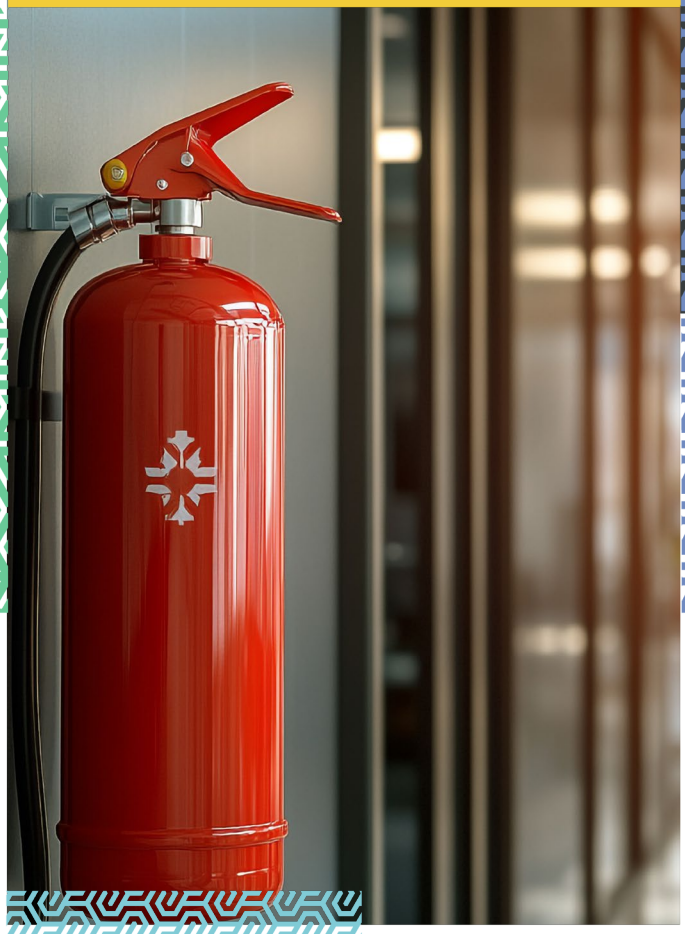
Risk control

Fire Protection Measures



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Fire Protection Measures

Introduction

According to annual statistics gathered by the Home Office[1] for the period up to March 2024 fire incidents in non-domestic premises across England totaled more than 13,000 cases, and of these approximately 69% were determined to have accidental causes while the remaining 31% were caused deliberately.

These incidents resulted in 18 fatalities, 857 other casualties, untold levels of damage to property and disruption to business as usual.

Because many fire safety controls are so visible within workplaces, many of us may perceive fire safety to be a risk that is taken very seriously by most organisations who invest significantly in a range of strategies to keep us safe.

We know that there are building regulations that must consider the structural features of new or adapted buildings and design in appropriate fire safety measures. We also know fire safety legislation requires those in control of non-domestic premises to have a suitable and sufficient fire risk assessment carried out and implement effective arrangements for fire prevention and protection.

However, the earlier statistics seem to indicate that not all of the precautionary mechanisms employed within our buildings for fire safety are working effectively.

So, it is important to recognise that while we may have an array of fire protection measures and systems established within our premises, we need to make sure they remain in good order and work as intended when required. This means monitoring and maintaining procedural systems and physical features such as fire doors, fire extinguishers, detection and alarm systems, etc. to ensure they are correctly designed, installed and effectively managed.

Fire Detection and Alarm Systems

The majority of commercial and industrial premises will require the installation of a fire alarm, but these may range from a basic manually operated system of call points, through to an extensive fire detection and alarm system that satisfies life safety and property protection objectives which may incorporate remote signaling to an alarm receiving centre.

Irrespective of the type of system, the following general considerations should apply:

- The fire detection and alarm system should be designed, installed, commissioned, and maintained in accordance with BS 5839-1: Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning, and maintenance of systems in non-domestic premises[2].
- The system should be designed to the relevant protection Category – Category M (Manual systems), Category L (Life Safety), Category P (Property Protection) and the appropriate sub-categories.
- The system should be designed, installed, commissioned, and maintained by a competent company which is approved by a suitable third-party certification scheme, of which the Loss Prevention Certification Board (LPCB) LPS 1014[3] and the British Approvals for Fire Equipment (BAFE) SP 203-1[4] schemes are examples.
- The fire alarm system should be serviced periodically in accordance with the recommendations of BS 5839-1: 2025 by an approved company operating under the same certification schemes listed above.
- Where required, the system should incorporate dual-path remote signaling by utilising a product, tested and certificated to Loss Prevention Council (now part of British Research Establishment (BRE)) standard LPS1277 Issue 3 as conforming to ATS5, configured as such, and installed in accordance with Annex C of that standard, connected to a National Security Inspectorate (NSI) or Security Systems and Alarm Inspection Board (SSAIB) certificated alarm receiving centre. Please Note: In considering the potential protection benefits of a remotely monitored fire detection and alarm system, it is important that the response policy of the local Fire and Rescue Service to automatic fire alarms is understood as they can vary significantly.
- Where the installation of a fire detection and alarm system is a requirement of insurers, it is important that a pre-contract design specification is submitted to them for approval.

More detailed guidance concerning the sourcing of fire safety products and services along with the ongoing management of fire detection and alarm systems can be found in the RISCAuthority publications RC66: Recommendations for sourcing fire safety products and services[5], and RC47 Recommendations for the management of fire detection and alarm systems in the workplace[6].

Fire Exit Routes and Lighting

Under UK fire safety legislation, the responsible person(s) in control of non-domestic premises have a duty of care to ensure that routes to emergency exits from premises and the exits themselves, are always kept clear and that these evacuation routes must lead as directly as possible to a place of safety.

The emergency routes and fire exits must be well lit and indicated by appropriate signage. In locations that require illumination (including external routes where there is insufficient lighting such as borrowed lighting from neighbouring street lighting), emergency lighting of adequate intensity must be provided.

Vitally important is the need to ensure that all fire exit doors and associated hardware are the subject of routine inspection and maintenance at appropriate intervals to guard against malfunction. All monitoring and repairs should be formally recorded as part of the fire safety management programme.

Where an emergency escape lighting system is installed, this should be tested at monthly and annual intervals as prescribed in BS EN 50172:2004/BS 5266-8:2004: Emergency escape lighting systems, and these should be recorded. In addition, it is recommended that the entire system be inspected and maintained annually by a competent engineer.

Fire Doors

Fire doors are to be found in almost every non-residential building in the UK. Fire doors are installed to facilitate fire compartmentation within buildings to assist in holding back the spread of flame and smoke from room to room, while creating a protected escape route for occupants past fire-affected rooms or in some cases as access for emergency services.

After ensuring correct installation, it is then essential that fire doors are subject to regular inspection and maintenance by competent persons following the recommendations of the Fire Door Inspection Scheme[7] operated jointly between BWF-CERTIFIRE and the Guild of Architectural Ironmongers.

Inspection of timber fire doors should be conducted at least once every six months as recommended in BS 8214, or more frequently, where determined by a risk assessment.

Detailed information on all aspects of fire doors published by the BWF Fire Door Alliance is available at: https://firedoors.bwf.org.uk/

Fire Stopping

Fire stopping is the application of inert / fire resisting materials into openings created through compartment walls, ceilings, and roof spaces to ensure the integrity of the fire resisting structure is maintained in accordance with building regulations.

It is often required after structural alterations have occurred involving the passage of services (electrical cables, pipework and ducting etc.) from area to area compromising the structural ability to withhold fire and smoke spread.

Gaps at the interface between compartment walls and floors and external cladding systems require sealing with cavity barriers. Cavity barriers, screens or curtains restricting the spread of fire will often be installed within floor, ceiling and roof voids.

To avoid fire and smoke spreading through the ductwork of ventilation systems and potentially bypassing the compartment walls and floors these systems should be designed with integral automatic fire dampers that shut off sections of the ducting. These can be activated by independent fusible links or motorised valves linked to the fire detection and alarm system and with periodic testing for correct operation.

In addition to ensuring that fire stopping products are correctly specified and installed during building construction, it is vitally important that they are maintained in-situ during the life of the building as part of planned inspection, and maintenance, where necessary employing specialist inspectors.

Fire Extinguishing Appliances

A complement of fire extinguishers should be installed to the following requirements:

— Fire extinguishing appliances should be installed throughout the premises in accordance with the requirements of BS 5306-8: 2012 – Fire extinguishing installations and equipment on premises – Code of practice for the selection and installation of portable fire extinguishers.

— All extinguishers to be certified as BS EN 3-7 compliant such as those certified by the LPCB or BAFE and installed by a specialist such as an LPCB approved contractor or BAFE registered company.

— All fire extinguishing appliances should be wall-mounted or positioned on stands by exits and fire alarm call points, or near to the specific hazard for which they are provided.

— Fire extinguishing appliances should be maintained under an annual service contract by a specialist such as a LPCB BS5306-3 approved contractor or a BAFE registered company.

— In accordance with BS 5306-3: 2009 Fire extinguishing installations and equipment on premises - Commissioning and maintenance of portable fire extinguishers - Code of practice, the responsible person should conduct visual inspections of all extinguishers regularly.

— These visual inspections should be conducted at least monthly or more frequently when circumstances require.

When conducting these visual inspections, it should be ensured that:

— Each extinguisher is correctly located in the designated place.

— Each extinguisher is unobstructed and visible.

— The operating instructions of each extinguisher are clean and legible and face outwards.

— Each extinguisher has not been operated and is not obviously damaged or has any missing parts.

— The reading of any pressure gauge or indicator fitted to an extinguisher is within operational safety limits.

— The seals and tamper indicators of each extinguisher are not broken or missing.

— The responsible person should record the results of these visual inspections and arrange for corrective action, where necessary, by a competent person. In the event of doubt, the responsible person should arrange for a competent person to examine the extinguishers.

In addition to ensuring the provision and maintenance of extinguishers, employees should be instructed and trained in their use as appropriate.

Local Application Fire Suppression Systems

Local application automatic fire suppression systems have a vital role to play in the protection of assets and business activity and should be installed as an outcome of a risk assessment.

A wide range of systems are available, most employing inert gas or synthetic/chemical extinguishing agents with automatic activation and discharge, commonly by linear heat and flame detection methods. Systems are typically low pressure in operation and will normally be employed for the protection of hazardous plant and machinery, and / or equipment that is business critical.

Common protection applications include:

— Electrical control cabinets and server racks.

— Industrial ovens and dryers.

— Cooking ranges.

— Fume cabinets and laboratory equipment.

Where appropriate, systems should be designed, installed, commissioned, and maintained in accordance with recognised UK or other international standards or codes, and should be installed and maintained by a company which has applicable third-party accreditation.

In addition to ensuring that the installation is inspected and maintained in accordance with the manufacturer's design, installation and maintenance manual by the system installer or an approved contractor, end user checks should be carried out weekly by a trained member of staff, making sure that the system is undamaged and operational. Remote system monitoring may also be incorporated.

Fire Sprinkler Systems

Sprinklers are by far the most widely used and most reliable automatic means of fire protection and have been successfully deployed in the UK since the late 19th century for the protection of property and business operations. They also have a major bearing on life safety.

In basic terms, a sprinkler system consists of a pipework distribution system charged with water, with a network of sprinklers heads, supplied by mains water or a tank / reservoir. Each sprinkler head operates independently, typically at a temperature of 68°C. In the event of a fire, the rising hot gases cause the sprinkler head(s), in the immediate vicinity, to open. As water flows from the head, it strikes a deflector plate creating a water spray on the fire below and the ceiling or roof above.

It is a common misnomer often perpetuated by the movie industry that in the event of a fire all sprinkler heads in a system operate simultaneously, resulting in widespread water damage. However, this is not the case as the water flowing from the operating head(s) cools the area preventing the remaining sprinkler heads in the system from activating.

According to the British Automatic Fire Sprinkler Association (BAFSA)[8], of all fires which occur in buildings protected by a correctly designed, installed and maintained sprinkler system, 99% are controlled or extinguished by sprinkler operation, with the majority involving fewer than 4 sprinkler heads.

Common types of sprinkler systems are:

— **Wet system**: The most common system, in which the entire system is fully charged with water permanently to its design pressure, allowing water to be discharged immediately on activation of a sprinkler head.

— **Dry system**: These systems are permanently charged with air under pressure, and the resulting pressure drop on activation of a sprinkler head activates a water control valve. This should generally only be used where a wet or alternate wet and dry system cannot be used.

— **Alternate wet and dry system**: The system is full of water during warm months and drained and charged with air under pressure in winter months where there may be a risk of freezing. When the system is charged with air it operates as described for dry systems above.

— **Pre-action system**: This system incorporates an electronic form of detection to pre-arm the system with water. The system is filled with air under pressure, and the activation of a sensor or detector lets water into the system. Water is then released into the space on activation of the sprinkler head. These are used in applications where it is not acceptable to have the pipework full of water continuously.

To ensure effective and reliable protection, the following should apply:

- All areas of the building(s) should be protected by the sprinkler system (with some 'permitted exceptions').
- The system should be designed, installed, commissioned, and maintained in accordance with the LPC (Loss Prevention Council) Rules for Sprinkler Installations incorporating BS EN 12845, and by contractors whose competence is third-party certified to the appropriate approval level of the Loss Prevention Standard LPS 1048-1 Approved Sprinkler Contractors Scheme.
- All equipment used in the system should be listed as approved by the LPCB.
- Weekly testing of the system should be conducted and formally recorded.
- Key members of staff should be trained in the operation and testing of the system, and the actions to be taken on sprinkler activation.
- System activation should be continuously monitored by an approved alarm receiving centre.

For further information and guidance, reference should be made to the BAFSA Library of Technical Information, available at: www.bafsa.org.uk.

Sprinkler System Impairments

Sprinkler systems (and other fire protection systems) are considered to be impaired any time that the system(s) are out of service, either partially or wholly. Such impairments are inevitable and fall into three categories:

- **Planned Impairments**: These occur during scheduled maintenance or should modifications to the system be needed.
- **Unplanned Impairments**: Unplanned impairments arise when the sprinkler system is out of service due to damage or malfunction.
- **Concealed Impairments**: These are potentially the most dangerous and occur, for example, when unknown to the personnel concerned, the system is left out of service following work on the system, or when control valves are deliberately or inadvertently isolated.

It is of vital importance that a written sprinkler impairment system is established, which should include, but is not limited to ensuring that:

- A suitable and sufficient risk assessment of the work proposed, and its impact is undertaken prior to a planned impairment.
- The appropriate authorities (Fire and Rescue Service, insurance provider, etc.) are given prior notice that the system will be inoperative.
- Prior to the isolation, draining or decommissioning of any part of the system, a thorough examination of all areas of the premises is to be made to confirm that there are no signs of fire.
- The extent and duration of sprinkler impairments to be kept to a minimum.
- Where impairment would deny protection to hazardous processes, consideration should be given to suspending such activity or deferring impairment to idle hours.
- All hot work to be strictly prohibited. Where absolutely unavoidable, it is essential that an effective hot work permit system is rigorously enforced.
- A sufficient number of appropriate fire extinguishers are placed in readiness, along with enough trained staff to provide constant cover.
- All personnel are instructed to remain extremely vigilant as regards fire safety throughout the period of impairment and all established fire precautions are observed.
- On completion of work, verify by inspection and testing that the system has been returned to full operational status.

To reduce the risk of concealed impairments occurring, the following measures should be taken:

- All sprinkler control valves to be secured in the correct position by the use of substantial padlocked chains or straps.
- Improved protection provided to main control valves by the use of continually monitored anti-tamper alarms.
- Visual inspection of all control valves undertaken at least weekly.
- Weekly drain tests and, where appropriate, pump tests to be conducted ensuring that the system remains fully operational.

Fire Safety Training

The actions of staff if a fire breaks out are likely to be crucial to their safety and that of other people on the premises.

In accordance with Health and Safety and Fire Safety legislation, all employees are required to be provided with adequate fire safety training as part of the normal training and induction process. Of particular importance is the need to ensure that all staff and contractors are informed of the emergency plan and are shown the escape routes.

The type and extent of training should be based on the particular features of the premises and should:

- Take account of the findings of the fire risk assessment.
- Clearly convey the emergency procedures so they are understood by both staff and other people who may be present.

— Consider the work activities and explain the duties and responsibilities of staff.

  In simple premises this may be no more than showing new staff the location of fire exits and assembly points along with giving basic training on what to do if there is a fire. In complex premises with a high staff turnover and many shift patterns, the organisation of fire safety training will need to be more comprehensive.

  Generally, fire safety training should include the following measures:

— Action on discovering a fire.

— How to raise the alarm.

— Action upon hearing the fire alarm.

— The procedures for alerting contractors and visitors including, where appropriate, directing them to exits.

— The arrangements for calling the fire and rescue service.

— The evacuation procedures for everyone in the premises to reach an assembly point at a place of total safety.

— The location and, when appropriate, the use of firefighting equipment.

— The location of escape routes, especially those not in regular use.

— How to open all emergency exit doors.

— The importance of keeping fire doors closed to prevent the spread of fire, heat and smoke.

— Where appropriate, how to stop machines and processes and isolate power supplies in the event of a fire.

— The reason for not using lifts (except those specifically installed or nominated, following a suitable fire risk assessment, for the evacuation of disabled persons).

— The location of fire refuges and procedures for the safe use of evacuation equipment for persons with mobility issues etc.

— Arrangements for the safe use and storage of highly flammable and explosive substances.

— The importance of general fire safety, which includes good housekeeping.

  All the staff identified in the emergency plan that have a supervisory role in the event of a fire (e.g., chief fire coordinator, fire marshals or wardens etc.), should be given details of the fire risk assessment, evacuation plans and receive additional training as required, with regular refresher training.

  All training should be formally recorded in writing and repeated as often as is necessary. It is important to recognise that alterations to the emergency plan, working practices and processes, or to preventative or protective measures are likely to influence training programmes.

  This includes any learning in light of evaluating the effectiveness of fire drills in terms of both hardware, procedural, and behavioural performance.

  It is generally recognised that refresher fire safety training should be provided for all employees at least annually, but this may be satisfied by a combination of participation in evacuation drills and E learning.

Conclusions

In a short guidance document such as this we cannot explore in detail all aspects of fire protection measures that require ongoing attention, or ever expect to give advice on every possible control measure that could be taken, but hopefully this article has provided some insight and further direction that will assist organisations in effectively evaluating and managing fire safe arrangements.

References

1. Home Office, available at: https://www.gov.uk/government/statistical-data-sets/fire-statistics-data-tables
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3. Loss Prevention Certification Board (LPCB), available at: www.redbooklive.com
4. British Approvals for Fire Equipment (BAFE), available at: www.bafe.org.uk.
5. Fire Protection Association RISCAuthority, available at: https://www.riscauthority.co.uk/public-resources/documents/resource/rc66-recommendations-for-sourcing-fire-safety-products-and-services-407
6. Fire Protection Association RISCAuthority, available at: RC47 - Recommendations for the management of fire detection and alarm systems in the workplace.
7. Fire Door Inspection Scheme, available at: www.fdis.co.uk
8. British Automatic Fire Sprinkler Association, available at: https://www.bafsa.org.uk/

Further information

For access to further RMP Resources you may find helpful in reducing your organisation's cost of risk, please access the RMP Resources or RMP Articles pages on our website. To join the debate follow us on our LinkedIn page.

Get in touch

For more information, please contact your broker, RMP risk control consultant or account director.

contact@rmpartners.co.uk

Risk Management Partners

The Walbrook Building
25 Walbrook
London EC4N 8AW

020 7204 1800
rmpartners.co.uk

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