

ELECTRICAL MAINTENANCE

By John Ware

THE IET's publication *Electrical Maintenance* has been completely revised and now includes up-to-date information on key areas including fire alarms, emergency lighting, risk assessment and legislation.

Why perform maintenance?

Maintenance is carried out for the following reasons:

- To prevent danger
- To reduce unit cost and to keep a facility in operation (reliability)
- To prevent pollution of the environment.

To prevent danger

Maintenance for safety may be carried out to meet common law requirements and legal requirements.

The common law requirements imply a general duty of care to other persons and their livestock, property, etc.

Legal requirements are those where there are stipulations in the legislation for maintenance. In the Electricity at Work Regulations (EWR), the requirement is phrased as follows:

'As may be necessary to prevent danger, all systems shall be maintained so as to prevent, so far as is reasonably practicable, such danger.' (Regulation 4(2)).

The requirement here is to maintain the system (including equipment) so as to prevent danger, and this may be achieved by carrying out a maintenance activity. In general, equipment cannot be kept in a safe condition without actually being maintained. Normally it is necessary to inspect and/or test a system to determine if maintenance (including repairs) is necessary. It is also likely to be necessary to monitor the effectiveness of maintenance procedures by keeping and analysing records.

To reduce unit cost and to keep a facility in operation (reliability)

The issues concern minimising business costs and maximising income.

Maintenance carried out to reduce the cost of an enterprise would include action taken to reduce or avoid:

- a) The cost of failure of plant or equipment – repair costs;
- b) The cost of loss of production – revenue costs;
- c) The cost of loss of service – revenue and goodwill.

Cost of failure of plant or equipment – repair costs.

Decisions on the approach to be taken are rarely simple. For example, all the lamps of a street lighting installation will need to be replaced at some time or the street will end up in darkness. The decision as to whether it is cost effective to replace the lamps routinely (preventive maintenance) or when they fail (breakdown) will need to take into account the reduction in light output (if significant), the effect on traffic of frequent disturbances and the cost of attending to replace lamps. It might be decided that breakdown maintenance was appropriate for a 'B' road, while preventive lamp replacement was necessary for a motorway.

A balance needs to be achieved between the cost of the maintenance activity and the cost of the equipment.

The cost of maintaining a large motor might well be small compared with the cost of replacement, whereas the cost of replacing a single tungsten filament lamp will far outweigh the cost of the lamp. The lamp may be maintained on a breakdown basis, the motor on a routine basis.

The IET's Electrical Maintenance, 2006

Chapter 1	Legislation and guidance. Maintenance strategies.
Chapter 2	Risk assessment, manual handling, display screen regulations and safety signs and signals
Chapter 3	Electrical installations. The need for maintenance, periodic inspection and certificates
Chapter 4	Testing of electrical installations
Chapter 5	Lighting maintenance. Lamp cleaning and replacement policies
Chapter 6	In service inspection and testing of electrical equipment
Chapter 7	Emergency lighting
Chapter 8	Fire detection and alarm systems
Chapter 9	Industrial and commercial switchgear
Chapter 10	Electromagnetic compatibility
Chapter 11	Lightning protection installations
Chapter 12	Environmental protection. The Waste Electrical and Electronic Equipment (WEEE) Directive.
Chapter 13	Legionellosis. Avoidance of the occurrence of Legionnaires disease from wet cooling systems and water supply systems.

Loss of production – revenue costs. In many situations the cost of the failed piece of equipment is insignificant compared with the cost of loss of output or production. In these circumstances breakdown maintenance is unlikely to be appropriate.

Loss of service – revenue and goodwill. Customer goodwill is difficult to estimate financially, but should be considered, when determining maintenance regimes. The additional costs of early replacement, or even frequent maintenance, can be justified by customer goodwill.

To prevent pollution of the environment

Maintenance may be required to be carried out, not simply to protect people's health and safety, but also to protect the environment. This may not be cost effective, but it may be seen as a general duty of care or it may be a legislative requirement as required by the WEEE Directive, the Clean Air Act or the Environmental Protection Act and associated Regulations.

So far as is reasonably practicable

Duties in some of the Regulations of the EWR, such as Regulation 4(2) quoted previously, use the phrase 'so far as is reasonably practicable'. Where this qualifying term is absent, for example in Regulation 16 concerning competence, the regulation is said to be absolute. The meaning of 'reasonably practicable' has been well established in law. The interpretations below are given as a guide both to administrators and to persons inspecting and testing.

■ Absolute

If the requirement is 'absolute' the requirement must be met regardless of cost or any other consideration.

■ Reasonably practicable

Someone who is required to do something 'so far as is reasonably practicable' must assess, on the one hand, the magnitude of the risks of a particular work activity and, on the other hand, the costs in terms of the physical difficulty, time, trouble and expense that would be involved in taking steps to eliminate or minimise those risks. If, for example, the risks to the health and safety of a particular person are very low, and the cost or technical difficulties of taking certain steps to prevent those risks are very high, it may not be reasonably practicable to take those steps. The greater the degree of risk, the less weight that can be given to the cost of the measures needed to prevent that risk.

In the context of the EWR, where the risk is very often that of death, for example by electrocution, and where the nature of the precautions which can be taken are so often very simple and cheap, for example by locking off a main switch or circuit-breaker, the level of duty to prevent that danger approaches that of an absolute duty. ■



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Published by **IET Publishing & Information Services** Michael Faraday House, Six Hills Way, Stevenage, Herts, SG1 2AY, United Kingdom
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IEE Wiring Matters is a quarterly publication from the Institution of Engineering & Technology (IET). The IET is not as a body responsible for the opinions expressed.

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Co-operating Organisations The Institution of Engineering & Technology acknowledges the contribution made by the following organisations in the preparation of this publication: British Electrotechnical & Allied Manufacturers Association Ltd – R Lewington, P D Galbraith, M H Mullins | Office of the Deputy Prime Minister – I Drummond | Electrical Contractors Association – D Locke, S Burchell | City & Guilds of London Institute – H R Lovegrove | Energy Networks Association – D J Start | Electrical Contractors Association of Scotland SELECT – D Millar, N McGuinness | Health & Safety Executive – K Morton | Electrical Safety Council | ERA Technology Limited – M Coates | British Cables Association – C Reed | Scottish Building Standards Agency | DTI – D Tee | CORGI – P Collins | GAMBICA – K Morris.

ISSN 1749-978-X

IEE Electrical Maintenance

2nd Edition

REVISED
AND UPDATED



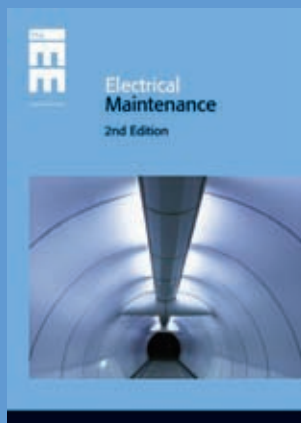
The IEE's Electrical Maintenance guide has been thoroughly revised and updated.

The new edition – which has been written by IEE Engineers - has been brought up to date to reflect changes in the law and explain new concepts and working practices.

Under the Electricity at Work Regulations 1989 there is a requirement that all systems are maintained so as to prevent danger. **This guide will ensure you follow best practice** and are aware of the legal requirements.

Contents

- The Need for Maintenance
- Risk Assessment
- Electrical Installations
- Testing
- Lighting Maintenance
- In-Service Inspection and Testing
- Emergency Lighting
- Fire Detection and Alarm Systems
- Industrial and Commercial
- Switchgear
- Electromagnetic Compatibility
- Lightning Protection Systems
- Environmental Protection
- Legionellosis
- Index



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Publication available from August 2006

A4 paperback £38

ISBN 0 86341 563 6

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