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Risk Control Services
Warehouse Hazards - Fires

Warehouses are a key part of the supply chain and often the final step towards fulfilling a company's commitment to its customers. Warehouses can represent a significant investment – both property and product – so when a catastrophic hazard occurs, devastating losses are often not far behind.

One of the costliest warehouse hazards is fire, which can spread quickly throughout a facility with disastrous results. A fires intensity can vary based on any number of factors including the types of products stored, storage arrangements, and building infrastructure.

This document provides an overview of potential contributing factors and the key controls for mitigating warehousing fires.

Ignition Sources:

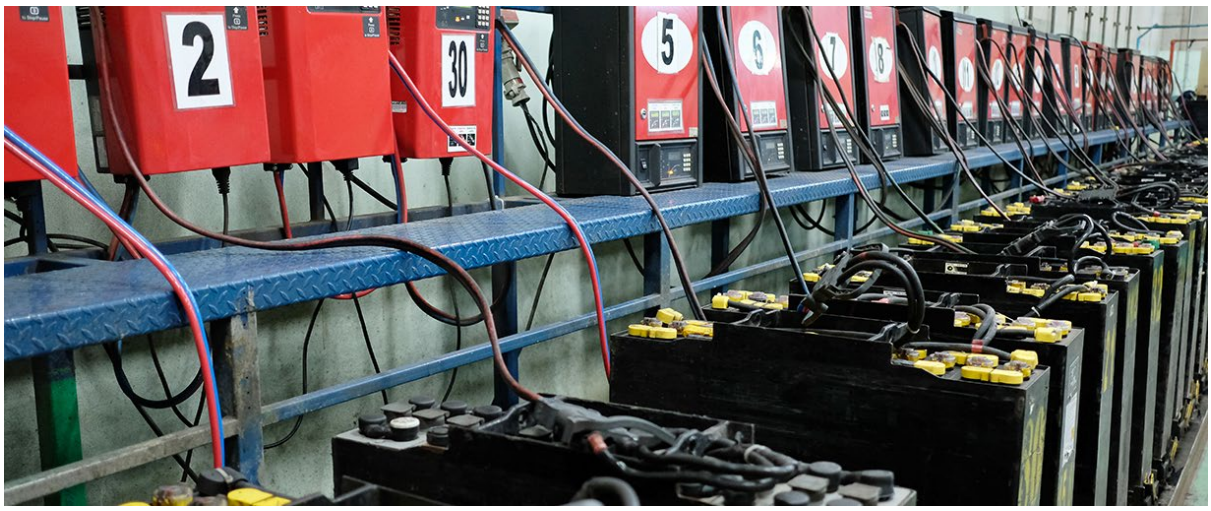
Battery Charging

Materials handling equipment and the associated batteries left charging and unattended during periods of low activity are a common ignition source – frayed or damaged cables, poor connections and electrical faults can lead to sparking and fire. If there is stored material around or poor housekeeping standards this provides an additional route for a fire to spread.

Where possible charging should take place in dedicated cut off rooms that meet the following specifications:

- Constructed of non-combustible materials
- Well ventilated
- Equipped with smoke detectors and sprinklers
- Free from combustible materials, with excellent standards of housekeeping
- Equipped with cabling and connectors to minimize the risk for damage from wear and tear
- Interlocked electrical supply to charging equipment via smoke detectors

Where a dedicated room is not available, a well demarcated area, with at least 2-m clear space to any other material should be provided, in addition to the other safeguards noted above.



Lighting

Failure of light fittings can drop burning material onto stored stock below, or lights “running hot” can also ignite stock if stored too close.

The use of high intensity discharge lighting inside the warehouse / storage areas should be avoided unless provided with a shroud to protect the lamp’s arc tube and a non-combustible external containment barrier enclosing the whole of the lamp unit. The barriers should be constructed of tempered or borosilicate glass as normal glass could shatter and barriers of either plastic or aluminium could melt. Light fittings should be sited over aisles and clear of stock.

Roof Mounted Photovoltaic (PV) Panels

With large roof surface areas, it is common to find PV or solar panels mounted on a warehouse roof. These units can introduce electrical ignition sources and their installation requires careful consideration. For existing installations, baseline controls, which can be influenced by site personnel, include:

- Maintaining clearance around invertors within the building

- Including all elements of the system in the annual infra-red thermographic inspections
- Providing readily accessible isolators and including their location in the site emergency response plan

Workshops/Maintenance Facilities

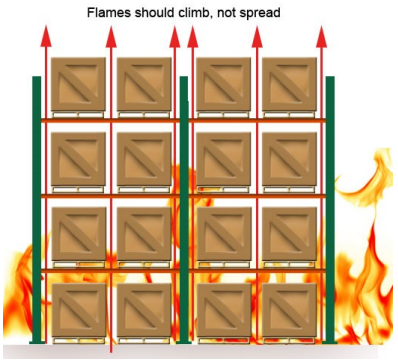
If maintenance or workshop facilities are needed, they should be housed in fire rated cut off rooms. Oils, grease, paints etc., should be kept in locked metal cabinets. Housekeeping standards should be of a very high standard. Any hot work (welding, grinding etc) should be conducted in a dedicated hot work area with appropriate controls, including being fully cut-off from storage areas.

Storage Management:

Flue Spaces

When racking is used for storage, it can create a particularly challenging fire hazard with the potential for significant horizontal and vertical fire growth. If the flue space between loads is blocked it can lead to fire spread beyond the sprinkler design area, and delayed operation of the sprinklers. Once the sprinklers eventually operate blocked flues can prevent water penetrating to the seat of the fire. At best this scenario gives rise to increased fire damage, at worst a total loss of control.

To minimize the potential for a fire hazard, clear flue spaces a minimum of 75-mm (net) should be maintained around each pallet load, through the entire height of the storage. A good rule of thumb is to imagine dropping a golf ball from the top of the racking – if it can freely fall through the flue space, you have met the standard.



For solid pile and on-floor palletized storage, individual blocks should not exceed 150-m^2 in footprint with at least 2.4-m aisles between blocks.

Hazardous Goods

Flammable liquids, flammable aerosols, etc., should be adequately separated from the main warehouse / storage area, preferably by fire walls of at least 2 hours fire-resistance. Specific physical controls dependant on the materials being stored can be obtained from your Sompo International Risk Control specialist.

Dispensing of flammable liquids or other hazardous goods should not be undertaken within the warehouse / storage area.

Aisle Storage

Aisles between racking should not be used for storage as this provides a route for fire to spread from one rack to another.

Marshalling

Marshalling areas are an essential part of warehouse operations, however storage discipline should still be maintained to avoid introduction of risk. This includes well-arranged storage blocks and excellent housekeeping.

In some modern warehouses with a single roof height through the whole building, the clearance from the top of the storage to the ceiling level sprinklers in the marshalling area can be very large and should be reviewed by a sprinkler specialist to ensure protection remains adequate. Clearance greater than 4-m from the top of the storage to the sprinkler is considered detrimental and needs specific attention.

Pallets/Yard Storage

Stacks of pallets provide the perfect arrangement for a fast-growing fire with intense heat; the large surface area coupled with rigid open structure allows a fire to develop rapidly. Even stored outside, the radiant heat can lead to fire spreading to the building structure or material inside the building. The same scenario can arise with storage of waste or other combustibles.

When stored indoors, pallets should be considered in the same way as any other commodity and sprinkler protection provided in accordance with the relevant standards.

Protection:

General Sprinklers

Warehouses and storage areas should be fully protected by an adequate automatic sprinkler system installed by an LPS 1048 approved sprinkler contractor, in accordance with either LPC Rules for Automatic Sprinkler Installations incorporating BS EN12845 or NFPA 13. Where other standards are proposed, the full design justification should be discussed with your Sompo International Risk Control specialist.

It is essential that adequate clearance be maintained between sprinkler heads and the top of the stored goods below. For sprinklers at ceiling level the required clearance is at least 1-m, for in-rack sprinklers, there should be a minimum of 150-mm clearance between the sprinkler and the top of the protected storage.

Inspection

Regular testing, inspection and maintenance is essential to ensure fire protection equipment will activate as designed when called upon. This should include recorded checks of the following:

a) Fire Pumps:

i) *Diesel fire pumps* should be started automatically on a weekly basis and run for 30 minutes, recording the following:

- Cut-in pressure
- Closed-valve (churn) pressure
- Engine cooling system, oil level, oil pressure (where gauge is fitted)
- Fuel level and battery condition satisfactory
- Cumulative hours run
- Satisfactory relay of the “pump running” alarm at a constantly attended location

ii) *Electric fire pump* should be run for 10 minutes each month with the cut-in pressure and churn pressures noted. The pressure gauges on all sprinkler risers should be inspected and the pressures noted.

iii) All types of fire pumps should be flow tested from churn through to 120% of rated duty annually. The results of the tests should be analysed to ensure that the fire pumps are both capable of meeting their rated duty.

b) Sprinkler Risers:

i) Each individual sprinkler riser should also be visually inspected on a weekly basis and the status of the main stop valve checked (open). The hydraulic motor gong should also be tested, including time taken from gong to ring and pressures before and after the test.

ii) Both pressure gauges above and below the sprinkler risers should be inspected monthly and the pressures noted. Any deviations from previous results should be investigated.

iii) The sprinkler risers should be tested quarterly, using the end of line inspectors test connection to ensure that the water gong sounds and that the waterflow supervision signal is received at the security office.

iv) All manually operated drencher system valves should be trip tested annually and fully flowed. The operation of all main stop valves on sprinkler risers should be tested from fully shut to fully open.

Impairments

Fire protection systems that have been taken out of service, either in whole or in part, are considered to be impaired. Impairments can be planned (e.g., routine maintenance or modification) or emergency (e.g., accidental damage or equipment malfunction).

Effective management of impairments is necessary to minimise their extent and duration and to eliminate avoidable hazards during the period of the impairment.

Develop and implement a formal impairment management procedure for all fire protection and detection systems. The procedure should be applied whenever systems are isolated, either for planned work or as a result of an emergency. The procedure should ensure that adequate precautions are taken, and avoidable hazards are eliminated, that the impairment is managed to minimise its extent and duration, and that interested parties are notified.

Impairment management kits are available on request from your Sompo International Risk Control specialist.

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Emergency Response Plan for Damaged Heads

Damaged sprinkler heads can release large amounts of water into the storage area, damaging stock. Whilst such an occurrence is unusual, it is possible, particularly where in-rack sprinklers are installed. It is important to note that the benefit provided by the sprinklers far outweighs any possible accidental water damage. A best practice is to train employees in the operation of the system and the actions to take in the event of an activation, either as a result of a fire or accidental discharge.

A proactive approach to addressing potential warehouse hazards is critical to keeping your property and employees safe. Please reach out to you Sompo International Risk Control Specialist or contact us at 1 877 667 5733 or RiskControlQuestions@sompo-intl.com for more information on how to minimize the risk.