

Insulation inserts in metallic gas service pipes to consumers' premises

Recently, a technical question was raised about the use of insulating inserts/insulation joints in metallic gas service pipes to consumers' premises in order to electrically insulate one section of pipe from another.

Chief engineer Geoff Cronshaw takes a brief look at the current requirements and the reasons why the gas industry installs insulating inserts/insulation joints (IJs) in metallic gas service pipes. The type of insulation joint used is outside the scope of this article. It is important that gas installations comply with all relevant legislation including the Gas Safety (installation and use) Regulations 1998.

What is protective multiple earthing (PME)?

Firstly, it is worthwhile explaining what PME is, as it is mentioned throughout this article.

The Electricity Safety, Quality and Continuity Regulations, as amended in 2002 (ESQCR) permit the distributor to combine neutral and protective functions in a single conductor provided that, in addition to the neutral to Earth connection at the supply transformer, there are one or more other connections with Earth.

Whilst a protective multiple earthing terminal provides an effective and reliable facility for the majority of installations, under certain supply system fault conditions (external to the installation) a potential difference can develop between the conductive parts connected to the PME earth terminal and the general mass of Earth. The potential difference between true Earth and the PME earth terminal is of importance when:

- (a) body contact resistance is low (little clothing, damp/wet conditions); and/or
- (b) there is relatively good contact with true Earth. Contact with Earth is always possible outside a building and, if exposed-conductive-parts and/or extraneous-conductive-parts connected to the PME earth terminal are accessible outside the building, people may be subjected to a potential difference appearing between these parts and Earth. (Earth is defined as: the conductive mass of earth, whose electric potential at any point is conventionally taken as zero.)

Purpose of an insulating section/insulation joint

In the case of a PME service, for example, in the event of a line-to-earth fault occurring within the installation, the fault current will travel through the circuit protective conductor to the main earthing terminal of the installation. From there, the installation's earthing conductor will carry the fault current to the PME earthing terminal; the fault current will then travel through the combined PEN conductor and finally back to the distribution transformer. This flow of current will be sufficient (if the installation complies with BS 7671:2008+A3:2015) to operate the protective device within the required time.

The use of an insulating section/insulation joint in a metallic gas service pipe is intended to prevent the fault current finding a route along that pipe.

In the case of a PME service, if the neutral conductor (PEN) in the service cable becomes severed then the neutral return current could flow through the metallic gas pipe. Such a flow of neutral return current can cause heating of the gas pipework and could lead to danger.

In addition, the use of an IJ in a metallic gas service pipe is used to provide an electrical break in the metallic pipework where cathodic protection is used to control the corrosion in gas pipelines.

The requirements

ENA Engineering Recommendation G12 published by the [Energy Networks Association](#)

ENA Engineering Recommendation G12 Issue 4 Amendment 1 December 2015 *Requirements for the Application of Protective Multiple Earthing to Low Voltage Networks* contains clause 5.2.1 which states:

Provision of earth terminal requires that where a metallic gas service is provided to a consumer's premises with a PME earth terminal, an insulated insert should be fitted in the gas service.

Historical note from ENA:

Prior to these standards (in particular IGEN GL/5), IJs were occasionally installed downstream of the ECV. This was to comply with PME requirements, and so these IJs are still required.

IGEM/G/5 Edition 2 document published by the [Institution of Gas Engineers and Managers](#)

IGEM/G/5 Edition 2 document (clause 11.2) contains requirements for insulating fittings. Clause 11.2.1 states:

... insulating fittings shall be installed in all metal pipe, whether gas carrying or containing a PE liner, capable of providing electrical continuity between earth and the above ground pipework.

Clause 11.2.2 states:

Insulation fittings shall be installed in accessible location as close to the pipes entry into the building or, in the case of external pipework, as close as possible to the pipes exit to the ground and upstream of any ECV. The uninsulated section of the exposed pipe shall be as short as possible.

BS 7671:2008+A3:2015 published by [BSI](#) and [IET](#)

Regulation 544.1.2 states the main protective bonding connection to any gas, water or other service shall be made as near as practicable to the point of entry of that service into the premises. Where there is an insulating section or insert at that point, or there is a meter, the connection shall be made to the consumer's hard metal pipework and before any branch pipework. Where practicable the connection shall be made within 600 mm of the meter outlet union or at the point of entry to the building if the meter is external.

Conclusion

To summarise, the two main reasons for insulating inserts/insulation joints in metallic pipework are to prevent corrosion and to prevent pipes being used as a path for fault current. Also, the main protective bonding requirements in BS 7671:2008+A3:2015 are understood to be written on the expectation that insulating inserts /insulation joints are installed in metallic service pipework.

It is important to be aware that this article only gives a brief overview of the issue of insulation inserts.