



TECHNICAL BULLETIN 226



Date issued: 16th May 2008

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Status: Current

Reviewer: May 2009

Title: Electrical safety requirements for gas appliances installed in rooms or spaces containing baths or showers

This Technical Bulletin supersedes TB 180 which is now withdrawn

British Standard (BS) 7671: 2008 *Requirements for Electrical Installations - IEE Wiring Regulations Seventeenth Edition* has recently been amended and is effective from the 1st July 2008. Any electrical installation designed and installed after this date should comply with this edition of the standard. This will include the electrical installation of a gas appliance that is installed in any room or space containing a bath or shower.

The electrical requirements for the installation of gas appliances in rooms containing a bath or shower are not new; however there are some important changes in BS 7671: 2008 in section 701. (*Section 601 of BS 7671: 2001*).

Gas appliances should only be installed in a room or space containing a bath or shower if there is **no other** practical location. If there is no alternative to installing a gas appliance in a this location, and in addition it can only be located in one of the zones identified in Figure 1 (below), then it needs to be suitably rated for use in that particular zone. Any controls for the appliance need to be adequately IP (International Protection) rated for use in the appropriate zone. Information on the zone requirements is contained in *Zones in locations containing a bath or shower* below.

BS 7671: 2008 Section 701 - Locations containing a bath or shower

Regulation 701.411.3.3 of BS 7671: 2008 requires that all circuits within this location shall be provided with additional protection by a residual current device (RCD) not exceeding 30mA, with an operating time not exceeding 40ms at a residual current of $5 \times I_{\Delta n}$ (this would effectively be 150mA). The RCD requirement will include low voltage lighting circuits, shower circuits, bathroom heaters, electric towel rails, central heating boilers, etc and the 230 V supply to Separated Extra Low Voltage (SELV) equipment.

Note: $I_{\Delta n}$ is the rated residual operating current of the protective device in amperes.

Unlike the 2001 edition of BS 7671, a standard 13 amp socket-outlet is now permitted to be installed in a room or space containing a bath or shower as long as it is sited no closer than 3m measured horizontally from the edge of Zone 1 (see Figure 1 below) and is protected by a 30mA RCD.

In the 2001 edition of BS 7671, there was a requirement to provide local supplementary equipotential bonding to all metallic water and gas pipes, metallic waste pipes, any metallic central heating pipework, any metallic structures, metallic baths and metallic shower trays, when any electrical equipment was installed within the zones in a room or space containing a bath or shower. However in BS 7671: 2008 this is not required as long as the following criteria are met:

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- All final circuits of the location comply with the automatic disconnection requirements of regulation 411.3.2, that means automatic disconnection of the supply in the case of a fault by providing an over current protective device.
- All circuits, including lighting circuits will have to be protected by an RCD in accordance with Regulation 701.411.3.3.
- All extraneous-conductive-parts which would include the main metallic water supply, the gas outlet supply and any other exposed metallic structure will require to be connected to the protective equipotential bonding (previously known as Main Equipotential Bonding) according to Regulation 411.3.1.2. Therefore as long as the gas installation pipework and metallic water installation pipework is bonded to the main protective earthing terminal, there is no requirement to bond the gas appliance and pipework, unless the appliance manufacturer asks for such bonding in the installation instructions.

However if these requirements cannot be achieved then supplementary equipotential bonding will have to be provided as specified in Regulation 701.415.2 of BS 7671: 2008. This is to bond all metallic pipes including central heating pipework, metallic structures, metallic baths, shower trays etc.

Supplementary equipotential bonding may be installed outside or inside rooms or spaces containing a bath or shower, preferably close to the point of entry of extraneous-conductive-parts into such rooms.

Zones in Locations containing a bath or shower

There is no Zone 3 in BS 7671: 2008 unlike the 2001 edition. Therefore the zones are made up as follows:

- Zone 0
- Zone 1
- Zone 2

The diagram below provides details and dimensions of the zones.

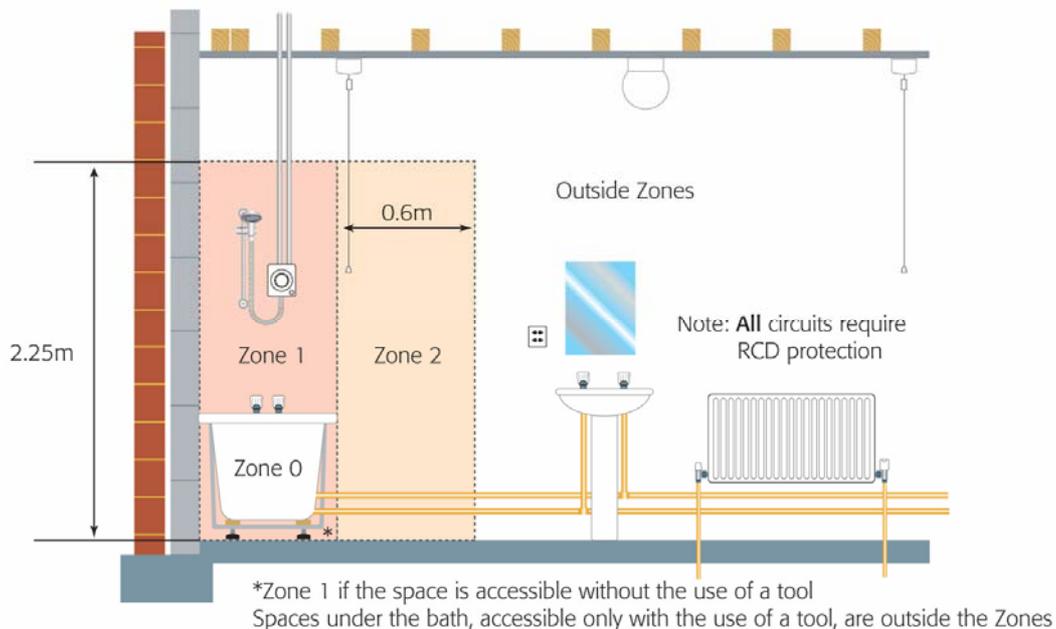


Figure 1

The zones are determined taking into account, the doors, fixed partitions, ceilings and floors where these effectively limit the extent of the zone. Where there are ceilings that slope and are lower than 2.25m, the extent of the zone is restricted.

This means that a zone does not extend through a door opening (with a door) neither does it pass through a fixed partition. However the zone does extend through an opening and around a fixed partition without a door.

Zone 0 (see Figure 1)

This is the location within the bath or shower tray and only 12V ac equipment with a minimum degree of protection to IPX7 may be installed in this zone (see *What are International protection (IP) Codes* below). Any transformers shall be located outside of this zone.

Zone 1 (see Figure 1)

This is the area above a bath, shower tray or basin up to a height of 2.25m from the floor and where a fixed shower is installed will extend to 1.2m out from the fixed shower head. Equipment to IPX4 or IPX5 (if subject to water jets for cleaning purposes, etc) and 25V ac may be installed in this zone. This would be items such as shower pumps and ventilation equipment.

Zone 2 (see Figure 1)

Fixed permanently connected equipment to IPX4 or IPX5 rating (if subject to water jets for cleaning purposes, etc) may be installed in this location. The Zone 2 area is measured 600mm from the side of the bath or shower tray into the room and is measured to a height of 2.25m from the floor.

What are International Protection (IP) Codes?

Suitably rated equipment, including gas appliances are classified using an International Protection Code (IP).

International Protection codes are more commonly known as Ingress Protection codes based on a European standard IEC 60529 (2001-02), which is published by the International Electro Technical Commission. This standard defines a classification system for the effectiveness of enclosures in preventing the ingress of solids and liquids and uses two letters – IP (for International Protection) followed by two digits - the first for solids the second for liquids as detailed in the Table 1.

Table 1 International Protection (IP) Codes

Digit Value	1st Digit (Solids)	2nd Digit (Liquids)
0	No protection	No protection
1	Protected against objects >50 mm	Protected against dripping water
2	Protected against objects >12 mm	Protected against dripping water when tilted $\pm 15^\circ$
3	Protected against objects >2.5 mm	Protected against spraying water
4	Protected against objects >1.0 mm	Protected against splashing water from all directions
5	Dust protected	Protected against water jets
6	Dust tight	Protected against heavy seas
7	Not used	Protected against immersion to >150mm
8	Not used	Protected against submersion to >1m
X	Not solid rated	Not liquid rated

For example, IP65 implies a dust tight case able to withstand a water jet and is a common level of protection for outdoor equipment.

Note: For gas appliances where the first digit for solids is not normally a concern, the requirement number is often replaced with the letter "X" and the rating number would normally be classified as follows: "IPX4".

Installation of gas appliances in a room or space containing a bath or shower (non-preferred location)

Generally, the installation of gas appliances in a room or space containing a bath or shower will be with an electrical installation that complies with earlier editions of BS 7671.

Therefore before commencing any electrical work, a survey of the property will be required to ascertain whether protective equipotential bonding is provided and if it is required it is adequately sized. The electrical supply will have to be of the correct size to supply the central heating boiler and any additional controls required. The over current protection device will have to provide protection for that circuit and will require additional RCD protection.

The location of the gas appliances will be determined by the IP rating of the appliance for the electrical installation. The gas appliances manufacturer will also provide all the information on clearances required and it is these requirements that should be complied with.

Cables buried in wall

Cables that are buried in the wall will have to be buried to a minimum depth of 50mm. Where this is not possible, the following alternatives will have to be complied with:

1. Installed in a metal trunking or metallic conduit that is earthed, or
2. Cables that have earthed metallic covering, or
3. Cables that are mechanically protected or
4. Install the cables in a 'safe zone' and protect by a 30mA RCD.

Because of the requirements to protect all electrical circuits in a bath or shower room with an RCD, some of the above items will automatically be complied with.