CONSTRUCTION SITE ELECTRICAL INSTALLATIONS

The role of the CDM regulations in ensuring electrical safety on construction sites.

By Geoff Cronshaw

THE CONSTRUCTION (Design and Management) Regulations 2007 (CDM Regulations) place responsibilities on most installation owners and their professional design teams to ensure a continuous consideration of health and safety requirements during the design and construction of, and throughout the life of, an installation, including maintenance, repair and demolition.

The scope of these responsibilities includes the design of electrical installations and the selection and erection of electrical equipment. Design work should take into account the practicalities of the installation, and allow adequate access for the operation and maintenance requirements of all equipment. It is important that all those who can contribute to the health and safety of a construction project understand what they and others, need to do under the CDM regulations, and discharge their responsibilities accordingly.

For example, designers must consider the need to design, as far as practicable, in a way that avoids foreseeable risks, so that the projects they design can be constructed, operated and maintained safely.

Under the CDM regulations the Health and Safety Executive (HSE) must be notified of projects where construction work is expected to last more than 30 days or involve more than 500-person days. Almost everyone involved in construction work will have a legal duty placed on them under the regulations. Those with legal duties are commonly known as 'dutyholders'. Dutyholders under the CDM Regulations include:

- **Client** Anyone having construction or building work carried out as part of their business. This could be an individual, partnership or company, and includes property developers or management companies for domestic properties.

- **CDM coordinator** Has to be appointed to advise the client on projects that involve more than 30 days or 500-person days of construction work. The CDM coordinator's role is to advise the client on health and safety issues during the design and planning phases of construction work.

- **Designer** The term 'designer' has a broad meaning and relates to the function performed, rather than the profession or job title. Designers are those who, as part of their work, prepare design drawings, specifications, bills of quantities and the specification of articles and substances. This could include architects, engineers and quantity surveyors.

- **Principal contractors** Has to be appointed for projects which last more than 30 days or involve 500 or more person days of construction work. The principal contractor's role is to plan, manage and coordinate health and safety while construction work is being undertaken. The principal contractor is usually the main or managing contractor for the work.

- **Contractor** A business involved in construction, alteration, maintenance or demolition work. This could involve building, civil engineering, >

For further information refer to:

Electricity at Work Regulations 1989
Memorandum of guidance on the Electricity at Work Regulations 1989 (HSR25).
Managing health and Safety in construction (L144)
The Construction (Design and Management) Regulations 2007
BS 7671:2008 incorporating Amendment 1

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< mechanical, electrical, demolition and maintenance companies, partnerships and the self-employed.

■ **Worker** Anyone who carries out work during the construction, alteration, maintenance or demolition of a building or structure. A worker could, for example, be an electrician, as well as those supervising the work, such as chargehands and foremen.

THE ELECTRICITY AT WORK REGULATIONS 1989

Persons involved in electrical installation work must be competent. The Electricity at Work Regulations 1989 imposes duties on persons involved in electrical work commercially, whether employers, the self-employed or employees, including most trainees.

Regulation 16 (Persons to be competent to prevent danger and injury) states: "No person shall be engaged in any work activity where technical knowledge or experience is necessary to prevent danger or, where appropriate, injury, unless he possesses such knowledge or experience, or is under such degree of supervision as may be appropriate having regard to the nature of the work."

The Memorandum of guidance on the Electricity at Work Regulations 1989 (HSR25, HSE: 1989) states that: "the object of the regulation is to ensure that persons are not placed at risk due to a lack of skills on the part of themselves or others in dealing with electrical equipment".

It continues:

"the scope of 'technical knowledge or experience' may include:

(a) adequate knowledge of electricity;

(b) adequate experience of electrical work;

(c) adequate understanding of the system to be worked on and practical experience of that class of system;

(d) understanding of the hazards which may arise during the work and the precautions which need to be taken;

(e) ability to recognise at all times whether it is safe for work to continue."

BS 7671:2008 INCORPORATING AMENDMENT 1:2011

Construction sites are potentially dangerous in many ways. Four factors contribute to the high risk of electric shock on a construction site:

1 the possibility of damage to cables and equipment.
2 the widespread use of hand tools with trailing leads (this problem is mitigated by the increasing use of battery operated tools).
3 the accessibility of many extraneous-conductive parts, which cannot practically be bonded.
4 the works are generally open to the elements.

Construction sites are potentially dangerous, with a high risk of electric shock

Section 704 of Amendment 1 of BS 7671:2008 prescribes particular measures to reduce the risks caused by this harsh environment. For example: BS 7671 strongly prefers the reduced low voltage system to supply portable hand lamps for general use and portable hand tools and local lighting up to 2kW, while SELV is strongly preferred for portable hand lamps in confined or damp locations.

It is usually impracticable to comply with the bonding requirements of the Electricity Safety, Quality and Continuity Regulations on construction sites for PME. Hence BS 7671:2008(2011) states that a PME earthing facility shall not be used for the means of earthing for a construction site installation unless all extraneous-conductive-parts are reliably connected to the main earthing terminal. See Regulation 704.411.3.1

Section 704 prohibits the protective measures of obstacles and placing out of reach (Section 417), non-conducting location (Regulation 418.1), and earth-free local equipotential bonding (Regulation 418.2).

Cables on a construction site location should preferably not be installed across walkways or site roads as they are susceptible to mechanical damage. If cables are installed in this manner they require the appropriate level of mechanical protection.

For reduced low-voltage systems flexible thermoplastic cables rated at 300/500V and suitable for low temperature (BS 7919) should be used. These cables remain flexible at lower temperatures than standard PVC cables, and are ideal for outdoor use. They are referred to as arctic-grade cable and typically have yellow (refer to section 4.6 of IET Guidance note 7) or blue sheaths.

For cables used for applications exceeding reduced low voltage, flexible cables rated at 450/750V that are resistant to abrasion and water should be used, type H07RN-F (BS EN 50525 part 2.21). (Please note, whilst BS7019 is still current, it is expected to be withdrawn end of December 2012). These are heavy duty rubber insulated and sheathed flexible cables suitable for outdoor use.

All equipment that is part of the movable installation should have a degree of protection appropriate to the external influences. Equipment for external use should be at least IP44. However, equipment installed in a weather protected location, such as an office being refurbished, should be at least IP 2X (see BS 7671 for exact requirements).

It is recommended that the maximum period between inspections of construction site installations is three months.

Fixed installation RCDs should additionally be tested daily (using the integral test button). Should RCDs be used as supplementary protection to protect mobile equipment they must be tested by the operative before each period of use (again using the integral test button) and by the responsible person every three months (using an RCD tester). *