

# SMALL GENERATORS ON CONSTRUCTION SITES

By John Ware



**EACH YEAR**, people are killed or seriously injured by electricity in the construction industry. Most of these accidents could be avoided. Construction sites present one of the most difficult environments for the safe use of electricity because:

- work is often performed outdoors in all weathers meaning electrical equipment may be subject to damp or wet conditions
- sites change as work progresses meaning electrical equipment can suffer damage
- a mains electricity supply may not be available. There is always a risk of improvisation
- cables can suffer damage due to equipment movement
- there may be a reluctance to provide proper earthing.

### **Effective management is essential to avoid injury**

A small generator is considered to be one that has an output from 0.3 to 10 kVA and such a machine is generally single-phase, portable or transportable and provides an output at 230 V and/or 120 V. Winding connections are normally brought out to a three-pin socket-outlet which should conform to BS EN 60309-2 in which the third or protective conductor socket tube is connected to the generator enclosure. In some cases the protective conductor socket tube will also be connected to one pole of the generator winding. A voltage-selector switch may be fitted to enable 230 V or 120 V outputs to be obtained from appropriate BS EN 60309-2 socket-outlets.

A small single-phase generator is often run as a floating system. A means of earthing is not required. In such a system the generator is deliberately not connected to external metallic parts nor is one pole of the single-phase electrical system connected to earth. In such a system there is no path for an earth fault current to return to the 'separated' winding of the generator. Safety must be ensured by meeting the following conditions:

- (a) The generator should be used only on a short term basis (for a maximum of a few days, but

ideally, less than one day).

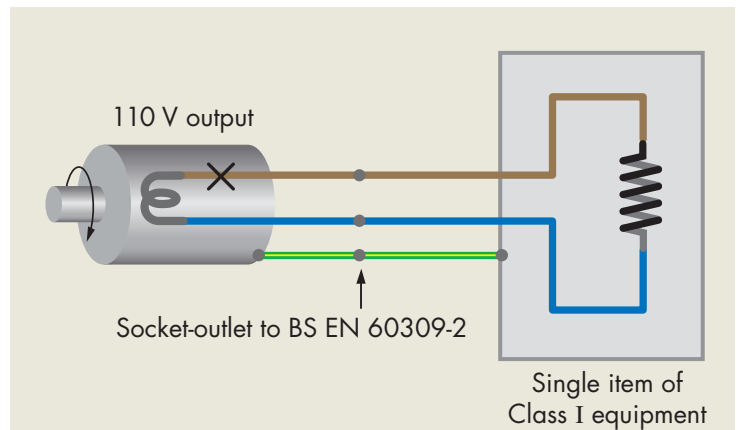
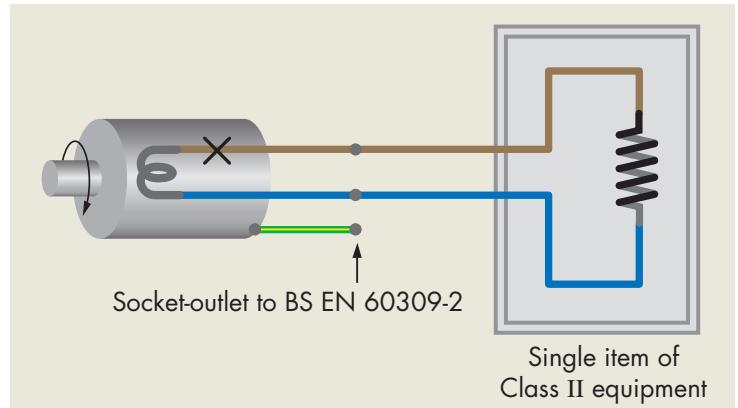
(b) The generator should preferably supply only one item of Class II equipment (See figure 1). Hand-held 110 V (industrial use) or 230 V (domestic use) portable equipment should be Class II construction.

(c) Only cables which are suitable for their environmental exposure should be used to connect the generator to its load. The use of PVC-insulated and sheathed cables with flexible braided wire armour and a PVC oversheath is recommended.

(d) All cables and plugs should be frequently inspected. Users should be alert to risks which arise from damaged cables. The cable, plugs and socket-outlets should be inspected frequently and should be replaced if defective, not repaired. Equipment and cables which are in good condition are vital for the continuous safety of an unearthed system and form the first line of protection against electric shock.

(e) Load cables supplied from unearthed single-phase generator windings should be kept as short as practicable. Load cables should supply compactly located loads which are not widely dispersed. With extensive unearthed or 'floating' systems there is a higher probability of the development of undetected earth faults caused by damaged cables.

Where, on a construction site, it is required to supply a single item of Class I equipment or more than one item of Class II equipment from a small generator, the following additional recommendations should be met:



**Top, Fig 1: The generator should supply only one item of Class II equipment**

**Above, Fig 2: A small generator supplying a single item of Class I equipment**

(f) The supply should be 110 V.

(g) The generator should be rated up to about 5 kVA

(h) The equipment and the metal armour or braid of interconnecting cables should be bonded with the frame of the generator (Figure 2). ■



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