

D.8 OTHER ELECTROFUSION FITTINGS

When assembling socketed fittings such as in-line tees, reducers and elbows. The fusion procedures for electrofusion couplers should be followed when (These will not rotate when clamped)

1. Specialized tooling may be required to accommodate such fittings.
2. Some electrofusion equal tees have an electrofusion body with a short integral spigot leg to enable connection via an electrofusion socket. See Figure D18.

Figure D 18- Short Spigot fitting

3. Where this type of tee is to be fitted a multi clamp must be used see Figure D 19 & D 20.
4. This clamp will restrain all three legs of the joint from axial and rotational movement and enable the sockets to be aligned correctly during the jointing/cooling process, but should not preclude free movement of the electrofusion fitting. (Two examples of multi clamps are shown below).
5. Electrofusion must not be completed without the correct use of an appropriate restraining clamp.
6. If a multi clamp is not available for use with a short spigotted tee, then an alternative fitting or method of constructing the tee must be used.

D.9 BRANCH CONNECTIONS

1. New Electrofusion fittings are normally suitable for multi-layer pipes of SDR 21 rating; fittings for SDR 26 should be checked for suitability with the fittings supplier. See Section D2.

Figure D 19 – Multi clamp

Figure D 20 – Tee Clamp

D.10 BLACK CORE PIPE

1. PE pipe suppliers (Radius) are now producing multilayer pipes using a black PE core with a standard yellow shell coating or yellow peelable skin.

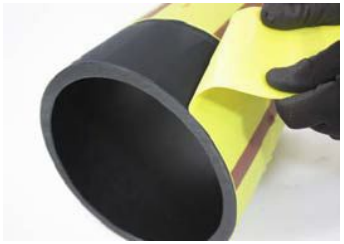


Figure D 21 – Black Core Multilayer pipe

2. These pipes are made to the same dimensions PE80 and PE100 and BSI Kitemark approved to gas industry standards (GIS/PL2: Part2).
3. The change is limited to visual impact only - work procedures, jointing techniques and tooling are unaffected.
4. It is important however to note that the innner black core is not a means to identify that you have scraped enough pipe. It is not a “scrape to marker”.
5. You must not over scrape and expose the inner black core.

Figure D22 – Electrofusion

Figure D23 – DO NOT Over Scrape

6. Using standard pipe scrape exposing the black Preparation tools.
7. Frialen marker pens can be used.

Figure D24 - Frialen marker pens

Appendix E | Butt fusion jointing of PE pipe and fittings | Page 1 of 8

E.1 GENERAL REQUIREMENTS

1. All butt fusion equipment must be of the fully automatic type with a data retrival facility and approved to GIS/PL2: Part 3. Preference should be given to butt fusion machines with GPS location and down loadable record systems.
2. When butt fusing Multilayer pipe check that the Butt-fusion machines has been either chipped to accommodate Multilayer pipe (such as Profuse pipe) or have a provision to enter the diameter and SDR of the pipe to be butt-fused.
3. Only pipe of the same diameter, polymer grade and Standard Dimension Ratio (SDR) can be jointed using butt fusion, dissimilar polymers and SDRs, can only be jointed using electro fusion, mechanical or flanged methods.
4. All joints must be made by a suitably qualified and competent operator.
5. For Intermediate Pressure (>2bar) projects:
   a) A competent person (who should not be the operator) must observe sufficient joints being constructed on site to make sure that fusion procedures are correct.
   b) The frequency of these observations should be as follows:
   - prior to the commencement of the project;
   - on a weekly basis for the duration of the project.
6. Before the first joint of the day, or any change of pipe size and after any washing, do the following:
   a) Place the hotplate in the machine
   b) Bring the pipe up to form a weld bead.
   c) Do not fuse this joint.
   d) Remove the hotplate,
   e) allow the melt to cool for a few minutes,
   f) trim back beyond the bead.
   g) Normal jointing procedure should then continue.
7. The PE pipe ends must then be re-prepared before making the joint.
8. Retain all butt fusion joint data retrieval printouts in the project file.

Note: Only PE 100 of 125mm diameter and above can be butt Fused.

E.2 BUTT FUSION PREPARATION

1. Choose a suitable location, which should be flat and dry to carryout the operation.
2. If you consider there is likely to be a problem with contamination due to air borne dust or wind chill, you must use an appropriate shelter around the machine.
3. Use a machine that has been regularly serviced and in good condition.
4. Select an appropriate power source, (check that the generator has sufficient fuel to complete the butt fusion cycle).
   Note: Butt fusion machines are not intrinsically safe and must not be used in gaseous or potentially gaseous atmospheres.
5. Before attempting to fuse any joints check that the generator is the correct voltage and power output. Reference must be made to manufacturer's instructions.
6. If you suspect that a gaseous atmosphere exists this must be checked using an approved gas detector at the start and during the operation to confirm that gas readings are, and will remain below 20% L.E.L.
7. Where circumstances change you will need to reassess and seek authority to proceed from your Operational Manager.
8. Not all gaseous atmospheres are the result of leaking gas pipes they can also result from collection of gases in defective sewer systems.

E.3 BUTT FUSION EQUIPMENT CHECK

1. Before using the machine make the following checks:
   a) That the butt fusion machine control unit is configured for the wall thickness to be fused. (for example SDR 21 or SDR 26).
   b) Neither the heating plate nor its non-stick coating is damaged.

c) The hydraulic hoses and connections are not be leaking and in good condition.
d) The fusion faces do not have any gouges or dents.
e) The temperature indicators are not be damaged.
f) That electrical cables are not damaged and have no loose connections.
g) The machine guide bars are free from corrosion and the clamps move freely.
h) The frame of the machine is sound and all the guides are secure, in place and not distorted.

2. Before connecting the machine to the power supply you must check the heating plate and trimmer for cleanliness.
3. If the heater plate is contaminated with mud and other site debris clean the plate using clean water and a bristle brush, and lint free cloth or paper towel which will not damage the non-stick coating.
4. You should remove any PE melt with a piece of wood to avoid surface damage.
5. If a surface cannot be cleaned by these methods, inform your Operational Manager.
6. Clean the trimming tool using water and a lint free cloth or paper towel all trapped plastic deposits must be removed.
7. Your Operational Managers may grant permission for aluminium cleaner or scouring powder, followed by a water wash, to be used to remove oily deposits.
8. If any of these are unsatisfactory the your Operational Manager must be informed and the machine labelled as faulty and returned for repair.

E.4 BUTT FUSION OPERATION – FULLY AUTOMATIC

1. After completing the checks the machine is suitable for use the machine and its component parts may be connected together, Figure E.1
2. If required enter the following parameters into the butt fusion machine.
   - SDR,
   - Mains Diameter and Type (gas), for main to be fused together,
   - Operators code, this will identify who fused this joint together,
   - Job details.

Refer to the manufacturer's instruction booklet to learn how enter the above information.

E.5 BUTT FUSION SEQUENCE

1. Check that the pipes to be Butt Fused are of the same diameter, SDR and pipe grade.
2. Inspect the pipe for any damage or cuts. See SGN/WI/ML/2 Section B1, If they are present this section of pipe must be cut out.
3. You must clean the pipe ends and dry them inside and out using a clean non-synthetic cloth or paper towelling.
4. You must remove any tarry deposits and writing by scraping using an approved scraper for a distance of at least 25mm from the pipe end.
5. Increase this distance if a large amount of trimming is required.
6. Secure the trimmer into the machine.
7. Peelable pipe can be Butt fused using a standard butt fusion machine; there is no requirement to remove the skin in order to clamp the pipe in the machine.
8. You must use a PET tool to score a strip around the end of the pipe for the butt fusion operation..
9. Remove a circumferential strip a minimum length of 25mm from the ends of the pipe to be jointed.
   Note: A wider strip of the peelable layer needs to be removed, when making a dummy joint.
10. Where extra trimming is required, remove the side plate adaptor fitted to the PET.
11. If the peelable layer shows evidence of disbonding prior to removal, the core should be lightly scraped in order to remove any possible contamination.
12. Extra trimming is required where the pipe end is out of square.

13. The distance for pipe end preparation should be increased to make a gap of approximately 25mm remains once the pipe ends have been trimmed.
14. Fit the correctly sized shells to the pipe clamps.
15. To reduce pipe drag always fit the new pipe which is being added to the pipe string to side of the butt fusion machine which has the greatest amount of travel.
16. Place the pipe onto correctly sized rollers to support the pipe and aide alignment in the machine.
17. Place the ends of the pipes to be fused into the machine against the trimmer.
18. Rotate the new pipe so that the pipe legend is facing upperwards.
19. Clamp the pipe in place. Figure E1
20. Place clean card or cloth beneath the machine to make sure that dirt or dust is not picked up as the trimmer rotates.
    This reduces the chances of contamination.

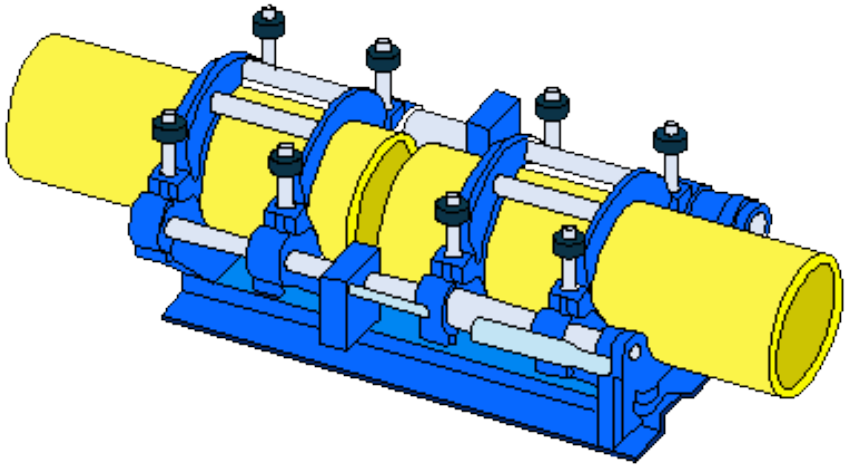


Figure E1 – Butt Fusion Machine

21. Install temporary end caps or expanding stoppers to avoid the heater plate becoming chilled due to draughts passing through the inside of the pipe.
22. In wet or windy conditions you must erect a tent or cover over the Butt Fusion machine.
23. Refer to manufacturers instructions to operate the “auto trim” cycle and continue the trimming until an even swarf of PE is shaved off from both ends of the pipe.
24. At this stage trimming can be discontinued. Figure E2.
25. On multilayer/peelable pipe check that there is a gap of approximately 25mm between the trimmed end and the skin.
26. If not remove pipes from machine; peel back additional skin and restart trimming cycle.

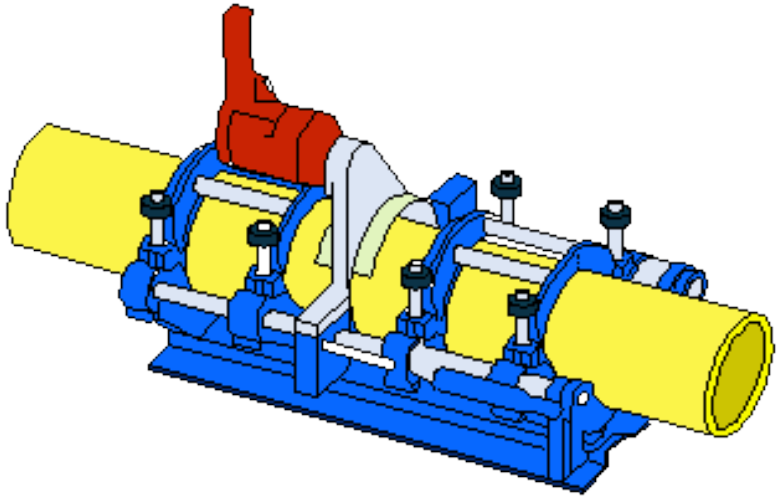


Figure E2 – Trimming of PE main

27. When the machine has pulled the pipe apart remove the trimmer and avoiding contact with the trimmed ends remove the swarf from around and inside the pipe avoiding contact with the trimmed ends, see Figure E3.

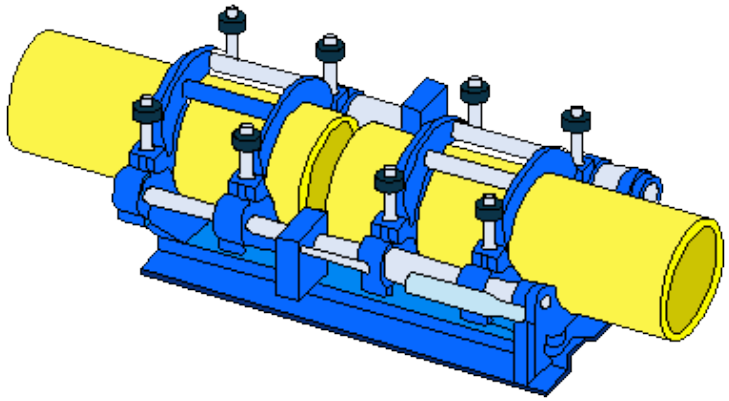


Figure E3 – Butt Fusion Check Cycle

28. Referring to manufacturer's instructions operate the 'check' cycle.
29. Make a visual check to confirm pipe misalignment is not greater than 1mm. For pipe sizes larger than 180 mm diameter, end offset of up to 10% of the pipe wall thickness is allowable.
30. Once the alignment check is complete and the pipe has been separated the heater plate can be installed between the pipes and secured.
31. Make a check to be sure that the thermostatically controlled heater plate is at the correct temperature.
32. This can be confirmed by ensuring that the heater pointer is in the green quadrant of the heater gauge or indicated on the LED display.
33. Should the heater plate not be up to temperature keep the pipe ends together to minimise any contamination until the correct heating temperature has been reached.
34. Referring to manufacturer's instructions operate the 'fusion' cycle.
    - The pipe ends will be pulled up against the heater plate for the appropriate length of time under controlled pressure.
    - The pressure is then released and the pipes moved away from the heater plate.
    - the heater plate removed and the molten ends of the PE pipes are then pulled together under controlled pressure to create the joint. Figure E4.
35. During the bead up cycle you should check that an even molten bead is being produced on each pipe end.

Note: If this is the first joint of the day, a change in pipe diameter to be fused or if the heating plate has been washed the fusion cycle must be cancelled after the bead up sequence is complete. The machine must then be opened, the heater plate removed and the melted pipe allowed to cool. This process must be completed twice on mains sizes above 180mm diameter. This process cleans the heater plate and must be repeated if the heater plate is:

- *switched off and allowed to cool or*
- *a different size pipe is used or*
- *a different SDR is used.*

Re-trim the pipe ends as stated above and repeat the trimming and check cycles.

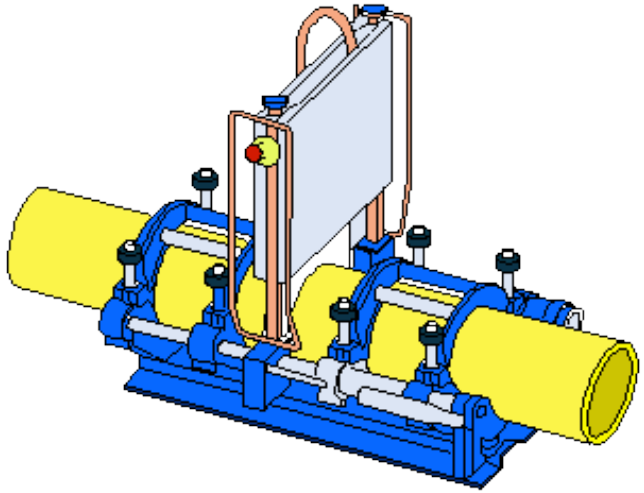


Figure E4 – Fusion Cycle

36. When the automated fusion cycle is complete and the cooling time, as indicated on the machine, has elapsed, carefully remove the section of pipe containing the joint from the butt fusion machine see Figure E5. **Fusion cooling times must not be aborted unless the joint is to be discarded.**
37. All external weld beads must be removed with an approved tool and inspected (see Figure E8) Following "Debeading" items 1 to 8).

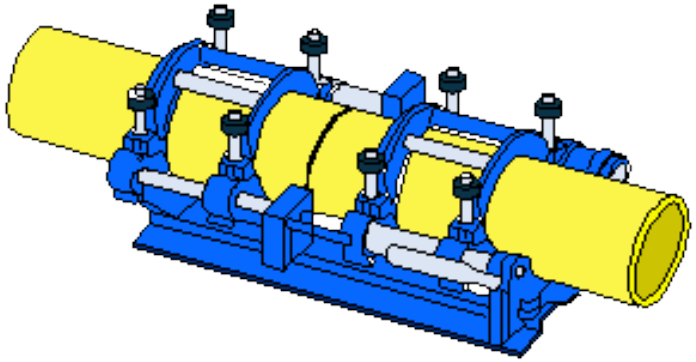


Figure E5 – Cooling Period

38. You must number and date each butt fusion joint on the top of the pipe with a marker pen so it corresponds with the information on the control unit of the machine. ***This aids identification.***
39. For intermediate pressure mains, the pipe joints must be numbered and the information recorded on the layout drawings.
40. The removed beads must be kept for inspection by your Operational Manager or their representative and must be numbered with its corresponding joint number.
41. Retain the numbered beads at least until the PE pipe has been successfully pressure tested and commissioned.

E.6 QUALITY CHECKS

1. The 1st joint (or 1st and 2nd joints on pipes above 180mm) shown on the print out or electronic copy must be a fail at the fusion cycle to indicate that the first joint was a 'dummy' joint to clean the heater plate. Figure E6
2. Check the complete weld bead for evenness as per Figure E7.
3. Visually inspect the weld bead.
4. The external weld bead width must be checked with the correct weld bead gauge, before removal, to confirm it is within acceptable limits, check for pipe misalignment and make sure that it is satisfactory, see Figure E7 or refer to manufacturer's guidelines
   Note: The evenness of the bead with a slightly greater bead width on the underside of the joint can be expected.
5. Where a bead inspection indicates a faulty joint, the joint must be cut out and the pipe re-jointed using the above procedure.
6. A verbal report must be given to your Operational Manager as to the cause of the joint failure.
7. A record of all joint(s) must be provided, a portable data printer may be attached to the Butt Fusion machine and a print taken off of all of the joints. Alternatively an electronic copy may be downloaded.
   Note: Refer to the manufacturer's instructions to operate the printer. Only those printers designed for that make and model of machine may be used.
8. All butt fusion joint data retrieval printouts must be retained and these printouts must be kept in the project file.
9. Where bead inspection identifies a faulty joint, you must cut out the joint and the jointing operation repeated according to the procedure detailed above.
10. Any problems must be reported to your Operational Manager or their representative.
    Note: As part of a quality control programme, your Operational Manager may require destructive testing of both butt and electrofusion joints made for checking fusion procedures prior to the project start, or selected as cut out samples from an ongoing project.

E.7 DEBEADING

1. Using an approved external bead remover remove the external bead and carry out visual checks on the underside of the bead for contamination.
2. You must complete a bend back test to identify any slit defects and lack of fusion.
3. It is important that all beads and pipe joints are numbered and the beads passed to your Operational Manager.
4. The bead must then be rechecked with a bead gauge and carry out an immediate check of the underside of the beads for evidence of offset, slit defects, and contamination. Figure E8
5. An unsatisfactory joint must be cut out immediately and discarded.
6. Where operational needs require the internal bead to be removed, approved tools should be used and the internal bead should be subject to the same inspection procedure as shown in Figure E8.
7. Your Operational Manager or their representative must also inspect all beads.
8. Each of the numbered beads must be retained at least until the PE pipe has been successfully pressure tested and commissioned.

E.8 JOINT RECORDING FOR INTERMEDIATE PRESSURE MAINS

1. The butt fusion machine data logger will automatically allocate a number to each joint: these numbers must be used as a reference for joint recording.
2. Each joint must have its reference number written on and this information recorded on the layout drawings.
3. The corresponding beads must be labelled in a similar way.
4. The numbered joints must be recorded in such a way as to facilitate the location of buried joints at any subsequent time.
5. The data logger display will give details of a satisfactory fusion joint: it should be checked each time a joint is made.

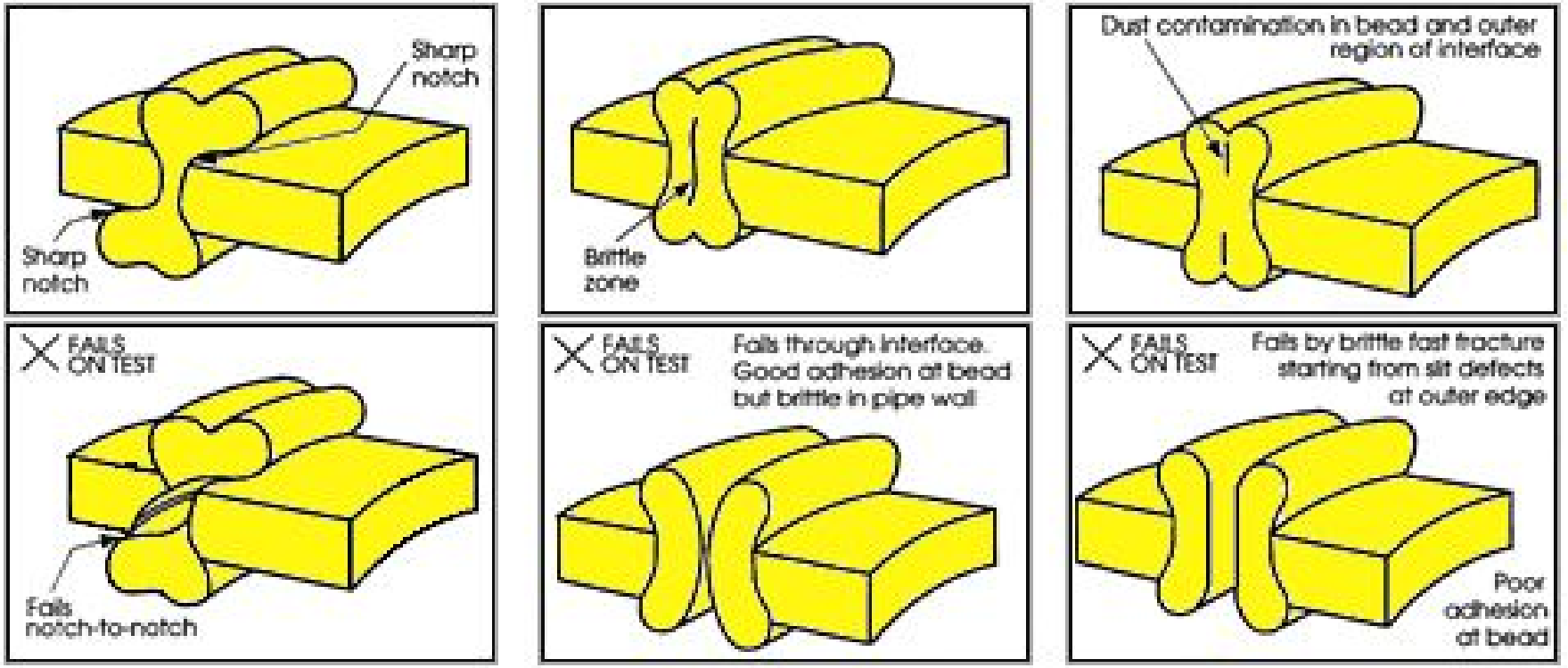
Figure E6 - Butt Fusion Joint Print Out

Machine type: BF3
Serial number : 145Z0696 V98 C005/I
Time : 10:45:18 Date : 14/08/2003
Ambient temperature = 25 Deg C
Joint number : 201
Job Number : FUS1
Operator Code : DEMO1

Pipe selected

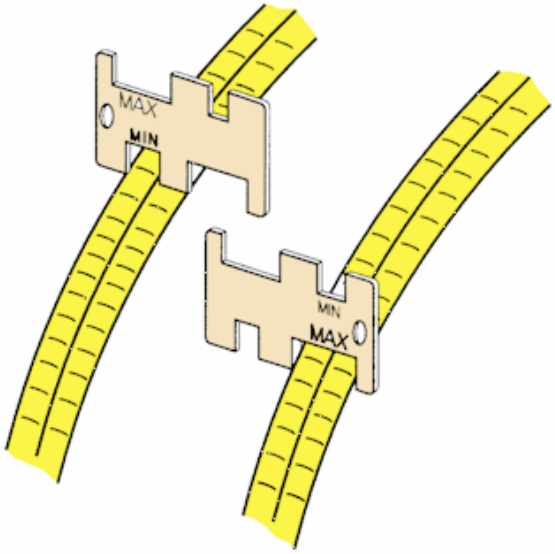
PE-X, Diam 180
Target heater temp. : 233 Deg C
Joint Cycle : COMPLETE

Parameter title	Value
Bead Pr. (no drag)	20.0 Bar
Join Pr. (no drag)	20.0 Bar
Dynamic Drag	14.9 Bar
Peak Drag	14.9 Bar
Heater temperature	231 Deg C
Bead up pressure	35.1 Bar
Bead travel	250
Heat soak pressure	1.6 Bar
Heat soak time	140 Seconds
Dwell time	1.9 Seconds
Fusion Pressure	34.6 Bar
Cooled time	600 Seconds



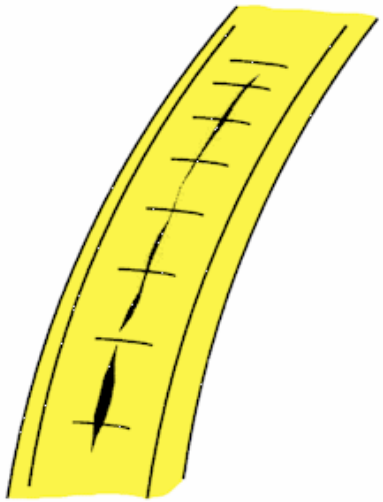
Pipe misaligment, combined with high fusion pressure, creates an excessively sharp weld bead notch. This can cause premature stress crack failure and reduced impact resistance. Bead removal will reveal th eoffset. Pipes meeting SGN's specification will tolerate a 10% wall thickness offset.	Re-cystallization of melt surface, due to excessive cooling before fusion, gives a low bond strength brittle region at the interface. The weld bead interface can be good, but the weld bead may be small. This causes a joint with poor impact strength and brittleness in bending. Strees crack resistance may be adequate.	In an otherwise well made joint, contamination from a dusty hotplate may be retained at the interface. Butt fusion is not fully self-cleaning. Weld bead removal will reveal a slit defect. The weld bead interface is weak. This causes very poor properties in bending or impact when the very sharp slit crack can grow. Pressure tests may fail to detect poor stress crack resistance.
a) Pipe misalignment	a) Melt cooling	a) Interface contamination

Figure E7 - Butt fusion visual inspection of bead



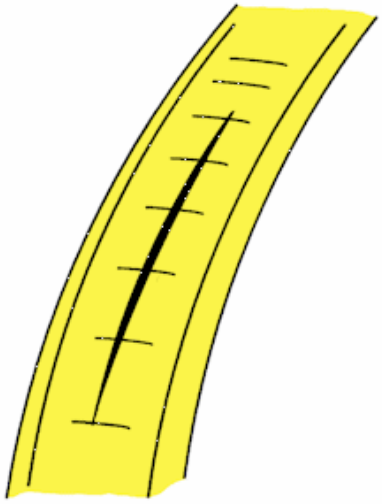
1. Bead width

Run the max/min bead gauge along the bead to check that it is within the specified limit. At the same time check for areas of distortion in the bead.



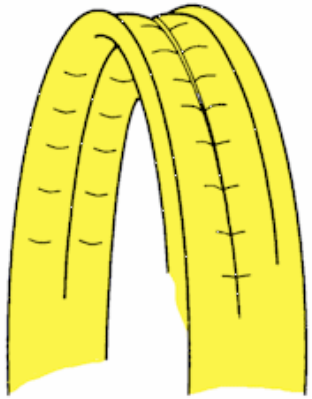
2. Contamination

Examine the underside of the bead over its complete length for contamination at the interface and, if found, confirm on the joint.



3. Slit defects

Examine the underside of the bead over its complete length for any separation caused by lack of fusion. This will be seen as a slit at the interface.



4. Lack of fusion

Confirm lack of fusion in the bead by bending it backwards on itself along its complete length. If faulty a clear separation will be seen. Locate the lack of fusion in the joint.

Figure E8 - Butt fusion visual inspection of bead

Appendix F | Other Jointing Techniques – Cutting & Threading | Page 1 of 2

Note: Jointing techniques are detailed within this Section, although minor deviations maybe required depending on the specific type of fitting. It is therefore important that manufacturer's instructions, included in the packaging, must be read and understood.

F.1 SCREWED JOINTS

1. The thread in use for tubes and fittings, where pressure tight joints depend on the thread, is the British Standards Pipe (BSP) thread to BS 21: 1985.
2. After the threads have been assembled hand tight, a tightening allowance of about 1.5 turns should be applied.
3. Threads to be joined must be clean, dry and free from rust, dirt, oil and grease. If the joint is being remade or a fitting being reused, then any previously used jointing compound must be removed.
4. Pipes should be carefully & adequately supported.
5. Over tightening joints gives no advantage in soundness or strength, and damage to the fittings will occur if this is done.
6. Jointing compound must be applied to avoid leaks.

Note*: *Table F1* and *Figure F1*, *give details of the overall lengths of thread to be made and the length that will be inserted into fittings.

Nominal Bore of pipe	19mm / ¾"	25mm / 1"	38mm / 1 ½"	50mm / 2"
Length of male thread	20 mm	21mm	25mm	28mm
Fitting engagement length (F.E.L.)	14mm	14mm	20mm	22mm
Amount of thread showing	6mm	7mm	5mm	6mm
Number of threads per inch	14	11	11	11

Table F1 – Pipe threads

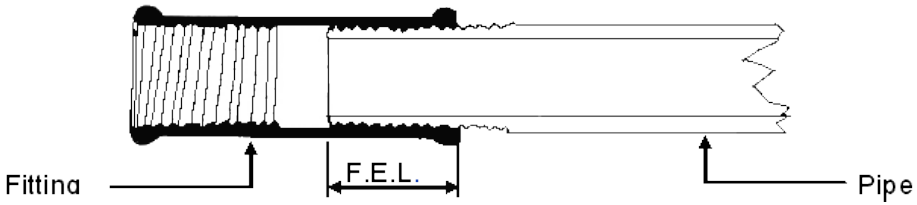


Figure F1 – Pipe thread

F.1.1 Screwing pipe

1. Dies used for cutting threads on domestic installation pipes up to 25 mm are usually solid block dies, held in ratchet stocks.
2. Above this size the dies may be solid or adjustable up to 50 mm, above this size only adjustable are used.
3. Before beginning to thread the pipe, it is essential to ensure that:

- The pipe has been cut square i.e. at right angles to the pipe.
- There are no burrs or obstructions on the inside or outside of the pipe.
- There is sufficient straight pipe behind the pipe end to accommodate the stocks and dies when the thread is fully made.
- The die block is clean, in good condition and fitted in the stock the right way around.
- The guide is a reasonable fit on the pipe. If this is too slack it will be difficult to ensure that the thread is cut parallel with the pipe, particularly with handed stocks.
- The pipe is fixed securely in a vice.
- A supply of cutting and threading lubricant is available.
- When cutting tapered threads, the die block should be screwed on until the face of the die is flush with the end of the pipe.

F.1.2 **Taps & Dies**

1. Taps and Dies are very brittle and rough handling can easily chip the teeth (Figure F2).
2. The taps must be turned backwards frequently to remove the metal cuttings.
3. The taps are easily broken and must not be forced.
4. Always lubricate the cutting edges of taps and dies using oil or grease for steel.
5. Keep the dies and guides clear of swarf and clean off excess oil. Check that the vice is clean and firmly fixed.

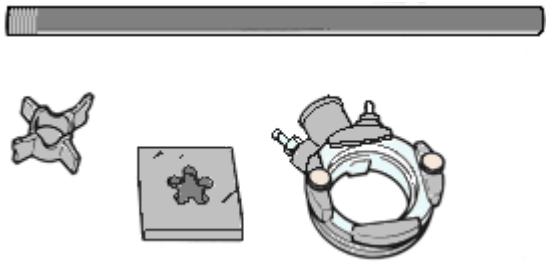


Figure F2 – taps and dies

F.1.3 **Jointing Materials**

Commonly used jointing compounds approved for SGN use must meet the Requirements of BS 751 part2 and PTFE tape part 3: -

- **Boss white** - For thread sealing only up to 2bar on Governor small diameter pipework and up to 2bar and up to 2in diameter on distribution and installation pipework.
- **Boss Gastite** (up to 2" dia and maximum of 0.7 bar)
- **Boss Universal** – (up to 2" dia and up to 2 bar)
- **Plasticoll X10**(normally used on higher pressures and on LPG systems).
- **Rocol Gas Seal**. (normally gas appliances only)
- Unsintered PTFE tape (For thread sealing up to 2in diameter single wrap at 2 bar only used on governor work and by First Call Operatives).

F.1.4 **Corrosion prevention**

On completion, all bare metal including any exposed threads must either be wrapped or painted to prevent corrosion.

G.1 PUSH FIT FITTINGS FOR PE PIPE ARE AVAILABLE FOR:

- House Entry Tees
- Surface/Inset Meter Box Adaptors
- Semi-Concealed Meter Box Adaptors
- Top Entry Service Tees and Side Entry Service Tees.

NOTE: Manufacturer's instructions must be followed to ensure that fitting specific assembly is undertaken correctly.

G.2 DRAWLOCK FITTINGS – METERBOX ADAPTORS

Drawlock fittings are available for 20 mm, 25 mm and 32 mm PE pipe)
The installation of Drawlock fittings should be undertaken as follows:

G.2.1 Preparation - PE Pipe

1. Cut the PE pipe so that the end is square and level with the bottom of the meter box and remove any burrs.
2. Wipe the PE pipe with a clean, dry cloth.
3. Inspect the pipe surface for defects
4. Mark the insertion depth onto the PE pipe. The correct insertion depths will be indicated on the protective packaging e.g. 14 mm for 20 mm pipe.
5. If excessive scratches or gouges are visible, cut off the defective length and repeat steps (1) to (3).

G.2.2 Preparation - Drawlock Fitting

1. Before removing the fitting from its protective bag check that it is the right type and size.
2. Remove the fitting and ensure that all components are included in the pack and not damaged.

G.2.3 Preparation - Draw lock tool

1. Remove the draw lock expander from the draw lock tool and check that it is the correct size for the fitting to be installed.
2. Clean and grease the threads on the draw lock tool to ease the drawing through of the expander.
3. Push the draw lock tool through the top of the fitting so that the threaded portion protrudes through the bottom.
4. Place the copper insert over the threads of the draw lock tool ensuring that the wider portion faces the nut at the top.
5. Replace the expander onto the bottom of the draw lock tool until it meets the copper insert. Ensure that the copper insert is in the centre of the base of the fitting.

G.2.4 Installation

1. Push the black bend and GRP sleeve, (or in the case of a semi-concealed meter box the black sleeve only) over the end of the PE pipe to be connected to the draw lock fitting
2. Push the PE pipe into the fitting and over the draw lock tool until it bottoms in the fitting.
3. The fitting must not be rotated during or after assembly.
4. Using the correct spanner to stabilise the draw lock tool whilst holding the PE pipe secure, commence rotating the nut at the top of the draw lock tool in a clock wise direction.
5. Continue with (4) above until the draw lock tool passes through the fitting.
6. Locate the GRP sleeve or black sleeve over the base of the fitting.
7. Secure in position using the C clip.
8. Complete assembly of service and pressure test in accordance with Section F of this work instruction.

Size
3/4" x 20mm
3/4" x 25mm
3/4" x 32mm
1" x 32mm

Table G1 - Drawlock sizes

G.2.5 **Drawlock Fittings – Service Head Adapters**

1. Drawlock fittings for service head adapters allow a seal to be provided when a PE pipe has been inserted into a steel carrier pipe. Sizes available for PE diameters are 16mm, 20mm, 25mm and 32mm.
2. The installation of these fittings is the same regardless of size, however, care must be taken to ensure the correct size Drawlock tool, adapter bush and expander is used.

G.2.6 **Preparation – PE Pipe**

1. Before cutting the PE, pipe ensure that the PE pipe that has been inserted has relaxed and is not under any tension or strain. This will prevent any unwanted movement during and after connection of the fitting.
2. Cut off the PE pipe leaving 20 cm above the end of the steel carrier pipe.

G.2.7 **Preparation – Steel Carrier Pipe**

1. Clean the threads of the steel carrier pipe.
2. Apply jointing paste to the threads of the steel carrier pipe.

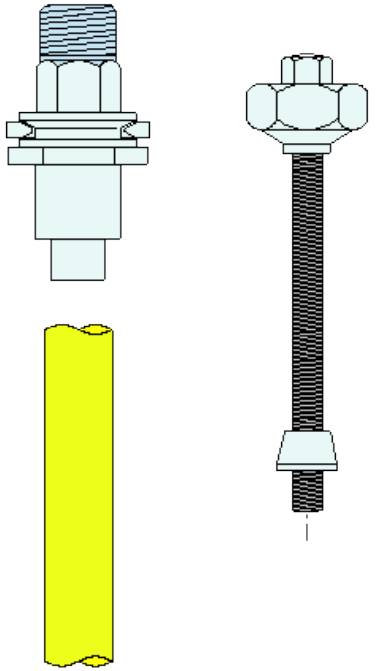


Figure G1 - Typical Drawlock Fitting

G.2.8 **Preparation – Service Head Adapter Fitting**

1. Before removing the fitting from the protective bag, ensure that the fitting is the correct size, type and check that all components are present.
2. Remove the plastic protection caps and the Drawlock copper liner from the service head adapter.
3. Slide the service head adapter over the PE pipe and tighten fully onto the steel carrier pipe.

G.2.9 **Preparation Drawlock Tool**

1. Remove the draw lock expander from the draw lock tool and check that it is the correct size for the fitting to be installed.
2. Clean and grease the threads on the draw lock tool to ease the drawing through of the expander.
3. Slide the Adapter bush over the end of the Drawlock tool (for 16mm fittings, ensure this is correct way round).
4. Slide the copper liner over the draw lock tool up to the adapter bush, ensuring that the wider end of the copper liner is closest to the adapter bush.
5. Screw the expander on to the Drawlock tool ensuring the tapered end is closest to, and touching the copper liner.

G.2.10 **Installation**

1. Once the PE has been checked for tension or strain, cut the PE flush and square with the end of the service head adapter and de-burr.
2. Insert the assembled Drawlock tool into the end of the PE until the adapter bush touches the top of the service head adapter. It is crucial that this is not forced, as unwanted movement of the PE could occur.
3. Using the correct size spanner, turn the nut on top of the draw tool in a clockwise direction, whilst exerting a slight downward pressure.
4. Continue turning until the Drawlock tool becomes loose and comes away from the service head adapter.
5. Remove the Drawlock tool and saw off the protruding copper liner and PE flush and square with the top of the service head adapter.
6. When fitting the ECV, ensure that the hexagonal part of the service head adapter is held with another tool to stop any unwanted movement of the fitting.

SIZES
16mm x 3/4" BSPM x 3/4" BSPF
16mm x 3/4" BSPM x 1" BSPF
20mm x 3/4" BSPM x 1" BSPF
20mm x 3/4" BSPM x 1.1/4" BSPF
25mm x 3/4" BSPM x 1.1/4" BSPF
25mm x 3/4" BSPM x 1.1/2" BSPF
32mm x 1" BSPM x 1.1/2" BSPF
32mm x 1" BSPM x 2" BSPF
20mm x 3/4" BSPM x 1" Flex F/P
25mm x 3/4" BSPM x 1.1/4" Flex F/P
32mm x 1" BSPM x 1.1/2" Flex F/P
32mm x 1" BSPM x 2" Flex F/P

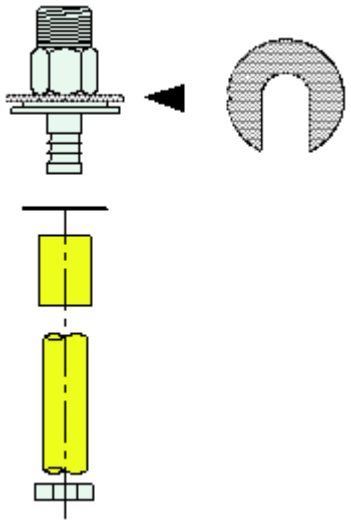
Table G2 – Service Head Adaptors Sizes

G.3 CRIMP FITTINGS

G.3.1 Crimp fittings are available for jointing PE pipe and are available for:

- House Entry Tees
- Meter Box Adaptors
- Above ground entries
- Wall mounted transition (for use with PE risers).

1. The installation of all the fittings (available for 20mm, 25mm and 32mm PE pipe) should be undertaken as follows.



Typical Crimp fitting

G.3.2 **Preparation - PE Pipe**

1. Cut off the PE pipe so that the end is square and remove any burrs.
2. Wipe the PE pipe with a clean, dry cloth.
3. Inspect the pipe surface for defects
4. If excessive scratches or gouges are visible, cut off the defective length and repeat steps (1) to (3).

G.3.2.1 **Preparation - Crimp Fitting**

1. Ensure that the crimp tool opens and closes. If necessary oil to ease application.
2. Clean and grease the threads on the crimp tool to ease the winding down on the nut arrangement.
3. Wind the nut anti-clockwise back to the end of the thread.
4.

G.3.2.2 **Preparation - Crimp tool**

1. Ensure that the crimp tool opens and closes. If necessary oil to ease application.
2. Clean and grease the threads on the crimp tool to ease the winding down on the nut arrangement on the tool.
3. Wind the nut anti-clockwise back to the end of the thread.

G.3.2.3 **Installation**

1. If a House Entry Tee or Meter Box Adaptor is to be fitted push the black bend and GRP sleeve, (or in the case of a semi-concealed meter box the black sleeve only) over the end of the PE pipe to be connected to the crimp fitting.
2. Place the rubber protector over the PE pipe.
3. Put the copper sleeve over the end of the PE pipe.
4. Ensuring that the plastic washer is in place at the top of the crimping section of the fitting, push the fitting into the PE pipe until it touches the top of the crimp fitting and the plastic washer.
5. Push the copper sleeve up to the top of the PE so that it is over the inserted crimp part of the fitting with the PE pipe in between.
6. Place the crimping tool over the PE sleeve and close the tool.

7. Wind the nut on the crimping tool clockwise ensuring that the nut pulls the two halves of the crimping tool together (while winding ensure the copper sleeve does not move away from its original position).
8. Stop crimping when the two ends of the crimping tool touch each other.
9. Rewind the nut and remove the crimping tool.
10. Locate the rubber protector below the fitting and push the GRP sleeve over the protector and up to the base of the fitting. For semi-concealed meter boxes, the rubber protector is not required. The black sleeve would be pushed up into the base of the fitting.
11. Pressure test service in accordance with Section F of this manual.

Item	Size	Through Wall length
House Entry Tee	3/4" x 20mm	150mm
	3/4" x 20mm	345mm
	3/4" x 20mm	500mm
	3/4" x 20mm	610mm
	3/4" x 20mm	910mm
	3/4" x 25mm	150mm
	3/4" x 25mm	345mm
	3/4" x 25mm	500mm
	3/4" x 32mm	150mm
	1" x 32mm	345mm
	1" x 32mm	500mm
	1" x 32mm	610mm
Above Ground Entry	3/4" x 20mm	155mm
	3/4" x 20mm	345mm
	1" x 32mm	345mm
M/Box Adaptors Corbel Walls	3/4" x 20mm	-
	3/4" x 25mm	-
Couplers - Reducing	20mm x 16mm	-
	25mm x 20mm	-
	32mm x 25mm	-
Wall Mounted Crimp Elbow	32mm x 20mm left hand elbow	-
	32mm x 20mm right hand elbow	-
Wall Mounted Crimp Tee	32mm x 32mm x 20mm	-
	20mm x 20mm x 32mm	-

Table G3 – Crimp Fittings

H.1 INSET METER BOX

H.1.1 Description

1. The inset meter box provides an unobtrusive installation built into the cavity wall.
2. The meter box must be installed by the property owner or developer.
3. The following installation checks must be completed prior to any work commencing.
   - Check the meter box is installed on an exterior wall.
   - Check that the meter box does not cross the damp proof course.
   - Check for any signs of damage to the meter box i.e. cracked door or interior.
   - Check that the meter box is sealed to the property.

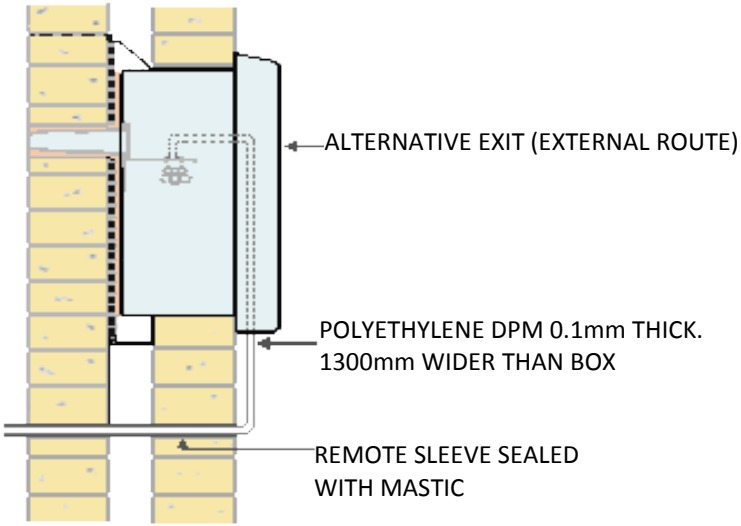


Figure H1- Inset meter box- Low Pressure

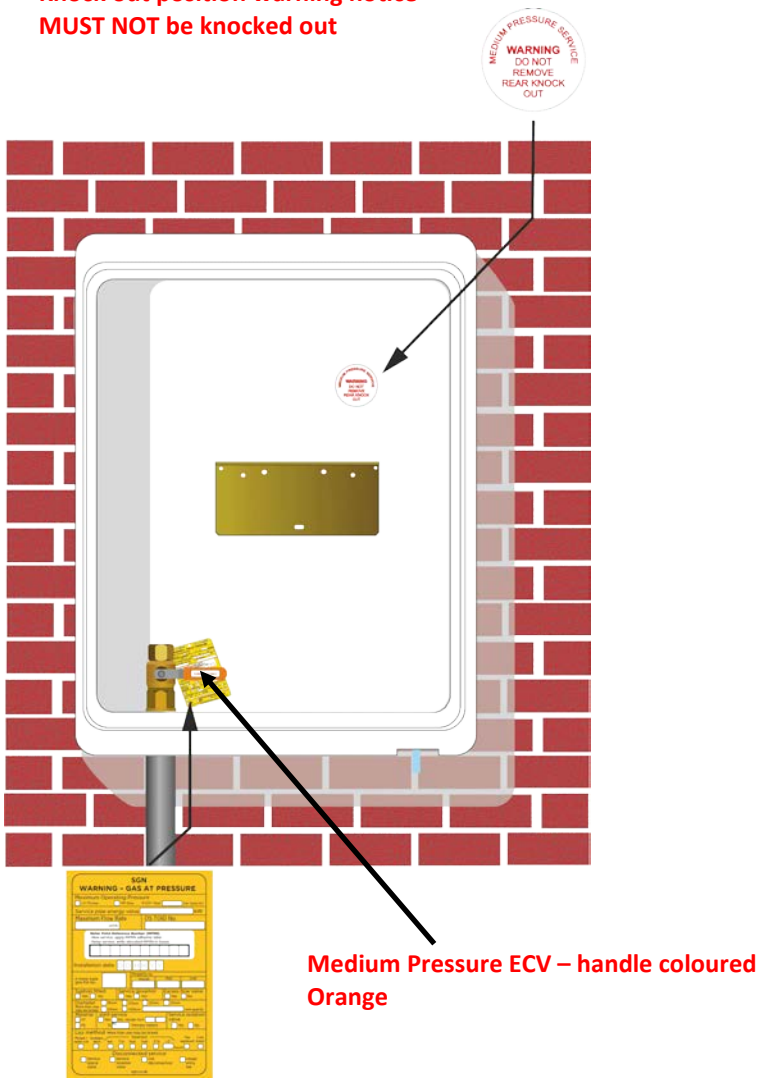


Figure H2 – Inset meter box – Medium Pressure

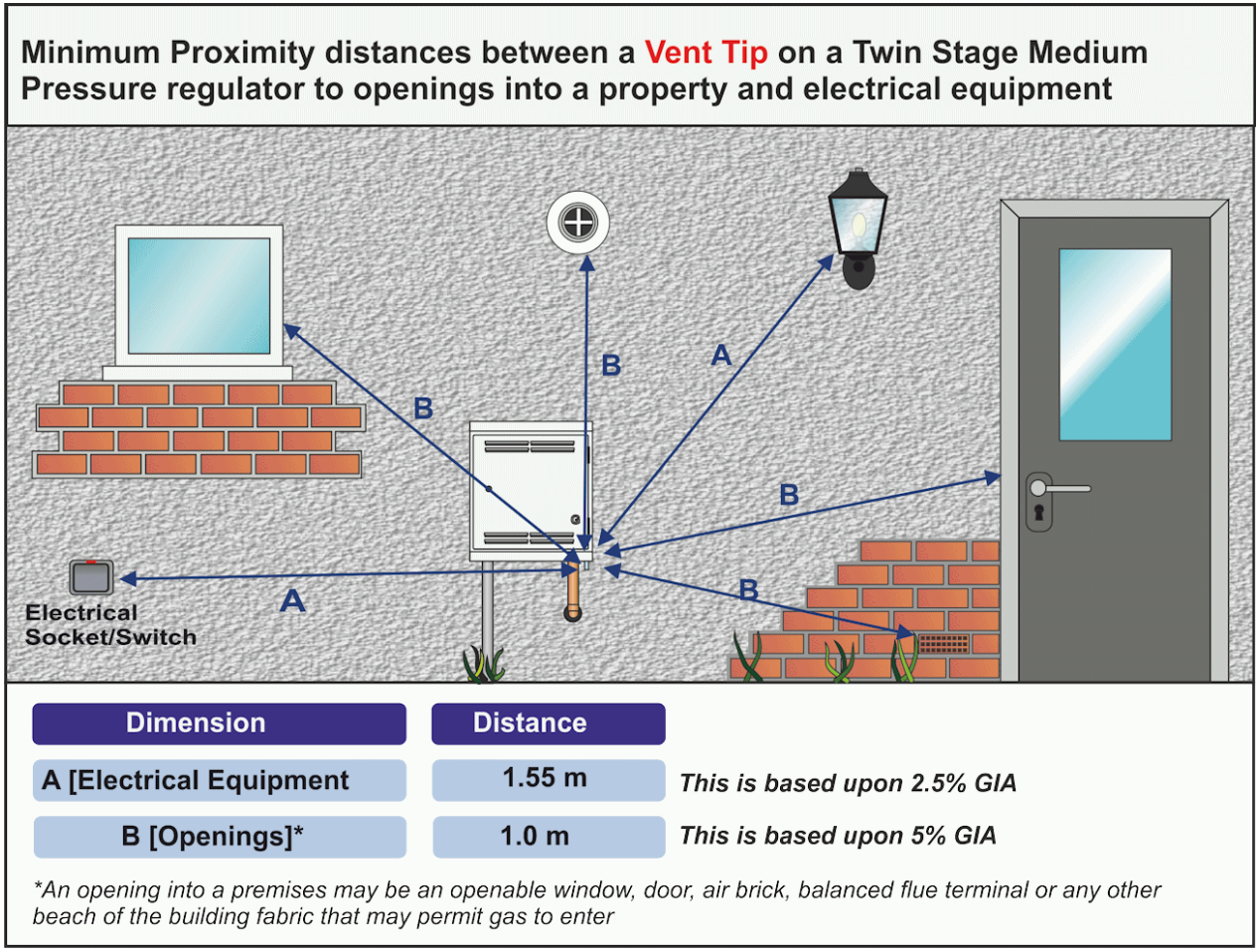


Figure H3 - Proximity distances for vent tip on meter box locations

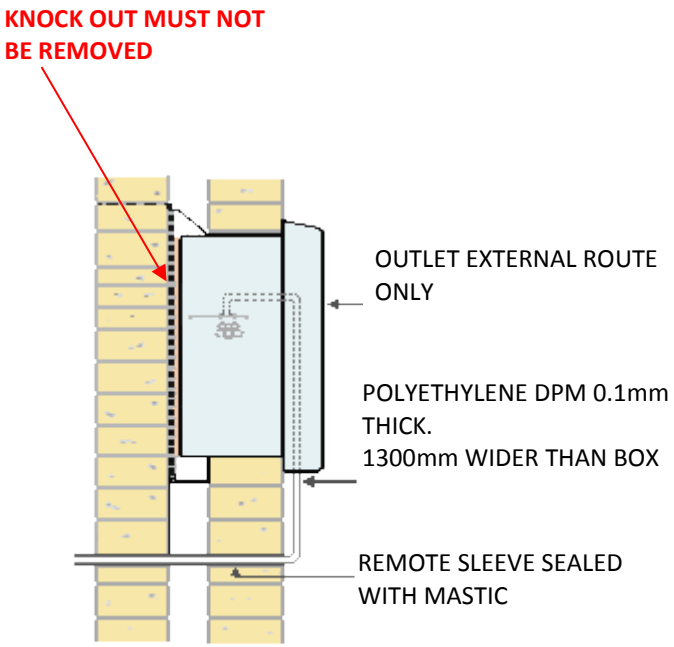


Figure H4- Inset meter box- Medium Pressure

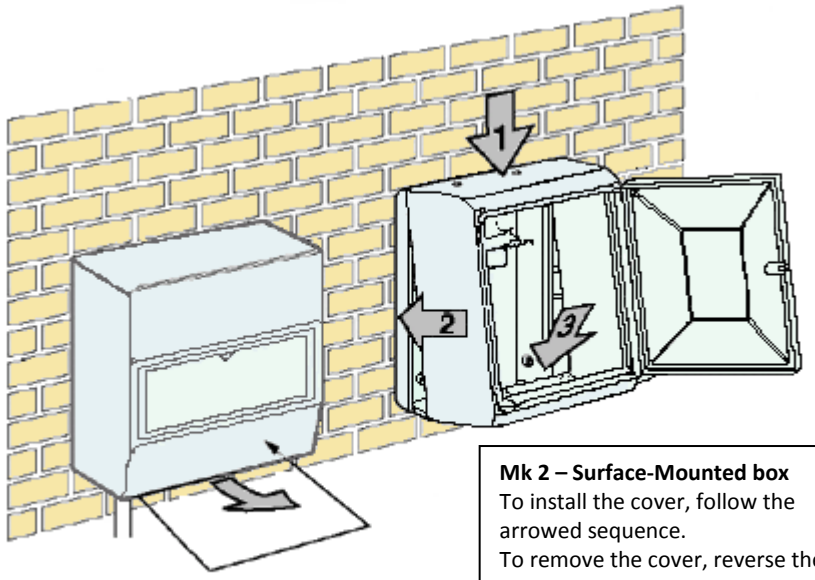
H.2 SURFACE MOUNTED METER BOX

H.2.1 Description

1. Surface mounted boxes provide an easily installed alternative to an inset meter box, and are especially suitable for conversions or modernisation of older homes.
2. The back plate is screwed to the wall, then the meter assembly hung on to it, and the cover and door then added.

H.2.2 Installation

1. The meter box must be inspected for signs of damage when delivery is made to site.
   Note: Never install a damaged meter box.
2. The surface mounted meter box must be sited on the outer wall and its base should be between 500 mm and 1500 mm above finished ground level.
3. The box must not bridge a Damp Proof Course. (DPC)
4. Outer walls of houses or garages are preferred options for siting the box.
   Note: The box must not obstruct a passageway or drive.
5. The box can be painted by the house owner if required to blend in with the finishes of adjacent surfaces.



Mk 1 – Surface-Mounted box
Remove two screws at base of box, and remove the cover by pulling the bottom of the box forward

Mk 2 – Surface-Mounted box
To install the cover, follow the arrowed sequence.
To remove the cover, reverse the arrowed sequence, pressing down on the side of the cover at "3" to release it.

Figure H5- Surface Mounted Meter Box Installation

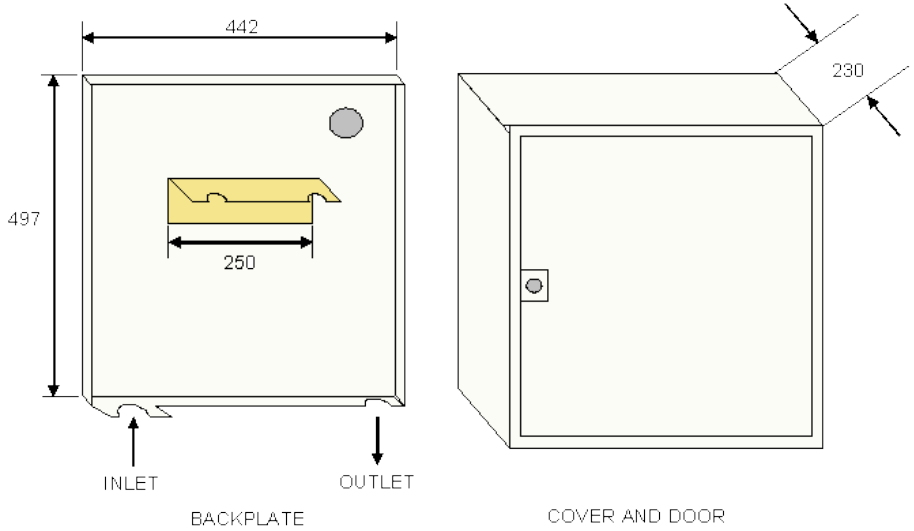


Figure H6 - Surface Mounted Meter Box Dimensions

Complete assembly:

Width	- 450mm
Height	- 506mm
Deep	- 230mm

6. It is possible to install a surface mounted meter box with classically designed corbelled wall construction.
7. The base of the meter box must not be less than two courses above the top of the corbelled section.
8. Where the building construction involves a concrete raft, and there is not the recommended depth of cover between the concrete raft and proposed finished ground level (375mm), the developer must provide a slot or vertical channel in the raft to allow safe installation of the gas pipe.
   Note: SGN will not be responsible for breaking out the concrete rafts footings to provide a slot for the service pipe.
9. Use the backing plate to mark the centre of the knockout in the back plate and drill through the wall.
10. Secure the back plate to the wall using zinc plated round- head screws and washers.

H.3 UNIBOX

Mitras Unibox (see Figure H7), should be used for meter box installations, exchanges and relocations. It is a universal gas meter box which can be used either surface mounted or partially-submerged (up to 75mm).

The Unibox is now the preferred option where the customer requires a less obtrusive box, and should be the first choice for resolving these situations.

The existing semi-concealed box should only be used as a last option. It can be used for both LP and MP services, and allows for various diaphragm meters to be relocated outside a property, without having to replace the meter with a different model/style.

Figure H7 – Mitras Unibox (Stock Code: 229312)

H.3.1 Installation requirements

1. The Unibox has a modified door which will accommodate the Elster J42 regulator. The housing does not require fitting spacers, as the top panel section mounts directly onto the wall, either above or below the Damp Proof Course (DPC).
2. Following the installation requirements for meter boxes at Section E.

H.3.2 Pre-installation checks:

- Ensure that the box is not damaged
- The position shall be in an accessible location:
  - To enable the installation, adjustment, servicing and exchange of the meter
  - To enable easy inspection and meter reading
  - To enable easy operation for all functions of the meter
- The box should not cause an obstruction or be exposed to damage from vehicles etc.
- The box should be located as close as practicable to the point where the customer's pipework is required to enter the building
- Ensure the box does not bridge the damp-proof course of the building

H.3.2.1 For MP installations:

- A new style B6M regulator with a reduce size meter inlet valve must be used (SGN stock code: 228840). See Figure H8.
- The box must not be sited within 500mm of any vent, flue or opening to the building.
- Installation must not be within 330mm to electrical equipment.
- Vent tube must be at least 1m from any opening to the property and 1.55m from any potential ignition source (e.g. electrical equipment).

Figure H8: B6M Regulator Kit (Stock Code: 228840) for Use in the Unibox

H.3.3 **Unibox installation procedure**

1. Determine the ground level and agree with the customer the position of the meter box in accordance with Section E1:
2. When installing the Unibox partially-submerged:
   - Housing can be submerged into the ground by no more than 75mm
   - Excavate trench for meter box against an exterior property wall in a position agreed with the customer
   - Position the box so that the indicated line is at ground level. Unless previously determined, ground level is assumed to be two bricks below the damp-proof course.

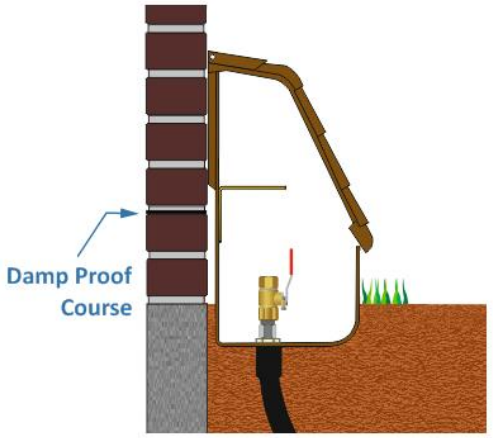


Figure H9: Unibox Installed via Partially-Submerged Method

3. Using the box as the template, mark the fixing holes on the wall, ensuring that the box is level
4. Secure the box to the wall using the screws and plugs provided (see Figure H.10)
5. Installation of the service and ECV must be in accordance with Section D2.

Figure H10: Fixing kit supplied with box

H.3.4 **Installation pipework**

1. The installation pipework for low pressure installs can leave the box via the rear knock-out or a side knock-out position.
2. The installation pipework for medium pressure installs must leave by a side knock-out position only.
   Note: Under no circumstances must a rear knock-out be used when a Medium Pressure supply is in a box.
3. Where soldered joints are used, care should be taken to avoid any heat damage to the box using a heat proof mat, or by assembly of the components away from the box.
4. Any gas pipe entering the building must comply with SGN/PM/TMP/3.
5. The installation pipework must be tested in accordance with SGN/WI/SMP/501.

H.4 SEMI-CONCEALED METER BOX

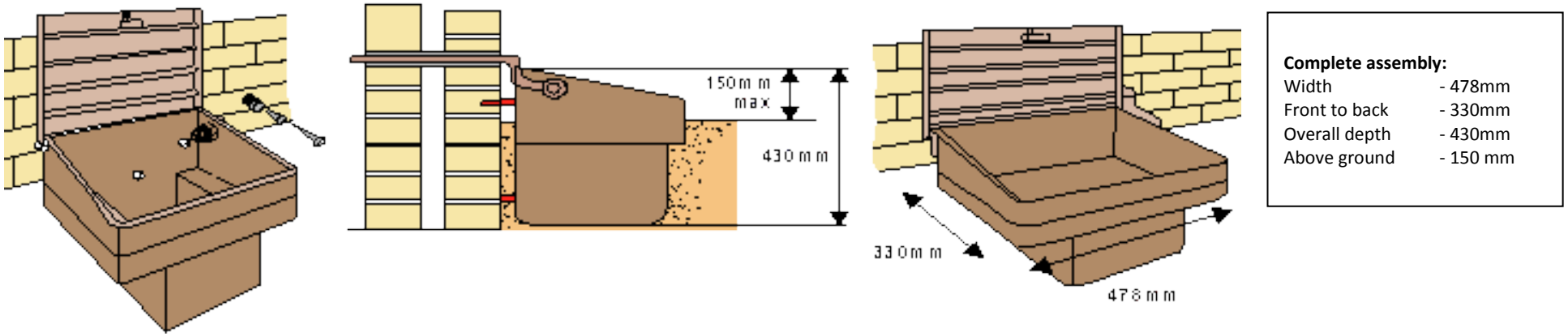
H.4.1 Description

1. Semi-concealed meter boxes provide an unobtrusive installation partly buried at the foot of the outer wall of the property.
2. They project as little as 100mm above the ground, and are ideally located two brick courses below the damp proof course.

H.4.2 Installation

1. The meter box must be inspected for signs of damage. Never install a damaged meter box.
2. The meter box must be fixed against an exterior wall.
3. It must be situated where it will not cause an obstruction or be exposed to damage from vehicles etc.
4. An excavation of 500 mm wide by 750 mm long by 500 mm deep will normally be adequate to position the box and to receive the service pipe.
5. Where the building construction involves a concrete raft, and there is not the recommended depth of cover between the concrete raft and proposed finished ground level (375mm), the developer must provide a slot or vertical channel in the raft to allow safe installation of the gas pipe.
   SGN will not be responsible for breaking out the concrete rafts footings to provide a slot for the service pipe.
6. When the property is on a concrete raft, a cut out section must be provided by the developer/owner.
7. A minimum excavation size of 0.5m by 0.5m is required to accommodate the meter box.
8. Unless previously determined, ground level is assumed to be two brick courses below the damp proof course (DPC).
9. Using the box as the template, mark the three fixing holes on the wall, ensuring that the box is level.
10. Fit the three spacers and secure the box to wall using the screws, washers and plugs provided.
11. Fit the lid with the fasteners provided when the service is commissioned and work is completed.

Figure H11 –Semi concealed Meter Box installation



Complete assembly:

Width	- 478mm
Front to back	- 330mm
Overall depth	- 430mm
Above ground	- 150 mm

Appendix I	Mains Break out Tools	Page 1 of 2

I.1 BREAKING OUT MAINS

1. Every effort must be taken to avoid the need to breakout mains by making additional hand or machine cuts.
2. There will be some circumstances where this is not possible particularly during replacement activities or for service connections on inserted PE mains.
3. In these circumstances only the “mains breakout tool” is approved for use.
4. The use of a sledge hammer is **NOT** to be used to break out mains.
5. The use of the mains breakout tool is fully explained in SGN’s Safety Handbook under the 'Mains Break Out' heading.
6. Damp sacking or equivalent should be arranged over the pipe to be broken out.
7. Damp sacking or rag will help to contain metal splinters and protect the operative.
8. You must make sure:
   - The tool is not used near cables and other plant where damage may occur.
   - Adjacent buried plant should be protected.
   - The approved hand-held tool is insulated, weighs 16.5kg, and has a minimum overall length of 2.2metres.
   - When breaking out mains make sure a damp cloth or equivalent is used to cover the striking area.
   - A continuity bond must be fitted to the gas main.
   - When using, the hand-held mains break out tool, stand at the top of the trench and drop the tool vertically onto the main.
   - Do not use undue force or throw the tool downwards.
   - Regularly check and remove metallic splinters and fragments to avoid causing damage to the inserted PE pipe.
   - Check the PE pipe for damage when the break out is complete and if necessary report damage to a team manager.
   - Wear the appropriate PPE for the task.

I.2 PPE REQUIREMENTS

1. Any operative using a mains breakout tool must wear the appropriate PPE which includes the mandatory use of a full face visor [as shown in the photo].
2. The tool must not be used unless a full face visor is worn and the work requirements detailed in “Breaking out mains” can be met.
3. Other team members and the general public must be protected by adequate guading from the potential of flying metal fragments.

I.3 HYDRAULIC MAINS CRACKER – 'CLICKSTICK'

The 'Click stick' is a portable hydraulic mains cracking tool, operated by either battery power or a hand pump. The tool is remotely controlled allowing the operator to stand clear of the excavation whilst the mains cracking takes place.
The tool can be pre-set to pressure thresholds to avoid damage to inserted PE mains, and break data extracted from the pump to provide an audit trail. This is an alternative tool to the existing mains breaking tool or 'Podger Bar'.
The tool is approved for use on mains which have been Live Inserted, when the PE main is not a 'close fit'. See Table J1 below for suitability.

6"	140	125	110	90	75	63	55
4"	-	-	-	90	75	63	55

Table I1: suitable use of the clickstick on inserted mains

1. The existing PPE requirements for the mains breakout tool remain the same for the 'Click stick'.
2. To use the hydraulic mains cracking tool, you must:
   - be trained and be competent in the operation and features of the tool
   - have a full set of manufacturers' instructions on site.
   - undertake site preparation in accordance with Section A.
   - include the method of mains break out on the Site Risk Assessment
   - avoid damage to other plant
   - be out of the excavation when the tool is in operation.

I.4 'CLICKSTICK' OPERATION

1. Install continuity bond around the breakout section.
2. Cut the main using rotation wheel cutters in three places to prevent longitudinal cracks and ease of removal.
3. You should place the clamp on the main with the long vertical handle.
4. If the tool is required to be used with the vertical handle removed a manager must be informed and the reasons for removing the handle recorded on the SSRA.
5. You and other operatives must get out of the excavation once the machine is set in position.
6. Everyone must also stand clear of the vertical handle, as this can kick when the main cracks.
7. Apply pressure to the tool and crack the main.
8. The clamp pressure must be released as soon as the main cracks.
9. Several cracks may be required to fully break the main.

Appendix J	PE Fittings & Pipe Faults – Reporting Arrangements	Page 1 of 2

Fault reporting is an integral part of SGN's overall safety management system.

1. For PE pipes and fittings it is essential to report any incidents of non-conformance or failure.
2. By making the report, the cause can be identified.
3. If pipe, fittings or tooling are found to be at fault, contact can be made with the manufacturer to enable corrective action.
4. If the manner of installation is identified as the root cause; retraining, updating of procedures and warnings can be issued as appropriate.
5. The form shown (Figure J1) must be used for all products received from company stores found to be unsuitable for use before installation.
6. Typical situations for reporting of non-conformance PE faults could include:-
   - PE pipe received in a damaged condition
   - PE electro-fusion fittings received with no heating element
   - PE fittings received with no 'O' ring seal
   - PE fitting has been incorrectly labelled.
7. All cases where a PE pipe or fitting is discovered to be unsuitable for use, either during installation or after commissioning, the PE fault form attached must be completed as soon as possible.
8. Typical "in service" faults could include:-
   - Pipe out of round or unable to re-round pipe from a coil for jointing
   - Difficulty in removing or peeling the "multilayer skin"
   - Difficulty in re-rounding after squeeze off operation
   - Pipe kinking
   - Top tees coming away from the main after fusion when cutting the tee.
9. Non-conformance report forms should be returned with the fittings to either Euro Central or Thatcham stores.
10. The pipe and/or fittings quarantined and held at the local depot for collection or inspection.

Note: Where an electro-fusion joint has failed, manufacturers require both pipe and fitting to be returned to carry out an investigation. Without both a comprehensive test cannot be completed.

PE Fault Report Form

This form must be completed for PE pipes and fittings where the fault is discovered at the time of installation or after commissioning.

To enable complaints to be managed correctly the following information should be supplied:

Contact name					
Contact tel. number					
Date of delivery		Date of installation			
Site address					
Pipe / Fitting Manufacturer					
Pipe / Fitting Description					
Pipe / Fitting Diameter		Material		SDR	
ID/Ref/Serial number					
Straight Pipe *Yes/No*		Coiled Pipe *Yes/No*			
Product batch details					
Print line details (pipes)					
Date screw details (fittings)					

Details of fault

Any additional relevant observations

Note: Where an electro-fusion joint has failed manufacturers require both pipe and fitting to be returned in order to carry out an investigation. Without both a comprehensive test cannot be completed.

This form must be returned to:-

Colin Manning
Scotia Gas Networks
2 Leesons Hill
Orpington
Kent
BR5 2TN

Appendix K — Conversions Imperial and metric

PSI (pounds per square inch) to bar			
PSI	Bar	Psi	Bar
1.0	0.07	21.0	1.45
2.0	0.14	22.0	1.52
4.0	0.28	24.0	1.65
5.0	0.34	25.0	1.72
6.0	0.41	26.0	1.79
7.0	0.48	27.0	1.86
8.0	0.55	28.0	1.93
9.0	0.62	29.0	2.0
10.0	0.69	30.0	2.07
11.0	0.76	31.0	2.14
12.0	0.83	32.0	2.21
13.0	0.90	33.0	2.28
14.0	0.97	34.0	2.34
15.0	1.03	35.0	2.41
16.0	1.10	36.0	2.48
17.0	1.17	37.0	2.55
18.0	1.24	38.0	2.62
19.0	1.31	39.0	2.69
20.0	1.38	40.0	2.76

Inches water gauge to millibar			
In wg	mbar	In Wg	mbar
1.0	2.49	21.0	52.26
2.0	4.98	22.0	54.74
4.0	9.95	24.0	59.72
5.0	12.44	25.0	62.21
6.0	14.93	26.0	64.70
7.0	17.42	27.0	67.19
8.0	19.91	28.0	69.68
9.0	22.40	29.0	72.16
10.0	24.88	30.0	74.65
11.0	27.37	31.0	77.14
12.0	29.86	32.0	79.63
13.0	32.35	33.0	82.12
14.0	34.84	34.0	94.61
15.0	37.33	35.0	87.09
16.0	39.81	36.0	89.58
17.0	42.30	37.0	92.07
18.0	44.79	38.0	94.56
19.0	47.28	39.0	97.05
20.0	49.77	40.0	99.54

Specific values	
mbar	In wg
40	16.1
75	30.1
bar	PSI
0.05	0.73
0.1	1.45
0.14	2.03
0.2	2.9
0.28	4.06
0.34	4.93
2.0	29.01

APPENDIX K Conversions Imperial and Metric

Length				
cm	2.54	1	0.394	inches
m	0.914	1	1.094	yards
km	1.609	1	0.621	miles
Volume				
m3	0.765	1	1.308	yd3
ltrs	4.546	1	0.22	gal
Area				
m2	0.836	1	1.196	yds2
km2	2.59	1	0.386	miles2
Torque				
Nm	1.37	1	0.73	lbft
Nm	4.11	3	2.19	lbft
Nm	6.85	5	3.65	lbft
Nm	13.7	10	7.3	lbft

Pressure				
mbar	2.5	1	0.4	wg
bar	0.69	1	14.5	llb/in2
lb/in2	14.18	1	0.071	kg/cm2
Weight				
gram	28.33	1	0.0353	oz
kg	0.454	1	2.205	lbs
Velocity				
m/s	3.23	1	0.31	ft/s
m/s	16.15	5	1.52	ft/s
Temp.				
°C	°F			
0	32			
5	41			
30	86			

Appendix L | DEFINITIONS OF SERVICELAYING TERMS | Page 1 of 3

This Work Instruction refers to the definitions listed below

TERM	DEFINITION
Additional Emergency Control Valve (AECV)	An AECV is a valve, not being the ECV, for shutting off the supply of gas in an emergency, intended for use by a consumer of gas. An AECV may be located within either the meter installation or installation pipework and, as such, may not isolate all the consumer's pipework or meter installation. ***Note: An AECV performs the same function as the ECV with respect to emergency isolation, usually of an individual premise or dwelling and is required by GS(I&U) R in many situations. It does not, however, denote the end of a network and is always fitted downstream of the ECV. The existence of an AECV does not affect the required existence of an ECV (which is always fitted).***
alignment clamps	Clamps used to hold pipes in the correct position prior to welding or heat fusion.
ambient temperature	The environmental temperature.
amount of thread	Number of threads produced per inch when threading pipe.
anchorage	Fixing of pipe ends, bends and tees to prevent movement.
annulus	The space between a carrier pipe and sleeve.
anti-shear sleeve	A sleeve used to minimise local stresses in rigid PE joints
branch	A connection, usually at right angles, often to a larger pipeline.
by-pass	A pipe valve and gauge system, used to provide and control the continuity of gas supplies, normally used when alterations to pipelines are carried out.
carrier pipe	The existing pipe into which another pipe is inserted.
cathodic protection (CP)	A method of inhibiting corrosion of buried metallic plant by ensuring that it is permanently cathodic, i.e. electrically negative, to the electrolyte in the surrounding soil.
collar	A fitting used to join the plain ends of two pipes.
continuity bond	An electrical connection made between two sections of a pipeline prior to and during their temporary severance, to prevent sparking from stray currents or static electricity.
creep (as applied to polymeric materials)	Deformation of material over time, under constant stress.
Cross Bonding	Means of ensuring electrical continuity between gas pipework and the customer's electricity supply earth terminal.
cut-out	A section of pipeline to be isolated for replacement, repair or the installation of an in-line tee to extend supplies

APPENDIX L DEFINITIONS OF SERVICELAYING TERMS Page 2 of 3

TERM	DEFINITION
Design Pressure (DP)	The pressure on which design calculations are based.
duct (also see "sleeve")	An encasement installed to protect a pipe or to facilitate its passage through or under a structure.
electrofusion	Method of jointing PE pipe, using fittings having integral electrical heating coils.
Emergency Control Valve (ECV)	A valve, not being an AECV, for shutting off the supply of gas in an emergency, intended for use by a consumer of gas and being installed at the end of a service. The outlet of the ECV terminates the network
encirclement fitting	Two-part fittings installed around pipe jointed together longitudinally and jointed to the pipe circumferentially at each end.
equipotential bonding	(See Cross bonding)
fitting engagement	Length of threads engaged into fitting
full diameter	Point at which thread is at its lowest point
fusion	Welded joints made on PE systems, by the controlled application of heat and pressure.
insulation joint	A fitting having high electrical resistance, which can be inserted in a pipeline to insulate electrically one section of pipe from another.
length	Length of threads still showing after fitting is engaged.
Lower Explosive Limit (LEL)	The concentration of flammable gas in air, above which ignition can occur.
Lower Flammable Limit (LFL)	The concentration of flammable gas, vapour or mist in air, above which combustion can be sustained.
Maximum Operating Pressure (MOP)	The maximum pressure at which a system can be operated continuously under normal conditions.
Meter Inlet Valve (MIV)	A valve fitted upstream of, and adjacent to, a gas meter to shut off the supply of gas.
nominal bore of pipe	Internal diameter of the pipe.
Operating Pressure (OP)	The pressure, which occurs within a system under normal conditions
pipeline	A system of pipework with all associated equipment and stations up to the point of delivery. This pipework is mainly below ground (buried) but includes above ground pipework.
pressure	Bar or mbar above atmospheric pressure, i.e. gauge pressure (1 bar = 100,000 Nm m-2)
primary meter	A meter connected to a main or service, the index reading of which constitutes the basis of charge for all gas supplied through that main or service.
purge	Displacement of one type of gas with another.
purge gas	The gas that is used for displacement when purging.
riser	The vertical part of a service leading to one or more primary meter control valves or ECV.
root diameter	Angle thread is cut at whilst producing thread.

APPENDIX L DEFINITIONS OF SERVICELAYING TERMS Page 3 of 3

TERM	DEFINITION
sacrificial anodes	A means of corrosion protection for buried equipment. A mass of relatively electro-negative metal, such as magnesium or zinc, electrically connected to a pipeline, to ensure that the pipe is maintained as the cathode in a galvanic cell.
saddle	A fitting that conforms to the shape of a main and is used for making a service connection to a main.
saddle fusion	Jointing of a shaped fitting onto the outside wall of a PE pipe.
service	A pipe for supplying gas to premises from a distribution main, being any pipe between a distribution main and the outlet of an ECV.
service excess flow valve	A device, installed in an M.P. service, designed to reduce the flow of gas released from a damaged pipe
service head adaptor	A fitting used to provide a gas-tight seal between a PE service, its steel encasement and a MIV or steel pipe
service isolation valve	A valve inserted in a service, outside a building, for shutting off the supply of gas.
service regulator	Apparatus for automatic regulator of pressure or of volume flow at a selected point within a service.
service tee	A fitting utilized to connect a service to a distribution main.
showing	Diameter of the pipe excluding the depth of the thread.
single stage regulator	A regulator which breaks down inlet pressure to outlet pressure in a single stage
siphon	A vessel installed at a low point in the pipeline network, to collect condensate and other liquids.
sleeve (also see "duct")	An encasement inserted into a prepared hole in a structure for the reception of a service
soil displacement hammer	Sometimes known as either Thrust bore or mole.
squeeze off	A means of stopping the flow of gas in a PE service by squeezing off the pipe with a specialist tool.
Standard Dimension Ratio (SDR)	The ratio of average outside PE pipe diameter to minimum specified wall thickness.
standpipe	A small diameter pipe, connected vertically to a pipeline.
thread angle	Point at which thread is at its highest point.
threads / inch	As per nominal external diameter.
two-stage regulator	A regulator which breaks down inlet pressure to outlet pressure in two stages to give a compact design with good control of outlet pressure.
vent pipe	Small diameter pipe, connected vertically to a pipeline and terminated with a flame trap well above the ground level.
Volt stick	This is a device for detecting the presence of an AC voltage on exposed metalwork.

Appendix M | ABBREVIATIONS OF SERVICELAYING TERMS | Page 1 of 1

This work instruction refers to the following:

Abbreviation	Meaning
AECV	Additional Emergency Control Valve
CDM	Construction (Design and Management) Regulations.
CP	Cathodic protection.
CV	Calorific value
DP	Design pressure
DPC	Damp Proof course
ECV	Emergency control valve.
EPM	Emergency Procedures Manual.
GS(I&U) R	Gas Safety (Installation and Use) Regulations
GS(M)R	Gas Safety (Management) Regulations.
GT	Gas transporter.
HASAWA	Health and Safety Act at Work etc. Act.
HAUC	Highways Authorities and Utilities Committee
HDPE	High-density polyethylene
HSE	Health and Safety Executive.
LEL	Lower explosive Limit
LFL	Lower flammable limit.
LPG	Liquefied petroleum gas (commercial butane, C4H10 and commercial propane, C3H8 or mixtures or combinations thereof).
MDPE	Medium density polyethylene.
MIP	Maximum incidental pressure.
MIV	Meter inlet valve.
NJUG	National Joint Utilities Group.
NRSWA	New Roads and Street Works Act.
OP	Operating pressure.
PE	Polyethylene.
PPE	Personal Protective Equipment.
PRI	Pressure regulating installation.
PSR	Pipelines Safety Regulations.
PVC	Polyvinyl chloride.

Abbreviation	Meaning
QC	Quality control.
SDR	Standard dimension ratio
SEFV	Service excess flow valve.
SIV	Service isolation valve.

Appendix N | Steel Pipe | Page 1 of 1

API 5L			BS ISO 3183		
GRADE	SMYS (N/MM^2)	SMTS (N/MM^2)	GRADE (N/MM^2)	SMYS (N/MM^2)	SMTS (N/MM^2)
B	241	414	L245	245	415
X42	290	414	L290	290	415
X46	317	434	-	-	-

Table N1 - Commonly used steel grades of line pipe

OUTSIDE DIAMETER OF LINEPIPE (MM)		MINIMUM WALL THICKNESS (MM)
EXCEEDING	BUT NOT EXCEEDING	
-	168	4.8
168	457	6.4
457	610	7.9
610	914	9.5
914	1067	11.9
1067	1219	12.7

Table N2 - Minimum wall thickness of steel line pipe

More details of steel pipe are available in SGN/SP/DAT/6.

Appendix O	Disconnection of meters during Engineering works	Page 1 of 3

This procedure applies to operational staff, who are not Gas Safe registered, and managers who are involved in work activities on the SGN network, upstream of, and including the Emergency Control Valve (ECV). It applies to the disconnection meter installations with flexible anaconda on the outlet of the ECV only. It allows one union on the outlet of the ECV, and if required, the complete removal of the meter on Low Pressure (LP) installations in domestic premises with U6/G4/E6 meters with capacities not exceeding 6 m^3hr.

1. In some situations, operational staff such as service layers may be required to disconnect meters whilst undertaking service replacement activities typically by insertion.
2. Upstream Operational staff holding EUSR registration card with Unit 219 for the Disconnection of Meters, and have been assessed competent under SGN DN-22 CAS inspection are considered competent to disconnect U6/G4/E6 meters at the union immediately connected to the outlet of the ECV, and if required, to completely remove the meter.
   Note: The 'On-Job' CAS inspection must be recorded and retained by the depot. Note: Contracting companies must be gas safe registered (), and have at least one Gas Safe registered operative.

O.1 PRE-DISCONNECTION CHECKS

1. Prior to any work being carried out the operative must carry out the following Risk Assessments:
   a) Ensure it is safe to access and egress the working area.
   b) Check to ensure that it is safe to work in a confined space if this applies.
   c) Check for signs of theft of gas. If it is suspected that the meter installation has been tampered with, the job should be suspended and you must immediately inform your Team Manager. You must not inform the consumer or provide information to any third party.
   d) Check to ensure that there is equipotential bonding and that it is correctly fitted. See Figure O1. The purpose of equipotential bonding is to ensure all metallic pipes within a property remain at the same electrical potential and thus reduce the risk of electrical shock. Bonding must be installed on the consumer side of the meter within 600mm of the outlet and before any branch in the pipe work in a position where it can be visually observed with a warning label attached.

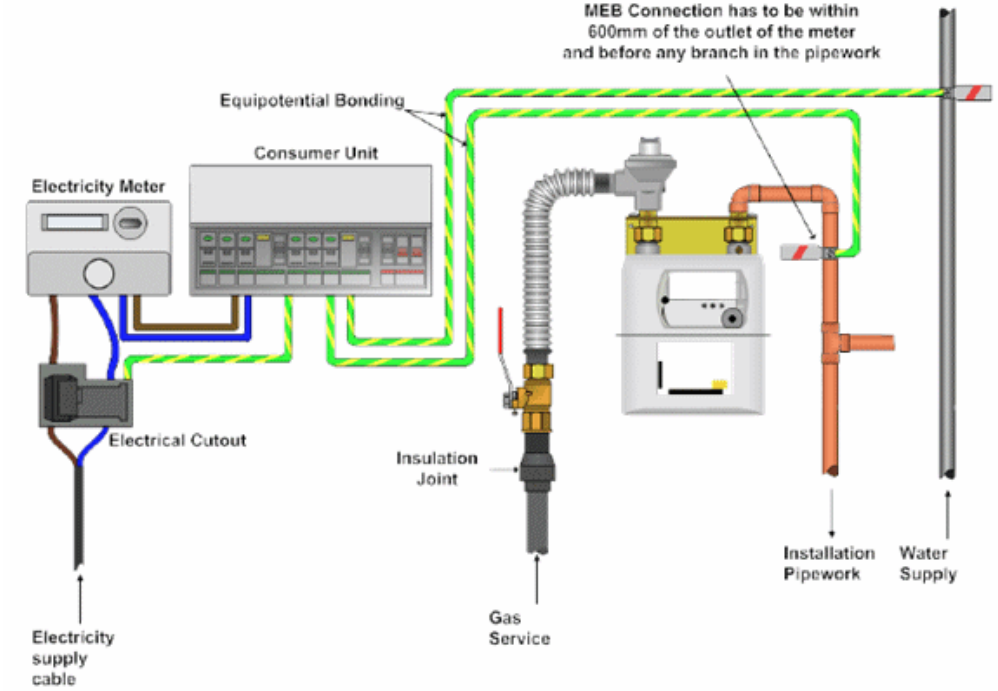


Figure O1 – Typical consumer earth bonding arrangement

2. If equipotential bonding is fitted on the meter inlet pipe or service pipe, then you must not disconnect the ECV or undertake the meter removal. In such cases issue Card 1, shown in Figure O2, to the customer and contact your Operational Manager explaining what you have found.

Figure O2 – Earth bonding warning notice

Note: If an MEB is not fitted, or is fitted in a non-preferred location, specific procedures must be followed to ensure personnel safety. Details of which are given in *SGN/WI/EL/15001*.

O.2 DISCONNECTION - TOOLS

1. To carry out this work the following tools and equipment are required:
   - Volt stick
   - Flat jawed 3/4" BS746 and 1" BS746 spanner (SGN Stock Code: 957352)
   - Temporary Continuity Bonds
   - BS746 red plastic plugs and brass caps
   - Relevant PPE [Pam, gloves, safety glasses, etc.]

   Note: There is no requirement for the upstream operative to undertake a tightness test on the installation downstream of the ECV prior to undertaking the disconnection operation.

O.3 DISCONNECTION PROCESS

1. Advise the customer to turn off any appliances in use.
2. Check meter installation and pipe work with a volt stick in accordance with the SGN/PR/EL/15003, 'Work Procedure for Electrical Safety Using Volt stick'.
3. Ensure that the Temporary Continuity Bond (TCB) is in good condition with no defects.
4. Select positions on the installation pipe work to attach the TCB.
5. Clean the pipe to provide a sound metal contact.
6. If an insulation joint (IJ) is fitted, the TCB must not bridge the IJ.
7. Attach TCB to the cleaned sections of the installation pipe work. See Figure O3.

   Note: For full TCB details refer to SGN/WI/EL/15001, 'Work Procedure for the Fitting of TCB's At Domestic Premises'.
8. Close ECV.

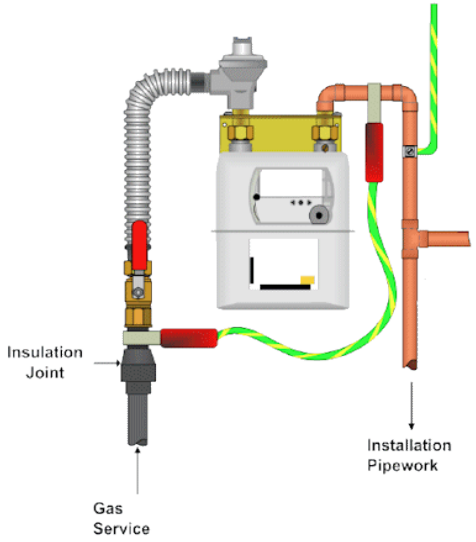


Figure O3 – Temporary bonding at the Meter

APPENDIX - O	Disconnection of meters	Page 3 of 3

9. Disconnect the flex union from ECV and bend the flexible connection away from the ECV (See Figure O4).
10. Cap the ECV and flex union with appropriate fittings, See Figure O4.

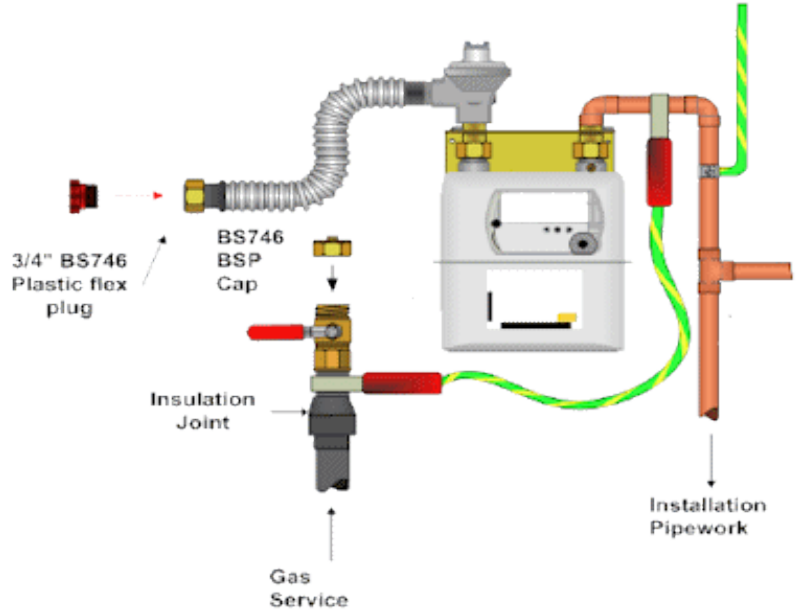


Figure O4 – Capping the Meter

11. Once disconnected at the ECV leave the TCB connected. The TCB will be removed by the FCO at the time of the purge & relight.
12. The upstream operation can now be undertaken in accordance with the appropriate sections of this work instruction.
13. The completion of the upstream operation may necessitate the removal of the gas meter to prevent damage or allow better access to the ECV. In these instances, the meter can be removed and immediately capped (see Figure O5), and carefully placed in a secure, well ventilated area. The meter union must also be plugged with appropriate fittings see Table 01.
14. Under no circumstances should the meter or its associated components (including the inlet flex, regulator and outlet pipe work) be removed from the premises.

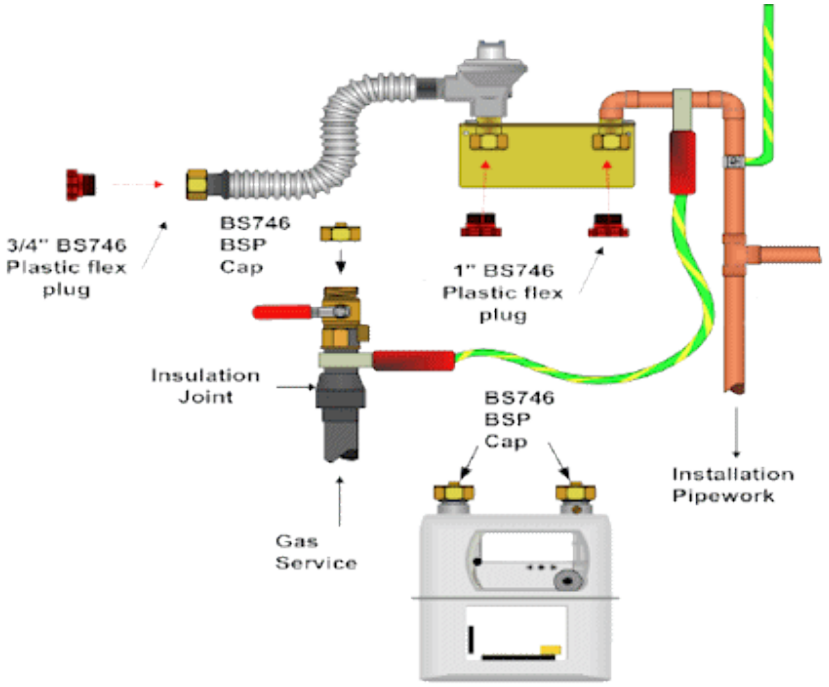


Figure O5 – Meter removal

15. Once the inlet flex connection has been disconnected from the ECV the upstream operative must not reconnect or undertake any work on the downstream installation. This can only be undertaken by a competent Gas Safe registered operative.
16. The SGN stock codes for the ¾" and 1" BS746 outlet plugs/caps are as follows: -

Item	SGN stock code
¾"BS746 plastic plug	228722
1" BS746 plastic plug	228723
¾ BS746 brass cap	227242
1" BS746 brass cap	227243

Table O1 – SGN stock codes for caps and plugs.

SERVICE TEST RECORD (SINGLE SERVICE)

Scotia Gas Networks			
Service Test Certificate (Single Service)		**Work Order No** (Complete @ Depot)	
Full Property Address	**(Line 1 incl. No.)**		
	(Line 2)		
	(Line 3)		
	(Post Code)		
Nature of Work Completed		**Relay (*)**	
		Transfer (*)	
		Alteration (*)	
		New (*)	
Date			
Duration of test (Note minimum acceptable duration is 5 minutes)			**mins**
Time Test Applied		**Time Test Removed**	

APPENDIX P	Service test certificate and recording	Page 2 of 4

Test Pressure		**LP – 100 mbar (*)**	
		MP – 3bar (*)	
Where MP, provide test instrument serial number			
Service Passed Test		**Pass (*)**	
(Allowable pressure loss – nil)		**Fail (*)**	
Name of Competent Person Completing Test			
Pay No. (SGN) / Resource No. (Contractor)			
Company		**Job Role**	

I can confirm that the pressure test and purge were completed in accordance with current procedures

Signed by the Competent Person

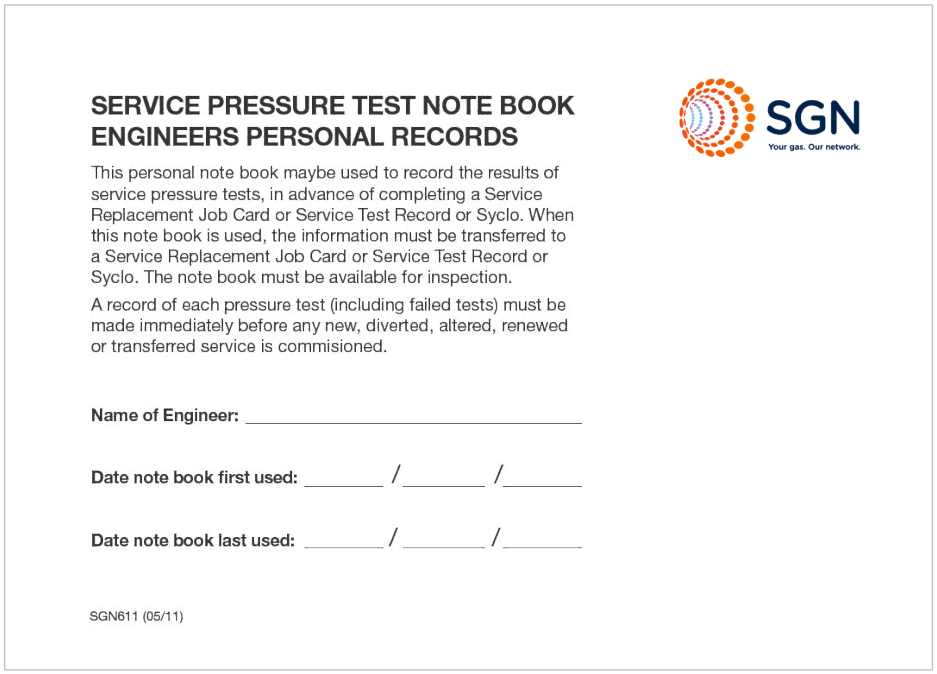
(*) Tick relevant box

Note; Services that form part of a riser system must be tested separately as per SGN/PR/RL/2

Figure P1 – Test certificate

APPENDIX P	Service test certificate and recording	Page 3 of 4

Service Pressure Test Note Book and Personal Records



SERVICE PRESSURE TEST NOTE BOOK
ENGINEERS PERSONAL RECORDS

SGN
Your gas. Our network.

This personal note book maybe used to record the results of service pressure tests, in advance of completing a Service Replacement Job Card or Service Test Record or Syclo. When this note book is used, the information must be transferred to a Service Replacement Job Card or Service Test Record or Syclo. The note book must be available for inspection.

A record of each pressure test (including failed tests) must be made immediately before any new, diverted, altered, renewed or transferred service is commisioned.

Name of Engineer: _____

Date note book first used: _____ / _____ / _____

Date note book last used: _____ / _____ / _____

SGN611 (05/11)

Figure P2 – Test Note Book

Property Address	(Street Name)						
	(Town)						
	(Property No.)						
Nature of Work Completed	Relay (*)						
	Transfer (*)						
	Alteration (*)						
	New (*)						
Date							
Duration of test (minutes)							
Time Test Applied							
Time Test Removed							
Test Pressure	LP=100mbar (*)						
	MP= 3bar (*)						
Test Result (Allowed loss = nil)	Pass (8)						
	Fail (*)						
Signature of Competent Person							
(*) Tick relevant box							

P.1 COMPLETING PRESSURE TEST RECORDS IN SYCLO AND MAXIMO

P.1.1 As part of 'Winter 2009' System Development Release, both the Syclo and Maximo systems have been modified to allow the capture of the additional detail specified above.

P.1.2 In the case of Repair activity, (processed via Syclo) a Pressure Test Form must be completed in Syclo for any activity where a pressure test is required. To complete the necessary, detail the user must:

- Select 'Accept' & 'Onsite' Work Order as normal.
- Select 'Complete' from the 'Details' tab.
- Select the 'Forms' tab.
- Select 'Pressure Test' from the 'Repair' heading.
- A 'Pop Up' will appear saying 'Do You want to add Pressure Test details?' Select 'Yes'.
- Complete the Pressure Test form with all required Information:
- Click on 'Finish'.
- A 'Pop Up' will appear saying 'Would you like to add more Pressure Tests?' Select 'Yes'.
- Select the 'Details' tab and complete the Work Order as normal.

P.1.3 All tests carried out must be recorded. If an initial test fails, enter 'Retest' and complete a second form with pass test details.

P.1.4 In the case of Replacement, Connections or any other activity where work is captured in the field by traditional methods and subsequently input to the appropriate Work Order in Maximo, the user must update the appropriate record as follows:

a) Find the Work Order within the Replacement and Connections stream of Maximo.
b) Select 'Pressure Test Details' Tab
c) Click 'Insert New Record'
d) Fill out the Pressure Test Details with all required information.
e) Save the record.
f) If there are more than one set of Pressure Test results on the job card, select 'Insert New Record' and repeat from Step 3 onwards.

Appendix Q	SGN Replacement Service Card	Page 1 of 5

Service Relay	**<= 2m copper (√)**		**Service Transfer (√)**		**Extended?**	**(Transfer)**	Y/N
Service Relay	**>2m copper (√)**		**New Service (√)**		**Service Alter**	**(√)**	
Date Letter Sent (1st Visit)			**Planned date**		*Note- "Planned date" & "Date letter Sent", not required if tracked via alternative process*		
5-day Notification		Y/N	**Early Start Agreed**	Y/N			
Date Letter sent (2nd Visit)			**Planned date**		*Note- "Planned date" & "Date letter Sent", not required if tracked via alternative process*		
5 Day notification		Y/N	**Early Start Agreed**	Y/N			
Domestic / Non Domestic N or ND							

Project Ref.		**Work Order Ref.**	*Office Use*
Team Manager		**Maximo Super Project No**	*Office Use*
Depot		**Service Location I.D.**	*Office Use*
Address, MPRN, (& Meter Serial No.)			

Name	**Pay/Resource No**	**Date 1**	**Start**	**Finish**	**Date 2**	**Start**	**Finish**

Job Type			
SPDL	LP Domestic Relay – Mains Replacement	**SPDM**	MP Domestic Relay – Mains Replacement
SRNL	LP **Non**-Domestic relay – Mains Replacement	**SRNM**	MP **Non**-Domestic relay – Mains Replacement
SODL	LP Domestic Relay, Changed meter Position	**SODM**	MP Domestic Relay, Changed meter Position
SRAD	Service relay, Alteration or Diversion	**RSED**	Relay Service following Escape, Domestic
ST	Service Transfer, Any pressure	**Other =**	

APPENDIX Q | SGN Replacement Service Card | Page 2 of 5

Service Span 1																		
Asset ID *(Office)*										**Length** (Measured on site)								
Start Location	Main			Other/Specify						**End Location**	Meter			Other/Specify				
Span 1 Pressure	**LP** Low Pressure							**MP** Medium Pressure					**IP** Intermediate Pressure				**Flow Restrictor** Y / N	
Diameter	**16**	**20**	**25**	**32**	**40**	**63**		**75**		**90**		**125**		**180**				
& SDR	**7**	**9**	**11**	**11**	**11**	**11 or 17**		**11 or 17 or 21**		**11 or 17 or 21**		**11 or 17 or 21**		**11 or 17 or 21**				
Material	**FP** Flexible PE				**GL** Galv. Steel				**PE** Polyethylene						**ST** Yellow Wrapped			
Grade	---------				**L2**				**MX** Yellow **HP** Striped (Profuse) or **HD** Orange						**L2** Steel			
Joint Type	**EF** Electro-fusion				**CO** Compression				**BF** Butt Fused		**TH** Threaded		**MC** Mech. Coupling				**WE** Welded	
Pipe Orientation	**HB** Horiz Below Grnd				**HA** Horiz Above Grnd				**HL** Horiz Lateral		**VA** Vertical Above Grnd				**VB** Vert Below Grd			
Method Laid	**ID** Insert Dead				**GM** Ground Mole				**OC** Open Cut		**AG** Above Grnd				Other/Specify			

Service Span 2																		
Asset ID *(Office)*										**Length** (Measured on site)								
Start Location	Main			Other/Specify						**End Location**	Meter			Other/Specify				
Span 2 Pressure	**LP** Low Pressure							**MP** Medium Pressure					**IP** Intermediate Pressure					
Diameter	**16**	**20**	**25**	**32**	**40**	**63**		**75**		**90**		**125**		**180**				
& SDR	**7**	**9**	**11**	**11**	**11**	**11 or 17**		**11 or 17 or 21**		**11 or 17 or 21**		**11 or 17 or 21**		**11 or 17 or 21**				
Material	**FP** Flexible PE				**GL** Galv. Steel				**PE** Polyethylene						**ST** Yellow Wrapped			
Grade	---------				**HD**				**MX** Yellow **HP** Striped (Profuse) or **HD** Orange						**L2** Steel			
Joint Type	**EF** Electro-fusion				**CO** Compression				**BF** Butt Fused		**TH** Threaded		**MC** Mech. Coupling				**WE** Welded	
Pipe Orientation	**HB** Horiz Below Grnd				**HA** Horiz Above Grnd				**HL** Horiz Lateral		**VA** Vertical Above Grnd				**VB** Vert Below Grd			
Method Laid	**ID** Insert Dead				**GM** Ground Mole				**OC** Open Cut		**AG** Above Grnd				Other/Specify			

APPENDIX Q | SGN Replacement Service Card | Page 3 of 5

Road Xing Indicator	Yes	No	**Meter Size**			**Service Length**	m	**Outlet Length**		**m**			
Outlet Pipe Material	**CO** Copper		**ST** yellow Wrapped steel		GL Galv. Steel		Other / specify						
Service Entry Point	Front	Side	Back	**Dual Service Indicator**	None	Left	Right	**Wrapping**	Y/N	Specify			
Service Termination	**SHA** Service Head Adaptor				**HET** House Entry Tee			**CE** Cellar Entry					
	SMB Surface Mounted box				**CIB** Cavity Inset Box			**SCB** Semi-Concealed Box					
	FE Factory Entry				**GEB** Garage Entry Bend			**CHE Corbelled House Entry**					
Annular Sealant	N/a		Annerseal		Grout		Steve Vick Foam (Not Servi-flex		Fullseal		Other / Specify		

DistFixed Point Details		**Proximity Location**		**AB** Above	**BE** Below	**SI** at Side	
Proximity Type	**EL** Electricity	**WA** Water	**FL** Flats within 30m		SP Special Property within 30m		
Surface Category @ Main	Asphalt	Bitumen	|Block Paving	Concrete	Flag Paving	Grass	
	Unmade	Cultivated Grass		Agricultural Land		Other / specify	
Main Locn. @ Connection Road	Foot path	Verge	Garden	Bridge	Building	Other / specify	
Measured From	Property Line	Kerb	Kerb Nr side	Kerb far side	Building Line	Other / specify	
Distance to Main **m**	**Depth of Cover at Main**		**m**	**Easting**		**Northing**	

Test 1				**Test Details**	*Test 2*			
Date tested		**Duration of Test**		**Date tested**		**Duration of test**		
Start Time		**End Time**		**Start Time**		**End Time**		
Pressure Test	0.1 bar	0.35 bar	3 bar	7 bar	**Pressure Test**	0.1 bar	0.35 bar	3 bar	7 bar
Allowable Pressure Loss - Nil		**Pass (P) or (F)**			**Allowable Pressure Loss - Nil**		**Pass (P) or (F)**		
Instrument Serial No. for 3 & 7 bar Tests =					Instrument Serial No. for 3 & 7 bar Tests =				
Competent Person					**Competent Person**				
Pay No. Resource No					**Pay No. Resource No**				
Company		**Job Role**			**Company**		**Job Role**		
I can confirm that the pressure test and purge were completed in accordance with current procedures. Signed by Competent Person.					I can confirm that the pressure test and purge were completed in accordance with current procedures. Signed by Competent Person.				

APPENDIX Q | SGN Replacement Service Card | Page 4 of 5

Span 1				**Decommissioned Asset Details**				*Span 2*			
Method Decommissioned	DI	DP	Other =	**Method Decommissioned**	DI	DP	Other=				
Material		Diameter		**Material**		Diameter					
Date decommissioned				**Date decommissioned**							
Asset ID Office				**Asset ID Office**							
Length Cutback			m	**Length Cutback**							m
Pipe supplied from				**Pipe supplied from**							

First Interruption				**RIGS**		**Second Interruption** Transfer to new main		
Date Off		**Time Off**		**Date Off**		**Time Off**		
Date On		**Time On**		**Date On**		**Time On**		
End Reason	Gas @ stopcock	Card Left	n/a	**End Reason**	Gas @ stopcock	Card Left	n/a	
CSEP Connected system exit point		Y	N	**OT** Point shown on MAPS			Y	N
Interruption Category	SR – Mains replacement (SGN Initiated)			LE – Leaking Service		WI – water Ingress		
	MA – Mains Diversion (Consumer Initiated)			3P – Third Party Action		OT – Other Upstream Event		
	SA – Service Alteration (Consumer Initiated)			UF – NTS Failure		NA – Not Applicable		

APPENDIX Q | SGN Replacement Service Card | Page 5 of 5

Supply Interruption 1			**Alternative Heater/ Cooker**			Supply Interruption 2					
Heater Left	Y	N	Cooker Left	Y	N	Heater Left	Y	N	Cooker Left	Y	N
Reason for **not** leaving Alternative Appliances						Reason for **not** leaving Alternative Appliances					
NE – Not Eligible			NO – Not Offered			NE – Not Eligible			NO – Not Offered		
CAD – Consumer Agreed Delay			NA – No Access			CAD – Consumer Agreed Delay			NA – No Access		
CDO – Consumer Declined Offer						CDO – Consumer Declined Offer					
VREQ – Follow Up Visit Required to Deliver						VREQ – Follow Up Visit Required to Deliver					
DCR – Delayed at Consumer Request						DCR – Delayed at Consumer Request					
GAP – Gas Back on to Appliances In: Less Than 4 Hrs						GAP – Gas Back on to Appliances In: Less Than 4 Hrs					
COC – Consumer to Collect from Centre						COC – Consumer to Collect from Centre					
SWC – Severe Weather Conditions						SWC – Severe Weather Conditions					
AHC – Consumer Has Alternative Heating And cooking						AHC – Consumer Has Alternative Heating And cooking					
Gifted			Loaned			Gifted			Loaned		
Monitoring Form (EI15) Number =						Monitoring Form (EI15) Number =					
Date			Time			Date			Time		
Consumer Details	Title:		Initials:			Surname:					

Reinstatement									
Exact Location	**Comp /Req**	**Pub /Priv**	**Surf. Cat**	**Loc.**	**L**	**W**	**D**	**I/P**	**RWO Ref**

I certify that this is a true record of the work undertaken Team Leader Signature	Pay No./Resource No.	Date Completed
Approved By Managers Signature:	Pay No. Resource No.	Date

Figure Q1 - SGN Replacement service card

APPROVAL

This Work Instruction was approved by Bob Hipkiss on 14/05/2018 for use by managers, engineers and supervisors throughout Scotia Gas Networks (SGN).

SGN documents are revised, when necessary, by the issue of new editions. Users should make sure that they are in possession of the latest edition by referring to the SHE & Engineering Document Library available on SGNnet.

Compliance with this safety and engineering document does not confer immunity from prosecution for breach of statutory or other legal obligations.

BRIEF HISTORY

SGN/WI/SL/1 is a full revision of T/PR/SL/1: July 2004 into SGN's new SMF format. The revision has taken account and merged information from the following procedures, instructions and bulletins which are now withdrawn.	May 2018	DESC-1734-24052016
SGN/PR/DIS/5.100.2: May 2008		
T/PR/SL/1: July 2004		
T/PR/D7: June 2002 T/PR/D8: August 2002 T/PR/D10: October 2004 SGN/PR/DIS/5.3.1 SGN/PR/DIS/5.100.2 SGN/PR/DIS/5.100.5 SGN/SEI/533 SGN/SEI/535 SGN/SEI/537 SGN/SEI/547 SGN/SEI/597 SGN/SEI/601		

SGN/SEI/602 SGN/SEI/604 SGN/SEI/612 SGN/SEI/617 SGN/SEB/724 SGN/SEB/728 SGN/SEB/731 SGN/SEB/736 SGN/SEB/750		

KEY CHANGES

Section	Amendments
ALL	Servicelaying document T/PR/SL/1 has been combined into one single document with other Servicelaying documents.
All	Style of document revised into SGN's new SMF format.
All	Order of subject matter amended, internal links provided to increase usability and allow quick reference to sections.
All	All drawings and diagrams throughout updated and coloured to aid clarity
All	Throughout the work instruction options for Intermediate Pressure services has been added.
A1	New section for general site setup added a dis referenced from other sections to remove duplication of text
A2	Reference to working near to AVK Donkin Mk3 valves added to refer to SGN/WI/ML/1
A4	New arrangements where dual services are acceptable has been added
A4	New B 608 label inserted
A4	Table 7 for standard PE diameters updated with additional pipe sizes
A5	Table 8 for pressure loss on services has been updated with additional pipe sizes
B2	Requirement not to use air driven motors added
B3	New requirement for positive evidence to confirm that main is inserted and not live main
B3	Text for foam off for transfer of services has bene updated
B4	Additional statements added for CP systems and coatings
B4.2.1	Welded tee fittings specification amended to include flanges to GIS/F7.
B4	Section 4.4 added for IP services connections
B5	Text revised to identify safety issues when working near to ductile iron mains
B6	Text added to confirm requirements to use "double chains" on drilling machine on pipes over 12" diameter.
B11 & B12	Requirement to check that service is not dualled has been revised
B14	New section on BA equipment added and new section on disconnections in uncontrolled conditions.
B14	Service cut of techniques now require the 1st choice method to be using the service isolator and 2nd rapid service isolator
B14	Cut off locations can now be within 2metres if compression fittings are NOT used
B14 – 14.5	Isolation for IP services added

B14	Proximity distances between squeeze offs added in table 15
Section C	Arrangements for all of section C cross referenced to site survey and site preparation provided by hot links
Section C	Proximity distance of 2 metres for connections has removed unless a compression fitting is used where it remains at 2 metres.
C4	Table 19 updated
C5	Section rewritten taking account of 40m Serviflex
C6	Table 23 rewritten
C7	Pre-moling check list added
C7	Points to remember list added
C8	Additional requirements for ditches and HDIP services added
D1	Addition of the combined ECV/IJ fitting
D3	Text amended at 3.1 to clarify the requirements for SEFV's.
E1	MP services can now be laid to built-in boxes, statement amended to confirm that IP services cannot be laid to built-in boxes.
E1	Requirement for the location of IP regulators at the boundary added.
E4	Requirements for services to LP Unibox added
E5	Requirement for annular sealant to be injected to a position "at least beyond the building line" added
E12	Arrangements for the installation of MP services to a built-in box added
E14	Requirements for services to MP Unibox added
E16.2	Text amended relating to requirements for location of meter installations
E17	Arrangements for the installation of IP services added
E18	Service information labels added to a single section and updated with new labels
F1 & F2	Service testing section has been revised and re-ordered, new testing arrangements added
F4	De-commissioning services has been revised, the new arrangements for engineering personnel disconnecting meters has been provided as an Appendix O
F6	Service Live/Dead checks has been substantially revised, the "Welsh Glove" has been replaced by the CaPEX tool. Figure 106 revised accordingly
Appendix A	The appendix has been added as a standard appendix.
Appendix B	Proximity of between fittings new requirements added from SGN/SEI/535
Appendix C	New section for the preparation of PE pipe for electrofusion added to provide a central linked location to remove duplication of text

Appendix D	The electrofusion of PE pipes and fittings has been moved to this position with new processes added for multilayer PE and SDR 21 & 26 pipe. For new black core pipe and fittings from SGN/SEI/579
Appendix E	The Butt fusion of PE pipes has been moved to this position with new processes & tables added for multilayer PE and SDR 21 & 26 pipe.
Appendix E	Text re-affirms the requirement of SGN to use only fully automatic butt fusion machines
Appendix F	New location for mechanical jointing taken from original Appendix A1
Appendix G	Push fit & Drawlock fittings added to a new separate appendix from original Appendix A2, A3 & A4
Appendix H	Originally Appendix B, Drawings amended and Unibox added
Appendix I	New requirements for the mains breakout operation from SGN/SEI/617 & SGN/SEB/724
Appendix J	New requirements form SGN/SEI/533 for the reporting of PE faults
Appendix K	Originally Appendix D - Conversion tables extended
Appendix L	Originally Appendix E - Definitions
Appendix M	Originally Appendix F - Abbreviations
Appendix N	New table for Steel pipe
Appendix O	New requirements added for the disconnection of meters during Engineering works
Appendix P	New certificate for service testing added
Appendix Q	New appendix - SGN Replacement service card added

DISCLAIMER

This safety and engineering document is provided for use by SGN and such of its contractors as are obliged by the terms and conditions of their contracts to comply with this document. Where this document is used by any other party it is the responsibility of that party to make sure that this document is correctly applied.

MANDATORY AND NON-MANDATORY REQUIREMENTS

In this document:

Must: Indicates a mandatory requirement.

Should: Indicates best practice and is the preferred option. If an alternative method is used then a suitable and sufficient risk assessment must be completed to show that the alternative method delivers the same, or better, level of protection.

END NOTE

Comments
Comments and queries regarding the technical content of this safety and engineering document should be directed to The SHE and Engineering Registrar at:
engineering.registrar@sgn.co.uk

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