

Electrical Lighting - Property

Lights and light fittings can present a significant ignition hazard.

This Loss Prevention Standard provides guidance to help reduce the potential for loss or damage associated with lighting.

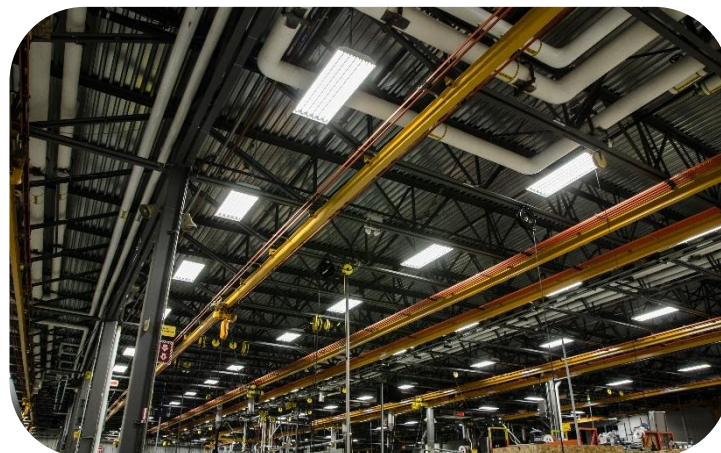
Electrical Lighting – Property

Introduction

Lighting is used in most business premises and serves various functions ranging from general fittings to illuminate corridors, yards and building entrances, to specific lighting types used for manufacturing and production processes, warehouse areas and other industrial applications.

Lighting and light fittings can present significant fire hazards, whether due to the type of fittings used, the environment they are used in or their condition and maintenance, and they require careful management to reduce the potential for fire and other material damage losses. This Loss Prevention Standard discusses these hazards and provides general guidance to help reduce the potential for loss or damage.

Note: This document relates to lighting and is focussed on property loss prevention and related risk management guidance. It is not intended to address liability exposures. The presumption is that all regulatory requirements, such as fire risk assessments and compliance with local building regulations, codes, or standards, have or will be met.



Understanding the Risks

Lighting and lighting systems present a number of risks if not properly managed, including but not limited to:

- **Overheating.** Poor ventilation, incompatible bulbs, damage, etc., can cause light fittings to overheat, potentially shattering and igniting nearby combustible materials, or in the case of High Intensity Discharge lighting, exploding.
- **Electrical Faults.** Damaged wiring, starter switches, loose connections, etc., can lead to short circuits, arcing, or electrical fires.
- **Proximity to Combustible Items.** Lighting in close proximity to combustible items, e.g., packaging, plastics, pallets, etc., can cause ignition from radiant heat.
- **Hazardous Environments.** Non-rated fittings used in flammable or explosive atmospheres (e.g., chemical storage) can trigger ignition.
- **Dust and Debris.** Build-up around fittings, especially in industrial or storage areas, can ignite when exposed to heat from lighting.
- **Incorrect Installation.** Poorly or improperly installed lighting systems may overload circuits, increasing the risks of fire.
- **Maintenance.** Inadequate maintenance can result in faults, wear, etc., developing.

Common Lighting Types

High Intensity Discharge (HID) Lighting - Metal Halide Lights. HID lamps are a type of electrical gas-discharge lamp which produce light by means of an electric arc between tungsten electrodes housed inside a translucent or transparent fused quartz, or fused alumina arc tube.

This tube is filled with noble gas and often also contains suitable metal or metal salts (mercury vapour, high pressure sodium metal halide).

The noble gas enables the arc's initial strike, and once the arc is started, it heats and evaporates the metallic admixture. Its presence in the arc plasma greatly increases the intensity of visible light produced by the arc for a given power input, as the metals have many emission spectral lines in the visible part of the spectrum. HID lamps are a type of arc lamp.

High Intensity Discharge (HID) lighting is widely used in commercial and industrial facilities to provide an efficient, low-cost light source. They operate at a high internal pressure and temperature (up to 6 bar pressure and 1,300°C), and as such, catastrophic failure is possible. HID lamps can explode on failure, scattering hot glass and debris over a wide area, which apart from safety issues, has the potential to cause a fire if they fall on combustible materials below. In addition, the capacitor on the upper part of the device stores electric charge. There have also been instances of fires caused by these when they are damaged, not maintained or housed too close to combustible materials.

In respect of Metal Halide lights, different types of lamps are manufactured for use within different types of light fittings as follows:

- **O-Type:** Shrouded tube or double containment feature designed for use in open fixtures.
- **E-Type:** For use within light fittings that are designed with integral containment barriers.
- **S-Type:** Non-shrouded lamp for use within enclosed or unenclosed fittings.

In addition to Metal Halide lamps, the other two main types of HID lamps are:

- Mercury Vapour (MH).
- High-Pressure Sodium (HPS).

Fluorescent Tube Lighting. A fluorescent lamp, or fluorescent tube, is a low-pressure mercury-vapour gas-discharge lamp that uses fluorescence to produce visible light. An electric current in the gas excites mercury vapour, which produces short-wave ultraviolet light that then causes a phosphor coating on the inside of the lamp to glow. Fluorescent lamps convert electrical energy into useful light much more efficiently than incandescent lamps. The typical luminous efficacy of fluorescent lighting systems is 50–100 lumens per watt, several times the efficacy of incandescent bulbs with comparable light output.

The main fire exposure from these lights is the continual striking where non-safety starter motors are used, and the heat generated from the ballasts.

Halogen Lighting. A halogen lamp, also known as a tungsten halogen, quartz-halogen or quartz iodine lamp, is an incandescent lamp consisting of a tungsten filament sealed into a compact transparent envelope, that is filled with a mixture of an inert gas and a small amount of a halogen such as iodine or bromine.

The combination of the halogen gas and the tungsten filament produces a halogen cycle chemical reaction that redeposits evaporated tungsten to the filament, increasing its life and maintaining the clarity of the envelope. Because of this, a halogen lamp can be operated at a higher temperature than a standard gas-filled lamp of similar power and operating life, producing light of a higher luminous efficacy and colour temperature. The small size of halogen lamps permits their use in compact optical systems for projectors and illumination.

Light Emitting Diodes. Light Emitting Diodes, commonly called LEDs, refer to a type of diode that provides light when electricity passes through it. LED lamps have a lifespan and electrical efficiency that are several times greater than incandescent lamps and are significantly more efficient than most fluorescent lamps. LEDs use only about 10% of the energy that an incandescent lamp requires.

Similar to incandescent lamps and unlike most fluorescent lamps (e.g., tubes and compact fluorescent lamps or CFLs), LEDs come to full brightness without the need for a warm-up time. The initial cost of LEDs is usually higher. Degradation of LED dye and packaging materials reduces light output to some extent over time.

Some LED lamps are made to be a directly compatible drop-in replacement for incandescent or fluorescent lamps. An LED lamp packaging may show the lumen output, power consumption in watts, colour temperature in kelvins or description (e.g., "warm white", "cool white" or "daylight"), operating temperature range, and sometimes the equivalent wattage of an incandescent lamp of similar luminous output.

Managing the Risks

General Precautions

- **Risk Assessment.** Relevant risk assessments should be completed prior to any installation and maintenance work on lighting systems. This should include the risks of physical damage, such as fire, impact, escape of water, malicious damage, etc., and those posed by the environment in which they are located, e.g., flammable or harsh atmospheres. Any control measures generated should be actioned appropriately.

Refer to the Aviva Loss Prevention Standards **Material Damage Risk Assessment** for further guidance.

- **Managing Change.** Any significant changes to the lighting installation should be managed through a formal Management of Change process. This helps ensure all stages of the change are progressed with minimal exposure to the existing arrangements.

Refer to the Aviva Loss Prevention Standards **Managing Change – Property** for further guidance.

- **Electrical Installation.** Ensure that the lighting circuits comply with local/national regulations, standards or codes, such as **BS 7671: (Institution of Engineering and Technology (IET) Wiring Regulations)** in the United Kingdom.

All electrical installation, maintenance and upgrading works should be completed by a competent, qualified and accredited electrical contractor.

Further information and guidance is provided within the Aviva Loss Prevention Standard **Electrical Installations – Inspection and Maintenance**.

- **Storage of Combustible goods.** Ensuring appropriate storage arrangements in proximity to lighting can help significantly reduce ignition risks.
 - ✓ Always locate lights over safe areas, such as unobstructed flooring and never above storage or combustible items.
 - ✓ Never permit storage, temporary or otherwise, in aisle ways – these should be kept clear.
 - ✓ Always maintain at least 1.5m horizontal distance between combustible materials and light fittings.
- **Timers.** Install automatic timers for lighting in normally unoccupied areas, such as storerooms.

- **Recessed Lighting.** Ensure any lighting installed within ceilings is not in proximity to any combustible materials or construction elements. Install non-combustible and non-conducting protective covers or back plates to any such lighting.
- **Construction Materials.** Ensure light fittings are mounted directly on to non-combustible surfaces.
- **Ventilation.** Ensure there is appropriate ventilation to prevent light fittings overheating.
- **Temporary Lighting.** Ensure any temporary lighting, such as used for seasonal decoration, or for use in otherwise unlit areas/construction works, etc., are sourced from reputable suppliers and are subject to regular inspection for signs of damage or faults. Ensure any regulatory requirements for inspection and testing are completed, such as portable appliance testing under the **Electricity at Work Regulations** in the United Kingdom.
- **Accidental or Impact Damage.** Install protective guards or relocate any lighting that is vulnerable to accidental or impact related damage.
- **Self-inspection.** Undertake simple regular visual checks to ensure the installations are in good condition and check for:
 - ✓ Accumulations of dust or debris.
 - ✓ Damage to ballasts, cables, housings, bulbs, etc.
 - ✓ Lights continually striking or flickering.
 - ✓ Utilise thermographic camera technology to support other loss prevention measures. These cameras can prove invaluable in understanding the fire exposure from light fittings.

Refer to Aviva Loss Prevention Standard **Use of Thermographic Cameras - General Considerations** for further guidance.

Note: The guidance above should be adapted as necessary and extended to self-contained luminaires used for fire safety purposes.

HID Lighting - Specific Precautions

- Lamps should be used in accordance with the operating and installation instructions supplied by the Original Equipment Manufacturer (OEM).
- The lamp type and rating should be appropriate for the fitting and meet the manufacturer's specifications.
- The use of light fittings with integral containment barriers for the appropriate lamp type (i.e., borosilicate glass or tempered soda lime glass) fitted below, that do not leave any gaps between the glass and the fixture should always be fitted.
 - ✓ Normal glass is unsuitable as it may shatter.
 - ✓ Aluminium or plastic barriers can melt.
 - ✓ Do not modify existing fittings or retrofit non-approved containment barriers without the manufacturer's input and approval. Lamp rupture can be caused by incorrect heat dissipation.
 - ✓ The lamp containment barrier will prevent fragments of hot glass or quartz from falling and igniting combustibles under them. Follow the lamp manufacturer's instructions for installation of the lamp to ensure proper application of the lamp, fixture, and associated auxiliary devices.
- Where containment barriers are not possible, consideration can be given to the use of lamps that either have the arc tube protected by a glass shroud (O-Type) or are shatter resistant.
- Protect the lamp from contact with liquid, moisture, dust, dirt, oils, etc.
- Avoid water contact with the lamps as this can result in rupture due to thermal shock

- Never touch the lamp with bare hands.
- Inspect the lamp before installing, and do not use any lamp that has been damaged or scratched. Physical damage may cause the lamp to fail unexpectedly.
- Lamps must be kept well away from combustible elements of construction.
- Due to the heat generated and the presence of stored charge in the associated capacitor unit, storage of any materials should not be permitted within 1.5m horizontally of the entire fitting, regardless of the nature of the fixture/fitting.
- Ensure individuals using equipment such as forklift or reach trucks are provided with training to avoid any contact with lighting equipment.
- Lamps should only be housed over safe floor areas.
 - ✓ Combustible stock should not be located below (even temporarily) - in the event of an uncontained failure this minimises the risk of hot particles falling onto combustible items. Even if shielded, storage should ideally not be permitted below.
- Lamps should be inspected on a regular basis and any that are dim, flickering or not producing light should be replaced immediately.
- Replacement of bulbs and other work should only be undertaken by properly qualified electricians and only when the lamps are cold and the power locked off.
- As failure rate increases with age, it is recommended that lamps are changed at 70% of their rated life.
 - ✓ To accomplish this in a cost-effective manner, consider maintaining records of lamp operating hours and implementing group re-lamping.
- ✓ To help prevent catastrophic failure lamps should not be operated continuously. They should be switched off for at least 20 minutes per week. This can also be used to check for lamps that are liable to imminently fail and replace.

Fluorescent Lighting - Specific Precautions

- Ensure protective light covers are always in place.
 - ✓ These help protect against hot glass shards igniting combustible materials should tubes shatter.
- Ensure flickering tubes are removed/replaced immediately.
 - ✓ Fluorescent lights that turn off and then on again intermittently may be suffering from a ballast failure and should be taken out of service.
- Always remove failed tubes.
 - ✓ The electrodes, located at each end of the tube, continue to receive power and can produce significant heat levels, potentially igniting.
- Utilise non-striking safety starter motors (where employed) to prevent continual striking (light flickering).
- Older light fittings (pre 1979 manufacture) should be decommissioned and replaced due to reported overheating issues and ballast failure.

Additional information and guidance on lighting can be obtained in the RISCAuthority document "[RC37- Recommendations for the control of fire hazards arising from electrical lighting](#)".

Checklist

A generic **Electrical Lighting** Checklist is presented in Appendix 1 which can be tailored to your own organisation.

Specialist Partner Solutions

Aviva Risk Management Solutions can offer access to a wide range of risk management products and services at preferential rates via our network of Specialist Partners.

- Thermal Imaging Cameras and PAT Testing Equipment - [Pass](#)
- Specialist electrical inspections - [Bureau Veritas](#)
- Inspection, audit, risk assessment software platform - [Safetyculture](#)

For more information please visit: [Aviva Risk Management Solutions – Specialist Partners](#)

Sources and Useful Links

- [RC37- Recommendations for the control of fire hazards arising from electrical lighting](#)
- [Electricity at Work Regulations](#) – Health and Safety Executive guidance
- [BS 7671: Requirements for Electrical Installations. IET Wiring Regulations](#)

Note: Whilst UK standards and legislation are referenced in this document, other international standards and legislation should be referenced where applicable.

Additional Information

Relevant Aviva Loss Prevention Standards include:

- **Use of Thermographic Cameras – General Considerations**
- **Electrical Installations – Inspection and Maintenance**
- **Managing Change – Property**
- **Material Damage Risk Assessment**

To find out more, please visit [Aviva Risk Management Solutions](#) or speak to one of our advisors.

Email us at riskadvice@aviva.com or call 0345 366 6666.*

*The cost of calls to 03 prefixed numbers are charged at national call rates (charges may vary dependent on your network provider) and are usually included in inclusive minute plans from landlines and mobiles. For our joint protection telephone calls may be recorded and/or monitored.

Appendix 1 – Electrical Lighting Checklist

Location	
Date	
Completed by (name and signature)	

	All Lighting	Y/N	Comments
1.	Have all light fittings been identified by fitting type and location?		
2.	- Are lights in use appropriate for the atmospheric conditions in which they are used? - Including any hazardous atmospheres such as DSEAR/ATEX zones?		
3.	- Are lamps inspected on a regular basis? - Any that are dim, flickering or not producing light should be replaced immediately.		
4.	If dust or fly is a by-product of your activities are the light fittings selected with a low surface temperature/low heat emitting?		
5.	- Are any light fittings passing or fixed to/through foam insulated metal panels? - Are all installations carefully reviewed? - Is all exposed foamed plastic insulation encapsulated in an appropriately approved fire resistive material? - To prevent cable insulation damage, are all cut metal panels grommited?		
6.	Are any light fittings directly fitted to any other combustible elements of construction?		
7.	Are light fittings maintained at least 1.5m away from combustible materials or combustible construction horizontally? - Can the light fitting be moved? - Can the combustible materials be moved? - Can the combustible construction be protected with a non-combustible/fire resistant covering?		

	All Lighting Contd.	Y/N	Comments
8.	- Are light fittings maintained at least 1.5m away from combustible materials or combustible construction horizontally? - Can the light fitting be moved? - Can the combustible materials be moved? - Can the combustible construction be protected with a non-combustible/fire resistant covering?		
9.	Are all light fittings located in areas where impact or vehicle impact is not expected?		
10.	Are light fittings considered and reviewed as part of regular housekeeping/inspection regimes?		
11.	Are light fittings properly maintained?		
12.	Are damaged light fittings electrically isolated until fully repaired?		
13.	Are light fittings cleaned regularly and maintained clean of dust and other accumulations?		
14.	Is there appropriate air movement to ensure light fittings remain cool?		
15.	Are light fittings checked at least annually with a thermographic camera?		

	HID Lighting	Y/N	Comments
16.	Is a record of the lamp installation date and recommended manufacturer's service life maintained?		
17.	- As the bulbs can catastrophically fail, even if shielded, are HID lights located over sterile areas? - Are all combustible materials below prohibited? - Is temporary storage prohibited below HID lights?		
18.	Are light fittings with integral borosilicate glass or tempered soda lime glass containment barriers for the appropriate lamp type used?		
19.	Where containment barriers are not possible, are lamps used which either have the arc tube protected by a glass shroud (O-Type), or are shatter resistant?		
20.	Do the replacement of bulbs and other work procedures state that the lamps are not touched with bare hands?		

	HID Lighting Cont'd	Y/N	Comments
21.	Are all lamps protected from contact with liquid, moisture, dust, dirt, oils, etc.?		
22.	Are all lamps protected from contact with water?		
23.	Are all lamps that have been damaged or scratched isolated?		
24.	Are all HID lights turned off for at least 20 minutes every week?		
25.	As failure rate increases with age, are lamps changed at 70% of their rated life?		
26.	Do the replacement of bulbs and other work procedures state that this should only be completed by properly qualified electricians and only when the lamps are cold and the power locked off?		

	Fluorescent Lighting	Y/N	Comments
27.	Are protective light covers in place on all lighting units?		
28.	Are failed tubes immediately removed/replaced?		
29.	Are flickering lights isolated and repaired immediately?		
30.	Where light fittings use starter motors, are non-striking safety starter motors used in all cases?		
31.	Have any older light fittings (pre 1979 manufacture) been decommissioned and replaced?		
32.	Additional Comments:		

Please Note

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