

Polyethylene (PE) Pipe Jointing

Relevant Industry Documents
BS 6891 and IGE/UP/2

PE pipe can be used for both natural gas and LPG. It is available as either medium or high density. The maximum operating pressures need to be confirmed with the supplier. PE pipe must be fully protected, in most cases by burying below ground. It may rise above ground level, but complete protection is needed to protect it from damage, including that from ultra-violet light from the sun. It would always be preferable to use metallic pipe entries into a building. However, if PE is used then the pipe entering the building must be placed inside a metal fireproof sheath in order to ensure that no gas escape from the plastic pipe could enter into the building. There are three methods of jointing to PE pipe: fusion welded joints, electro-fusion welded joints and compression joints. *Note:* Fusion welded joints may only be undertaken by companies or specialists who are competent and assessed for these jointing methods.

Fusion welded joint

This is a specialist joint that is undertaken using a fine stream of extremely hot air and a filler rod. With the heat directed at the pipe ends and the filler material applied, fusion occurs as the plastics melt together.

Electro-fusion welded joint

An electrical coil is incorporated into each joint. This connects to the outside via two terminals. To make the joint a special transformer that supplies a small voltage of 39.5 V is used for a set time of around 24–90 seconds, depending on the fitting size and manufacturer. A label attached to the fitting will give precise data. First the pipe end should be scraped clean using a special scoring tool, then the pipe is pushed fully into the fitting. At this point a pencil mark to indicate the fully 'in' position is made on the pipe. Failure to do this may lead to a problem as the pipe has a tendency to creep out from the fitting as it is heated. The mark will indicate any lateral movement and so the pipe can be held in place. If the pipe did creep from the fitting, molten plastic would ooze inside and restrict the pipe. With the fitting fully assembled and the connections made, the supply is switched on for the set period. As the fitting melts, markers pop up from the fitting, indicating that sufficient weld temperature has been achieved. *Note:* There are two electrical connections to each fitting, thus with branches for example, the middle connection is a spigot on to which another coupling would be required to complete the connection.

Compression joint

These fittings are usually used where the PE is to join another material, such as copper or steel, and as such they are often referred to as transitional fittings. The fitting consists of a body into which the pipe spigot can enter and be clamped there via a rubber compression ring. In order to prevent the rubber ring twisting out from the fitting as the lock nut is turned, a slip and guide washer are used. This allows the pressure to be spread evenly on to the rubber, forcing it squarely into the fitting. An insert needs to be placed inside the plastic pipe prior to connection; this maintains a solid true bore within the pipe, preventing leakage. The fittings used for an LPG installation may need confirmation with the manufacturer to ensure that the rubber ring is suitable for use.



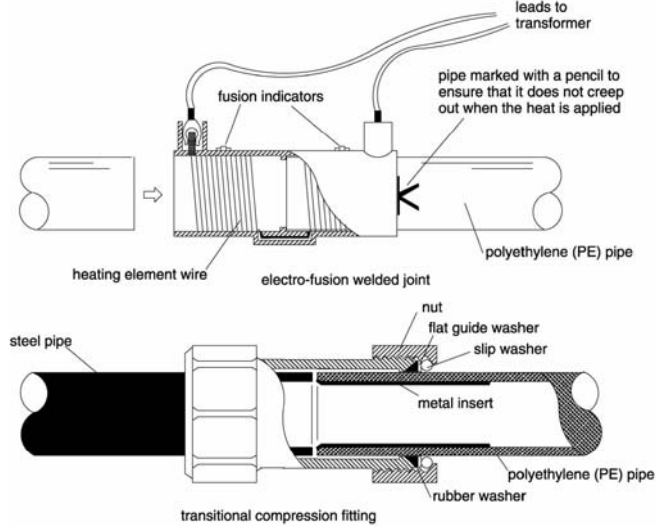
Electro-Fusion Welding Transformer



Transitional Compression Joint



Label Indicating Heating and Cooling Times



Polyethylene Pipe Jointing

Gas Meter Installations

Relevant ACS Qualifications
MET1 – MET4

Relevant Industry Documents
BS 6400 and IGE/GM/1 and 6

Meter Location

The gas meter should be located at a point as close as practical to the point of entry to the building and where the service pipe terminates and may include any of the following locations:

- in a purpose-made meter housing, to include a meter box, located outside the building either adjacent to the property or at a boundary enclosure;
- in a garage or outbuilding;
- inside the building.

The location must provide ease of access for servicing, exchange and reading purposes or, in the case of prepayment meters, to enable easy operation of the coin or token mechanism. The site of any gas meter must be well ventilated and it must be mounted at least 25 mm from the surrounding wall surfaces.

Fitted prior to the gas meter would be the emergency control valve, previously described, with a label attached indicating the 'on' and 'off' positions and the installation regulator. The regulator must not be situated where water from rain or floods could get into the breather hole. Water inside the valve would corrode the mechanism and could freeze during the winter, cracking the valve.

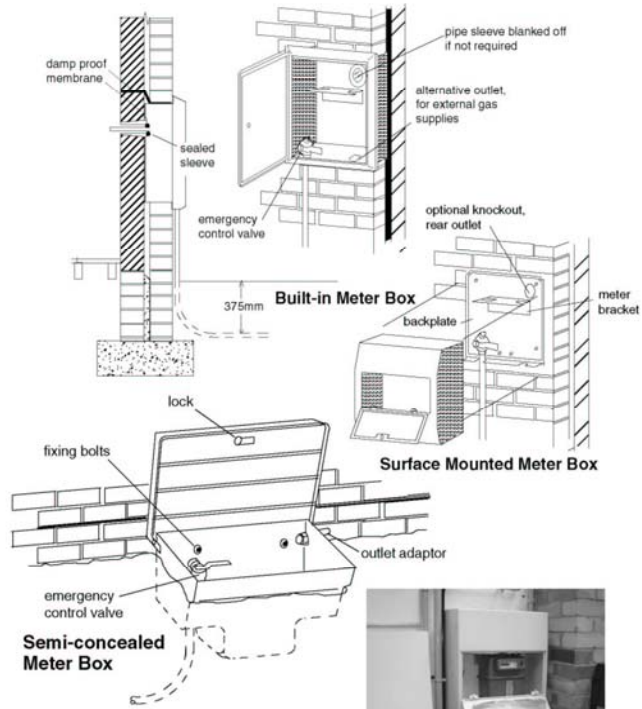
Affixed to the meter, or adjacent to it, must be a completed and dated emergency control notice that tells the occupier what to do in the event of a gas escape, including turning off the supply. It must also contain the telephone number of the emergency service contact.

Meter Boxes

There are various types of meter box, including built-in, surface mounted and semi-concealed designs, all of which are shown opposite. These boxes all have the following basic characteristics:

- They provide adequate ventilation to the external environment.
- They are suitably sized to enable installation, exchange and servicing of all components, e.g. meter, regulator, thermal cut-off, as appropriate.
- They are of non-combustible construction and have adequate fire resistance.
- They are constructed so that access can only be gained by the use of a special key, with which the consumer has been provided.

When installing the meter into these boxes no drill holes should be made except those intended by the manufacturer and all exits should be suitably sealed so that any escape of gas can pass only to the external atmosphere and not into the building. The gas service pipe is run to a point adjacent to the meter bracket, from which the gas meter is suspended. A semi-rigid stainless steel connector (anaconda) connects to the



Typical Meter Box Installations

Gas Supplies from a Bulk Tank Installation

A bulk tank may serve an individual property or it may serve several buildings. The service to a single building may be either low pressure or, where the supply is some distance from the building, a medium pressure installation may be found. Many of the controls listed were discussed in Part 3.

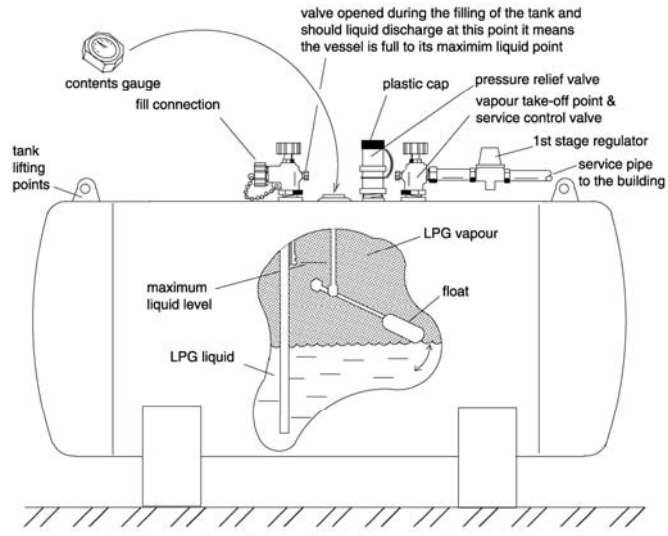
Connected to the outlet from a bulk tank will be a vapour take-off point and service control valve and it is from here that the pipe is run to the building. This pipe is referred to as the service. Along its route will be the regulators and safety controls designed to allow the gas to flow safely and at the correct pressure. The first valve encountered is the first stage regulator. This is a control regulator designed to reduce the gas pressure to an intermediate medium pressure of 0.75 bar. Following this valve may be fitted the second stage regulator, which reduces the gas pressure further to that required inside the building, usually 37 mbar. If the tank is sited some distance away from the building this second stage regulator may not be fitted close by the tank, but just prior to its entry to the building. In this way pressure loss within the pipework is reduced to a minimum. Also along the gas service route to the building will be found the over pressure shut off device (OPSO) and the under pressure shut off device (UPSO). These two controls were described on page 82. They may be installed as separate controls or may be incorporated as a combined unit and also incorporate the second stage regulator. Note that where polyethylene (PE) is used for the gas supply to the building the OPSO will need to be installed close to the tank to ensure that any excessive pressure within the gas line does not cause a problem. Finally, before the entry into the building an emergency control valve needs to be fitted.

Additional Storage Vessel Fittings

A pressure relief valve, designed to operate should the storage pressure become excessive, is fitted to the bulk tank. The pressure relief will discharge the vapour contents into the open air, therefore consideration needs to be given as to a safe method of discharging the gas, which will otherwise flow to lower ground levels and accumulate. A liquid filling connection and its shut-off valve, along with a contents gauge, are also found. Sometimes a combination valve is used, this comprises the filling connection and its shut-off control, the liquid level indicator and the vapour take-off with its appropriate service valve.

Multiple Building Installations

This is where the service is run from the bulk tank, through a distribution network to a number of different locations. Generally the distribution service would be run at a pressure of 0.75 mbar with an OPSO/UPSO, second stage regulator and emergency control fitted at the entry to the premises. A meter can be installed at this point to monitor the volume of gas used.



Typical Bulk Tank Installation



Bulk Tank Combination Valve



Typical LPG Meter Installation