Electrical Fires

Fixed Electrical Installations

Understanding the Risk

Fixed electrical installations are present in all types of occupancies, e.g., offices, shops, factories, warehouses, schools, etc.

A typical fixed electrical installation will comprise the main electrical switchgear, electricity transformers, electrical distribution boards, electrical control panels and all the associated fixed electric wiring, including lighting circuits.

As well as causing serious personal injury, sometimes fatal, faults involving fixed electrical installations often result in either fires and / or costly production downtime so it is essential that they are adequately designed, constructed, inspected and tested e.g. in accordance with BS7671: 2008 + A3: 2015 Requirements for Electrical Installations (IEE Wiring Regulations; 17th edition) the national standard for all electrical installation work undertaken in the UK.

In addition to the inspection and testing on completion of newly installed or altered fixed electrical installations, to verify their compliance with BS7671: 2008 + A3: 2015, it is also necessary for periodic inspections and tests to be carried out on existing fixed electrical installations. This is to identify any deterioration which could either impair safety or increase the risk of a fire.

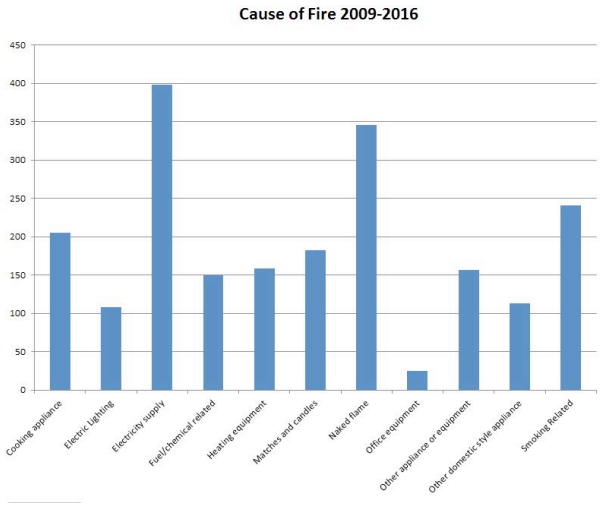
Deterioration can occur as result of a number of factors;

- Electrical overloading
- Ageing
- Damage
- Wear and tear
- Corrosion
- Environmental causes

The adequate maintenance of fixed electrical installations is also a legal requirement, as per the Electricity at Work Regulations 1989, which state that “as may be necessary to prevent danger, all systems shall be maintained so as to prevent, so far as is reasonably practicable, such danger.” Electrical installations, which comply with BS7671: 2008 + A3: 2015 are likely to achieve conformity with statutory regulations such as the Electricity at Work Regulations 1989, although this cannot be guaranteed.

Related Loss Statistics

According to the document Fire Statistics UK 2005 published by the Department for Communities & Local Government: the fire & rescue services attended 162,000 accidental fires in England during the period 2015-2016. Of these fires the main cause, approx 25% was faulty electrical appliances and leads as highlighted in the chart on the next page.



During this same period according to statistics collated by the Fire Protection Association (FPA), there were a total of 398 reported fire losses that were electrical in origin. The reported losses resulting from these fires totalled over £126m, equating to an average loss per incident of over £317,000.

Controlling the hazard

In order to prevent or mitigate the fire, business interruption or personal injury risks associated with fixed electrical installations it is necessary for:–

- Newly installed or altered fixed electrical installations should be designed, constructed, inspected and tested in accordance with BS7671: 2008 + A3: 2015 Requirements for Electrical Installations (IEE Wiring Regulations; 17th edition) including all subsequent amendments.
- This work should be undertaken by a competent person(s) e.g. an approved electrical contractor, who should issue an Electrical Installation Certificate on completion, as prescribed in BS7671.
- An adequate system of electrical maintenance to be operated in respect of existing fixed electrical installations, to involve a combination of periodic inspection and testing, supplemented by routine checks in the intervening years, allowed between the formal inspections.

The Electricity at Work Regulations themselves do not make any specific requirements, in connection with the frequency of periodic inspections and tests as this needs to be determined taking into account:–

- The type of fixed electrical installation involved
- The nature of its use and operation
- The frequency and quality of the existing electrical maintenance
- Any external influences to which the installation is subjected to

Guidance on the recommended frequency of the inspection and testing of fixed electrical installations is contained in BS7671.

Some of the key inspection frequencies indicated are as follows:

- Offices – 5 years
- Shops – 5 years
- Industrial – 3 years
- Commercial – change of occupancy / 5 years
- Educational – 5 years

Initial in BS7671 refers to the time interval between the issuing of the Electrical Installation Certificate, on completion of the work and the first inspection and tests.

Thereafter the frequency of subsequent inspections and tests may be increased or decreased at the discretion of the competent person(s) carrying out the inspection and testing subject to risk assessment.

Inspection and testing should be undertaken by a competent person(s) e.g. an approved electrical contractor, who should issue a Periodic Inspection Report on completion, as prescribed in BS7671.

For fixed electrical installations, which are the subject of effective supervision in normal use, periodic inspection and testing may be replaced by an adequate regime of continuous monitoring and maintenance of the installation and all its constituents by skilled persons.

If an installation is maintained under a planned maintenance management system, incorporating and supervised by a suitably qualified electrical engineer with the results being recorded and kept over a period of time then a formal inspection and test certificate may not be required.

Irrespective of how the inspections and tests are carried out it is essential that adequate records are kept, including test results to be able to prove the adequacy of the maintenance system being operated and to enable its effectiveness to be monitored.

Routine checks to be carried out in the intervening years between formal inspections should aim to identify potential causes of electrical failure e.g.

- Breakages
- Wear / deterioration
- Overheating
- Missing parts
- Restricted access to switchgear etc
- Inadequate securing of electrical enclosures
- Loose fittings

These checks need not be carried out by a qualified electrician, but the person concerned should have received adequate training to enable them to safely recognise potential defects in the fixed electrical installation

The frequency of routine checks should be based on a risk assessment taking into account the nature of the premises and the type of fixed electrical installation

BS7671 provides guidance on the recommended frequency of routine checks, e.g.

- Offices – 1 year
- Shops – 1 year
- Industrial – 1 year
- Commercial – 1 year
- Educational – 4 months

Thermography and Ultrasonic Testing

In addition to the periodic inspection and testing detailed in BS7671 the maintenance of fixed electrical installations can also be significantly enhanced by either thermographic surveys and / or ultrasonic testing.

Thermographic surveys identify electrical system hotspots associated with loose or dirty connections, defective insulation or improper torque etc.

Ultrasonic testing complements thermographic surveys, particularly where the doors and covers to parts of a live fixed electrical installation cannot be removed, to enable the required thermal imaging to take place.

Solution Supplier

TEGG Corporation specialises in providing predictive testing and preventative maintenance solutions to the required standard on electrical distributions systems in business and industrial facilities. TEGG manages an international network of over 145 independent professional electrical service contractors specially trained in providing TEGG Service. To learn more about TEGG go to www.tegg-service.co.uk

For further information on fixed electrical testing contact your local AIG risk engineer.

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