SUPPLEMENTARY BONDING IN LOCATIONS INTENDED FOR LIVESTOCK

Many modern farms consist of a number of separate buildings, not all of which are intended for use by livestock. This article explains the requirements of BS 7671 for supplementary bonding in locations where it is intended to keep livestock.

Such locations include the milking parlour shown pictured below, where protection against indirect contact is provided by Earthed Equipotential Bonding and Automatic Disconnection of supply (EEBAD).

For agricultural premises, except for any dwellings intended solely for human habitation, the general requirements of BS 7671 are supplemented and modified by the requirements of Section 605 (Agricultural and Horticultural Premises).

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Typical dairy farm milking parlour

One of the additional safety measures required by Section 605 is supplementary equipotential bonding in locations intended for livestock (Regulation Group 605-08 refers). The bonding should be arranged as explained later in this article.

Items to be connected together by supplementary bonding

The supplementary bonding required by Section 605 has to connect together the following conductive parts where these can be touched by livestock:

- exposed-conductive-parts, such as metallic enclosures of Class I switchgear, controlgear, accessories or current-using equipment; metal conduit or metal trunking, **and**
- extraneous-conductive-parts, such as exposed structural metalwork or metal fence posts, where such metalwork is likely to come into electrical contact with the general mass of Earth.

The purpose of the supplementary bonding is to assist in limiting the magnitude of voltages occurring between conductive parts under earth fault conditions, so as not to cause danger to livestock.

Bonding conductors

The supplementary bonding conductors, whether of copper or another metal, must have a cross-sectional area not less than that required by Regulation Group 547-03 of BS 7671. Attention should be paid to the protection of the conductors against mechanical damage and to the avoidance of corrosion, particularly at connections.

Connections should preferably be made accessible for inspection, testing and maintenance. Where not accessible, connections are required to be made by one of the methods listed in Regulation 526-04-01, such as welding, soldering or brazing. (See the article regarding the accessibility of connections on page 43 of issue 157 of Connections.)

The resistance (R) of a supplementary bonding conductor connecting together any of the conductive parts referred to earlier must satisfy the following condition, as required by Regulation 605-08-01:

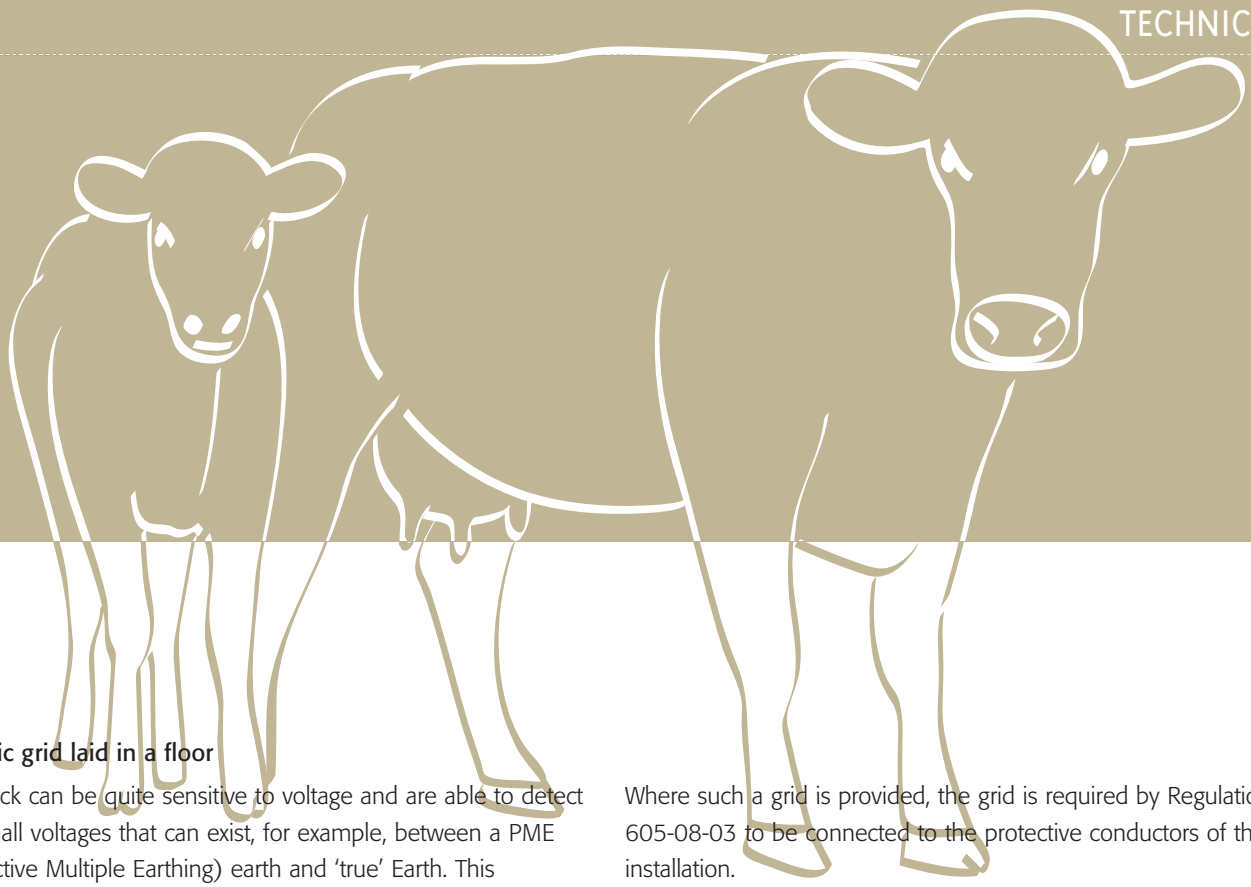
$$R \leq \frac{25}{I_a}$$

Where:

I_a is the operating current of the protective device:

(i) for a residual current device, it is the rated residual operating current, $I_{\Delta n}$

(ii) for an overcurrent protective device, it is the minimum current which disconnects the circuit within 5 seconds.



Metallic grid laid in a floor

Livestock can be quite sensitive to voltage and are able to detect the small voltages that can exist, for example, between a PME (Protective Multiple Earthing) earth and 'true' Earth. This sensitivity can result in a marked reluctance for animals to enter locations where such a differential exists. Therefore, in a location where it is intended to keep livestock and where the floor is not insulated from the general mass of Earth, the provision of a suitable metallic grid in the floor should be considered for the purpose of supplementary bonding. This is particularly the case where the main earthing terminal of the installation is connected to a PME earthing facility.

Where such a grid is provided, the grid is required by Regulation 605-08-03 to be connected to the protective conductors of the installation.

Two or more supplementary bonding connections should be made to the grid, preferably at diagonally opposite corners, and it should be ensured that all parts of the grid are reliably electrically connected together. Good and permanent electrical contact must be provided between adjoining metal grids. This can usually be achieved by binding them together with metal wire for 50 mm at one metre intervals.