Storage Fires

Understanding the Risk

Many of the most costly fires occur in warehouses and storage areas, where often a high fire risk is combined with high values and/or a high business dependency.

Warehouse and storage areas are found in connection with many differing types of occupancy e.g. wholesale distribution warehouses, stockrooms to retail outlets, manufacturer's raw materials and finished goods stores etc.

In recent years the fire risk associated with warehouses and storage areas has been exacerbated by the increasing use of combustible packaging, including expanded plastics and the move to ever larger and higher warehouses with increasing levels of automation and limited compartmentation.

In order to understand the nature of the fire risk presented by warehouses and storage areas it is necessary to understand the key features associated with storage and their impact on both the rate of fire inception and fire spread i.e.

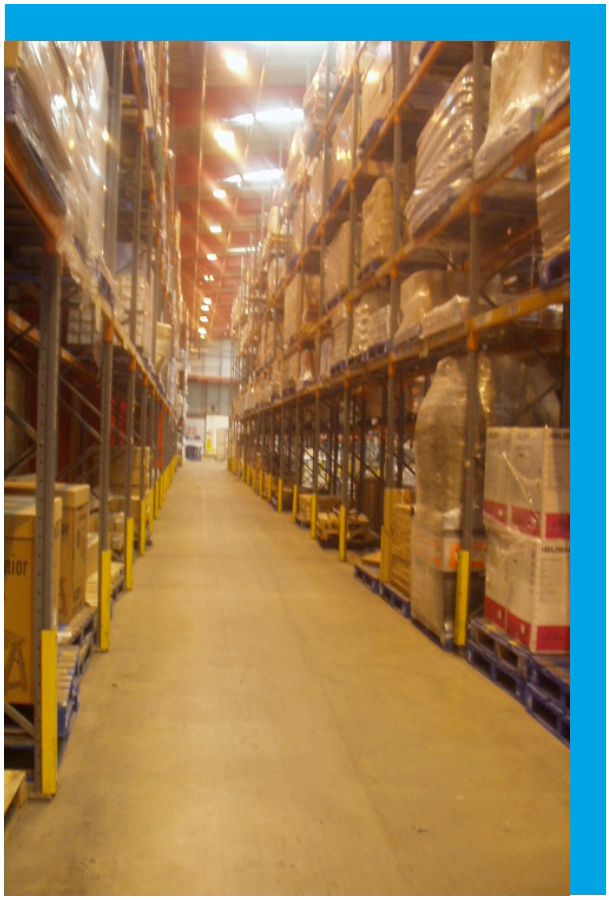
- Commodity classification
- Storage configuration
- Storage height

Commodity Classification

For fire protection purposes goods stored, including their packaging are classified according to their combustibility i.e. their rate of combustion, rate of heat release and rate of flame spread.

Technical Bulletin TB217 of the LPC Rules for Automatic Sprinkler Installations incorporating BS EN12845 classifies goods into 4 Categories I to IV, including plastics.

The higher the commodity class or category the greater the fire risk presented so it is critical that goods are correctly identified so that the appropriate level of fire protection can be provided.



Where storage involves goods of differing commodity classes or categories fire protections should be based on the highest commodity class or category present.

Storage Configuration

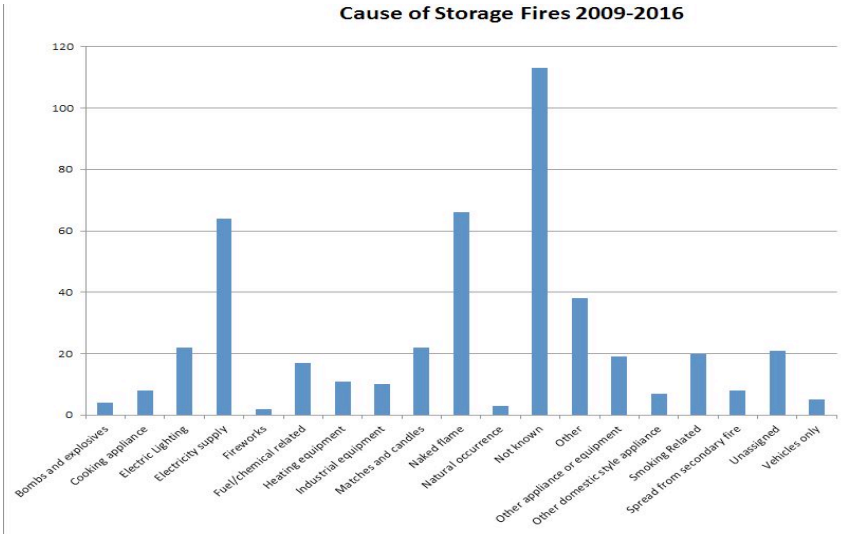
From a fire protection viewpoint storage is divided into 4 main types – bulk storage, solid piling, palletized storage and rack storage.

Bulk storage – consists of piles of unpackaged material in loose free flowing condition such as powders, granules, pallets or flakes – these are typically found in silos, bins, tanks or in large piles, on the floors of storage buildings.

Solid piling – consists of cartons, boxes, bales, bags etc in direct contact with each other.

Palletised storage – consists of unit loads mounted on pallets.

Rack storage – consists of a structural framework into which unit loads (usually on pallets) are placed. Rack storage can be further classified into single row, double row, multiple row and drive through racks plus specialist rack storage systems such as automated storage and retrieval systems and storage carousels.



The differences between these 4 storage configurations that affect fire behavior and the difficulty in achieving fire control are:-

- The nature of the horizontal and vertical air spaces or flues between the goods stored, which allow fire spread between and around the goods.
- The aisle widths between the individual blocks of storage – narrow aisle widths increase the risk of a fire spread between adjacent blocks and restrict access for fire-fighting purposes.

Storage Height

In the event of a fire the height to which goods are stored will have a significant influence on the rate at which the fire will spread and in the difficulty of achieving fire control.

Whilst limitations imposed by stability requirements limit the storage heights associated with bulk storage, solid piling and palletized storage this is not the case with rack storage and storage heights in excess of 13 metres (40 feet) are not uncommon.

Related Loss Statistics

According to statistics collated by the Fire Protection Association (FPA) in the period from 2009 to 2016, 460 fires were related to storage facilities with a total cost of £83m in the UK.

One quarter (41) of the fires are recorded as either cause unknown or under investigation Of of the remainder deliberate ignition is by far the largest cause being responsible for 153 of the fires i.e. 33% with 86 fires (20%) being electrical in origin. 10 separate causes accounted for the remaining 15% (19) of the fires recorded.

Controlling the hazard

In order to effectively control the fire hazard associated with warehousing and storage it is necessary to have in place an effective combination of both human element and physical protection controls.

Human element controls relate to the management procedures etc aimed at reducing the likelihood of a fire occurring and ensuring an effective response in the event of a fire.

Physical protection controls relate to protection or design principles aimed at reducing or mitigating the effect in the event of a fire.

The issues detailed under these 2 headings should be considered fully, to create an integrated storage risk control programme.

Human Element

- Undertake a fire risk assessment to identify the fire hazards present, including an assessment of the goods stored and the adequacy of the controls in place. The assessment of the goods stored should include their compatibility and the need for segregation e.g. flammable liquids, flammable aerosols, oxidizing agents, hazardous chemicals etc.
- Procedures should be in place at the goods receiving stage to correctly identify the goods concerned and ensure that they are located in the correct area(s) and to identify any damage requiring immediate action e.g. removal from the warehouse or adequate segregation – clear guidelines should be drawn up for handling damaged goods.

- Review storage arrangements to ensure that these provide for clearly defined storage areas with adequate aisles between them. In connection with solid piling and palletized storage individual blocks should not exceed 150m^2 in area with at least 2.4m aisles between blocks.
- Where automatic sprinkler protection is installed it is essential that adequate clearance is maintained between sprinkler heads and the top of the stored goods below.
- In connection with roof level sprinklers the required clearances are at least 1 metre for high hazard storage and 0.5m for ordinary hazard storage. In connection with in rack storage the required clearance is a minimum of 150mm.
- Establish effective housekeeping arrangements to ensure that clear aisles are maintained at all times and prevent buildups of combustible waste inside the warehouse / storage area.
- External combustible storage should be undertaken as far away as possible from the outside of the buildings, to be no nearer than 10m.
- Ensure that adequate smoking controls are in place and are fully complied with.
- A system of regular self-inspections should be established to ensure that housekeeping disciplines are being maintained and that fire protections remain in place and fully functional – weekly inspections are recommended.
- All hot work should be the subject of an adequate permit to work system – further guidance can be found in the AIG RiskFix document on hot work.
- Review fire emergency planning arrangements to ensure that all staff are adequately trained in the actions to take in the event of a fire, including fire evacuation procedures and the use of portable fire extinguishers.
- Ensure that adequate arrangements are in place for calling the fire brigade in the event of a fire, to include 1 or more deputies to cover for holidays and sickness etc. It should also be ensured that adequate access is available for the fire brigade to undertake fire-fighting operations – in this context familiarisation visits by the fire brigade can be of assistance.
- In connection with automatic sprinkler systems it should be ensured that an adequate number of employees receive training in the operation of the system and on the actions to take in the event of an activation either as a result of a fire or of an accidental discharge.
- An effective sprinkler impairment procedure should be also established for notifying AIG UK in the event of impairment to the sprinkler system.
- An arson risk assessment should be undertaken – see the AIG RiskFix document on arson.
- Stock should be stored at least 150mm clear of the floor to prevent water damage.
- Implement an effective planned preventative maintenance system to include all key items of site and equipment including heaters, boilers, mechanical handling systems etc.
- Ensure that all fixed electrical installations and portable electric appliances are the subject of adequate periodic inspection and maintenance in accordance with the Electricity At Work Regulations 1989.
- Prepare a detailed written business continuity plan which identifies critical business activities and threats, evaluates these in terms of their potential impact on the business and formulates a plan for ensuring prompt business recovery.
- Ensure that procedures are in place for change management at the premises to ensure that fire protections and procedures remain valid for the fire risk presented.

Physical Protection

- Construction of the warehouse / storage area should be of non-combustible materials including walls, roof and floors. In connection with the use of composite metal panels these should be LPCB approved. Exposed structural steelwork should be fire protected to prevent premature collapse.
- The use of large undivided warehouse and storage areas should be avoided with 250,000 sq ft being the maximum recommended undivided area for a warehouse / storage area particularly where adequate automatic sprinkler protection is not provided.
- Reference should also be made to requirements imposed by the Building Regulations 2000 Approved Document B: Fire Safety (Volume 2) – Buildings other than dwellinghouses.
- Warehouse and storage buildings should preferably comprise detached buildings with adequate spatial separation from adjacent buildings. Where this is not practicable warehouse and storage areas should be effectively fire separated from all adjacent areas in particular production areas.
- Internal fire walls between adjacent warehouse / storage areas and between warehouse / storage areas and production areas should be of at least 4 hours fire-resistance or 2 hours where the areas on both sides of the wall are adequately sprinkler protected.
- A clear area of at least 2m should be maintained on both sides of all fire doors.
- All openings in internal fire walls should be protected by LPCB approved fire doors / shutters of the same fire-resistance as the fire wall and designed to close automatically in the event of a fire e.g. by fusible link devices or preferably smoke detectors positioned on both sides of the opening.
- Hazardous goods e.g. 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. Dispensing of flammable liquids etc should not be undertaken within the warehouse / storage area.

- Hazardous operations e.g. forklift truck battery charging etc should be adequately separated from the main warehouse / storage area, preferably by fire walls of at least 2 hours fire-resistance.
- Shrink wrapping operations should be avoided in the warehouse / storage area. Where this is unavoidable it should be that the operation is fully risk assessed and undertaken in compliance with the LPC Recommendations for Shrink Wrapping.
- Site rooms e.g. electrical substations / switch rooms, boiler rooms etc should be adequately separated from the main warehouse / storage area preferably by fire walls of at least 2 hours fire -resistance
- Externally sited site and equipment etc e.g. transformers, generators, LPG storage should be sited as far away as possible from the outside of the buildings to be no nearer than 10m.
- The use of high intensity discharge lighting inside warehouse / storage areas should be avoided unless of an approved type with a shroud to protect the lamp's arc tube and a non-combustible external containment barrier enclosing the whole of the lamp unit – barriers should be 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.
- Heaters should be preferably of the fixed black heat type sited at least one metre clear of stock and where floor mounted within a substantial fixed metal barrier.
- Warehouses and storage areas should be fully protected by an adequate automatic sprinkler system installed by a LPS 1048 approved sprinkler contractor, in accordance with either LPC Rules for Automatic Sprinkler Installations incorporating BS EN12845.
- Warehouses and storage areas should be fully protected by an automatic fire detection system installed by a LPS 1014 certified fire detection and alarm systems firm in accordance with BS 5839, Part 1, 2013 preferably to a P1 standard.
- The activation of automatic sprinkler systems and automatic fire detection systems should be continuously monitored preferably at an approved alarm receiving centre via the BT RedCARE system.
- Where smoke vents are required they should be preferably under manual control. Automatic operation of smoke vents should be interfaced with automatic fire protection systems in particular automatic sprinkler systems to ensure that their operation is not impaired.
- Adequate water supplies should be available for use by the fire brigade for fire-fighting purposes.
- Adequate numbers of suitable portable fire extinguishers should be available for fire-fighting purposes.
- Warehouse / storage areas should be provided with adequate security arrangements – further guidance can be found in the AIG RiskFix documents on security.

References

1. Technical Bulletin TB217 of the LPC Rules for Automatic Sprinkler Installations incorporating BS EN12845.
2. NFPA 13 Standard for the Installation of Sprinkler Systems 2016 Edition.
3. LPC Recommendations for Shrink Wrapping.
4. Building Regulations 2000 Approved Document B: Fire Safety (Volume 2) – Buildings other than dwelling houses.
5. Electricity At Work Regulations 1989.
6. BS5839, Part 1, 2013 Fire Detection and Alarm Systems for Buildings.
7. AIG RiskFix – Hot Work.
8. AIG RiskFix – Security.

For further information please contact your local AIG risk engineer.

www.aig.co.uk

BELFAST
Forsyth House
Cromac Square
Belfast BT2 8LA
Tel: 02890 726002
Fax: 02890 726085

BIRMINGHAM
Embassy House
60 Church Street
Birmingham B3 2DJ
Tel: 0121 236 9471
Fax: 0121 233 3597

CROYDON
2-8 Altyre Road
Croydon, Surrey CR9 2LG
Tel: 020 8681 2556
Fax: 020 8680 7158

GLASGOW
Centenary House
69 Wellington Street
Glasgow G2 6HJ
Tel: 0141 303 4400
Fax: 0141 303 4440

LEEDS
5th Floor Gallery House
123-131 The Headrow
Leeds LS1 5RD
Tel: 0113 242 1177
Fax: 0113 242 1746

LONDON
58 Fenchurch Street
London EC3M 4AB
Tel: 020 7954 7000
Fax: 020 7954 7001

MANCHESTER
4th Floor, 201 Deansgate
Manchester M3 3NW
Tel: 0161 832 8521
Fax: 0161 832 0149

American International Group, Inc. (AIG) is a leading global insurance organisation. Founded in 1919, today AIG member companies provide a wide range of property casualty insurance, life insurance, retirement products, and other financial services to customers in more than 80 countries and jurisdictions. These diverse offerings include products and services that help businesses and individuals protect their assets, manage risks and provide for retirement security. AIG common stock is listed on the New York Stock Exchange and the Tokyo Stock Exchange.

Additional information about AIG can be found at www.aig.com and www.aig.com/strategyupdate | YouTube: www.youtube.com/aig | Twitter: @AIGinsurance | LinkedIn: http://www.linkedin.com/company/aig.

AIG is the marketing name for the worldwide property-casualty, life and retirement, and general insurance operations of American International Group, Inc. For additional information, please visit our website at www.aig.com. All products and services are written or provided by subsidiaries or affiliates of American International Group, Inc. Products or services may not be available in all countries, and coverage is subject to actual policy language. Non-insurance products and services may be provided by independent third parties.

American International Group UK Limited is registered in England: company number 10737370. Registered address: The AIG Building, 58 Fenchurch Street, London EC3M 4AB. American International Group UK Limited is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and Prudential Regulation Authority (FRN number 781109). This information can be checked by visiting the FS Register (www.fca.org.uk/register).