

Additional protection: Supplementary protective equipotential bonding in medical locations of group 1 and group 2

This guide gives information on the installation of supplementary protective equipotential bonding conductors and the associated equipotential bonding busbar (EBB), based on the requirements of regulation group **710.415.2** of BS 7671.

Supplementary protective equipotential bonding is required under the general rules of BS 7671 and shall be applied in special locations, such as medical locations, where there is an increased risk of electric shock.

In medical locations, the risk to patients is increased due to the reduction in body resistance, as the skin is often cut, broken or penetrated during medical procedures or the patient's defensive capacity is either reduced by medication or nullified while anaesthetized.

In medical locations the provision of supplementary protective equipotential bonding is enhanced by the installation of an EBB to form a bonding network, where bonding conductors for the location are arranged in a specific manner.

In each group 1 and group 2 medical location, supplementary protective equipotential bonding shall be installed (see Fig's 3 and 4), the supplementary bonding conductors shall be connected to an EBB to form a supplementary equipotential bonding network to help limit the touch voltage under fault conditions and to facilitate the equalisation of potential differences between the following parts which are either located in, or that may be moved into, the 'patient environment' (**710.415.2.101**):

- Protective conductors
- Extraneous-conductive-parts
- Screening against electrical interference fields, if installed
- Connection to conductive floor grids, if installed
- Metal screens of isolating transformers and cable shields, via the shortest route to the earthing conductor
- Supplementary equipotential bonding connection points (where provided).

Conductive parts intended to be isolated from earth shall not be connected to supplementary protective equipotential bonding.

Supplementary equipotential bonding connection points for the connection of ME equipment shall be available in group 2 and may be provided in group 1 medical locations. The number of supplementary equipotential bonding connection points shall be determined by the designer in consultation with those responsible for ME equipment use and recorded as part of the information to be provided in **Regulation 710.514.9.101**. (**710.415.2.101**).

An EBB shall be located in (Fig. 1) or near (Fig. 2) each medical location it serves and be readily accessible taking into consideration the local infection prevention and control requirements (**710.415.2.103**). The EBB shall not be located in a ceiling void due to infection risks associated with ceiling tile removal for inspection and testing purposes.

The above term "near" often causes confusion to users of the standard and those undertaking inspection and testing of the system, so for clarity the technical intent of "near" is immediately outside the location it serves.

The intent is to keep the resistances as low as practically possible. As access and maintainability is key, locating EBBs in or near the location and minimising the sharing of EBBs over a larger number of patient locations increases the ability to access for inspection and testing purposes.

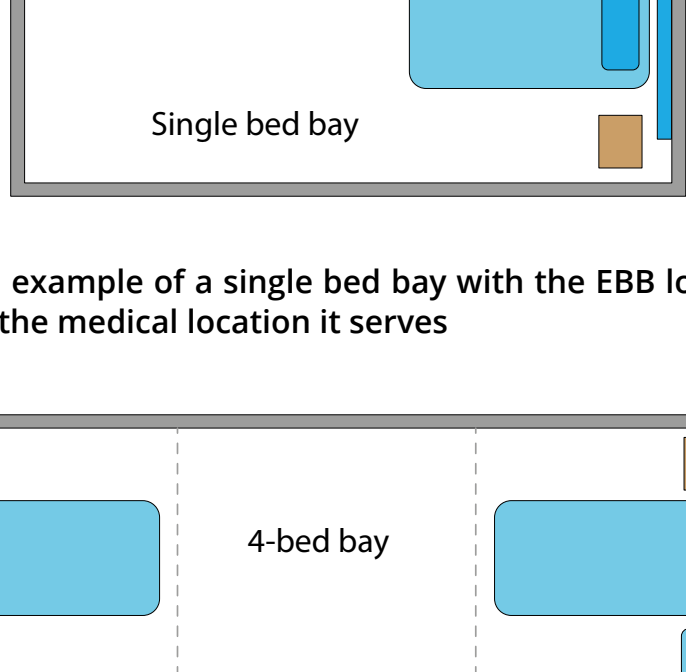


Fig 1. An example of a single bed bay with the EBB located in the medical location it serves

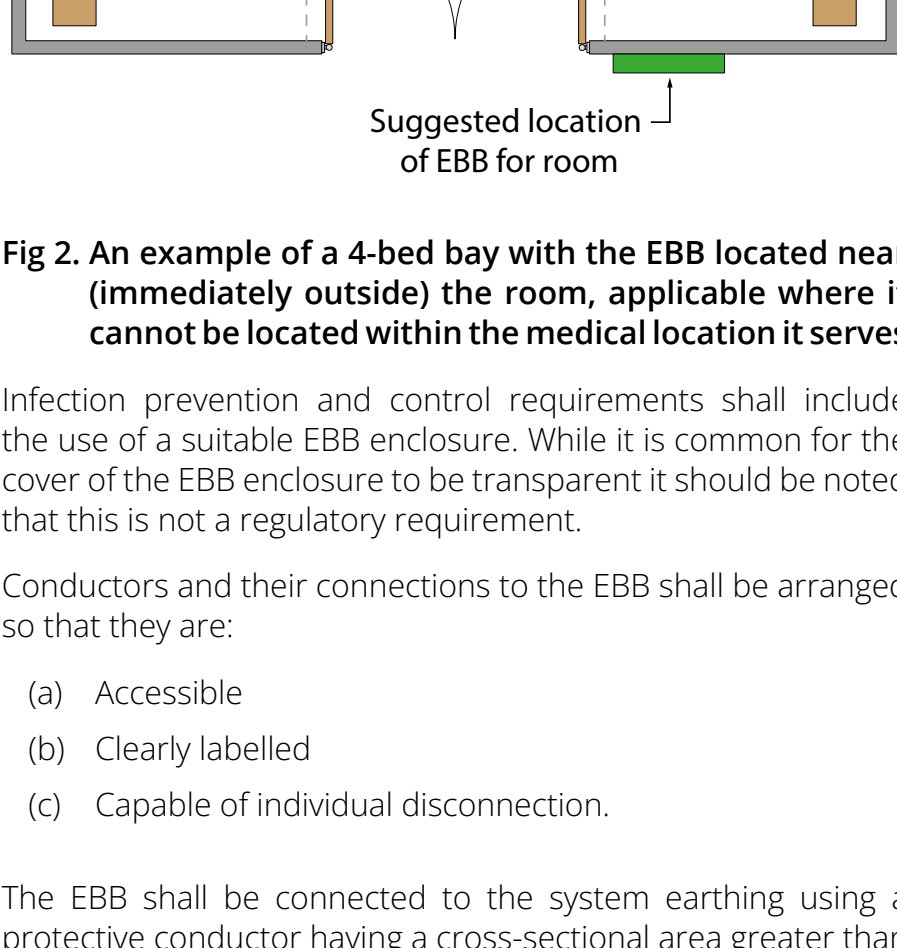


Fig 2. An example of a 4-bed bay with the EBB located near (immediately outside) the room, applicable where it cannot be located within the medical location it serves

Infection prevention and control requirements shall include the use of a suitable EBB enclosure. While it is common for the cover of the EBB enclosure to be transparent it should be noted that this is not a regulatory requirement.

Conductors and their connections to the EBB shall be arranged so that they are:

- Accessible
- Clearly labelled
- Capable of individual disconnection.

The EBB shall be connected to the system earthing using a protective conductor having a cross-sectional area greater than or equal to the largest cross-sectional area of any conductor connected to the EBB.

- Regulation group 544.2** sets out the requirements for supplementary bonding conductors:

- 544.2.1** A supplementary bonding conductor connecting two exposed-conductive-parts shall have a cross-sectional area (CSA), if sheathed or otherwise provided with mechanical protection, not less than that of the smaller protective conductor connected to the exposed-conductive-parts. If mechanical protection is not provided it's CSA shall not be less than 4 mm².
- 544.2.2** A supplementary bonding conductor connecting an exposed-conductive-part to an extraneous-conductive-part shall have a CSA, if sheathed or otherwise provided with mechanical protection, not less than half that of the protective conductor connected to the exposed-conductive-part. If mechanical protection is not provided it's CSA shall not be less than 4 mm².
- 544.2.3** A supplementary bonding conductor connecting two extraneous-conductive-parts shall have a CSA not less than 2.5 mm², if sheathed or otherwise provided with mechanical protection. If mechanical protection is not provided it's CSA shall not be less than 4 mm², except that where one of the extraneous-conductive-parts is connected to an exposed-conductive-part in compliance with **544.2.2**, that regulation shall apply also to the conductor connecting the two extraneous-conductive-parts.

- In medical locations of group 1 and group 2, the measured resistance between simultaneously accessible exposed-conductive-parts, including the terminals for the protective conductors of socket-outlets and of fixed equipment, extraneous-conductive-parts and the supplementary equipotential bonding connection points (where provided) shall not exceed 0.2 Ω (**710.415.2.102**), and
- The resistance described in (b) above shall be such that the resulting voltage during a fault condition does not exceed 25 V AC or 60 V DC (**710.415.2.2**).

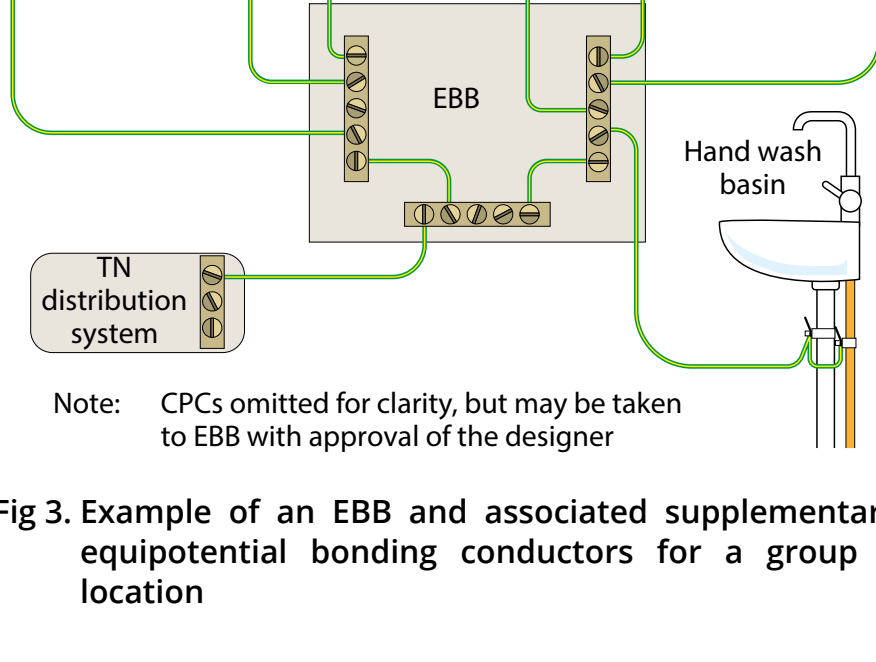


Fig 3. Example of an EBB and associated supplementary equipotential bonding conductors for a group 1 location

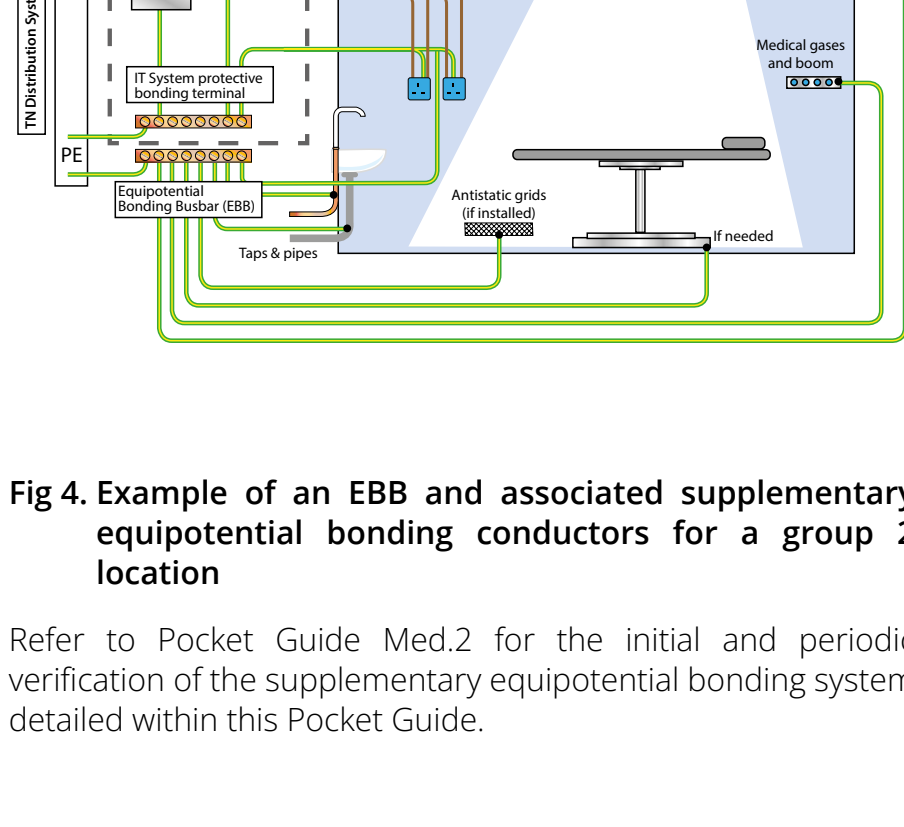


Fig 4. Example of an EBB and associated supplementary equipotential bonding conductors for a group 2 location

Refer to Pocket Guide Med.2 for the initial and periodic verification of the supplementary equipotential bonding system detailed within this Pocket Guide.