

HAZARDS IN WAREHOUSE

AUGUST - 2023



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LOSS PREVENTION BULLETIN

- BY RISK MANAGEMENT DEPARTMENT

BEACON INSURANCE BROKERS PVT LTD



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1. BRIEF ABOUT WAREHOUSE:

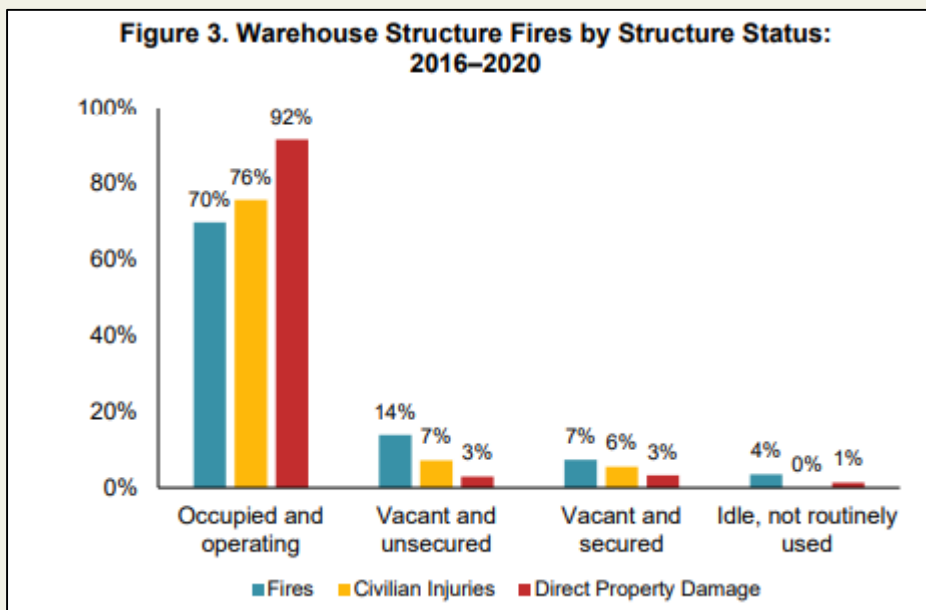
- ❖ **Warehouse** is the facility / complex / building used for the storage of various types of materials / goods supplied by manufacturers, Importers, exporters, wholesalers, etc. Apart from storage, warehouse management allows the Incoming goods flow as well as outgoing goods flow controls.
- ❖ Warehouse contains various potential storage hazards that needs to be protected as the prevention of any major losses in terms of materials as well as money.
- ❖ In this article, we'll discussing the best practice with required loss prevention measures for the keeping warehouse safe against any unwanted incident.
- ❖ The term **warehousing** is defined as the act of storing the goods that will be sold or distributed later. Warehouse also used specific elements that can help manufacturers, distributor's or retailors to monitor their inventory and store it safely.
- ❖ Below is the overview of basic warehousing element –
 - 1) Rack or pallet or ASRS or Mobile racks storage systems that provides maximum access of storage goods and easy product access.
 - 2) Climate control systems for the goods storage (I.e. Cold storage, Refrigeration system including certain pharmaceutical and laboratory goods etc.)
 - 3) Firefighting arrangement in the premises
 - 4) Inventory control software
 - 5) Equipment's for the goods / material movements (I.e. Forklift, Pallets, Stacker, Conveyor belts for transferring, etc.)
 - 6) Security arrangement for the protection of the warehouse block / building / complex.

Reference image – Warehouse for refrigerated & frozen foods



2. WAREHOUSE FIRE SCENARIOS AROUND THE WORLD

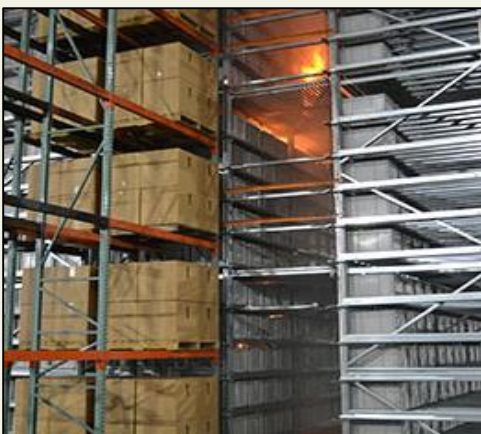
- ❖ In the U.S., the NFPA registered approximately 1,240 warehouse fires per year between 2009 and 2013, with annual property damages of around USD 155 million. This represents a reduction in the number of fires over a 30-year observation period, from 4,700 to around 1,200 per year.
- ❖ Local fire departments responded an average 1450 structure fire incidents at the warehouse premises during the year 2016 to 2020. The mentioned fires caused estimated direct property loss of \$283 million as well as average 02 deaths & 16 injuries.



- ❖ In South Africa, the Fire Protection Association of Southern Africa (FPASA) recorded a total of 436 warehouse fires between 2011 and 2015.
- ❖ In Germany, analysis of available statistics from the German Insurers' Association (GDV) from 2001 to 2016 shows a total of over 76,000 risks and approximately 7,000 claims from warehouses during this period – about 430 claims per year.

3. HAZARD ASSOCIATED WITH WAREHOUSE

- ❖ Warehouses are often large constructed shed with fewer man movements. So chances of timely notice of fire are less.
- ❖ The principle fire cause in the warehouse blocks can be considered as electrical sources, sparks from external sources, hot works, careless smoking or disposal of smoking materials etc.
- ❖ Fuel is another factor involved in the origin of a fire. This is where the nature of goods or materials stored is of most importance, as it will affect how quickly a



fire spread.

- ❖ Type of storage (ASRS, Pallet storage system, Rack storage system, etc.) also plays important role in the fire hazard as well as fire spreading.
- ❖ Operation of Forklift as well as fuel used / storage for the forklift also plays vital role in the hazards in the warehouse blocks.
- ❖ Location of charging point possess significant hazards in warehouse fire scenario.

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- ❖ Conveyor belts / equipment's generally used for transferring the materials between warehouses or till the dispatch area which has fire and related hazards due to Presence of static charge.
- ❖ Many ASRS systems store materials in very tall racks with narrow aisles. This arrangement can make it very difficult for fire suppression system to control potential fires.
- ❖ Improper stacking of goods can results slip or trip hazards for nearby workers.
- ❖ Stacking height is one of the important factor for the hazardous situations in warehouse and also lead to delayed in detection system also.
- ❖ The most common cause of physical injuries in warehouse and storage facilities involves improper manual lifting and handling of materials.



4. LOSS PREVENTION MEASURES IN WAREHOUSE

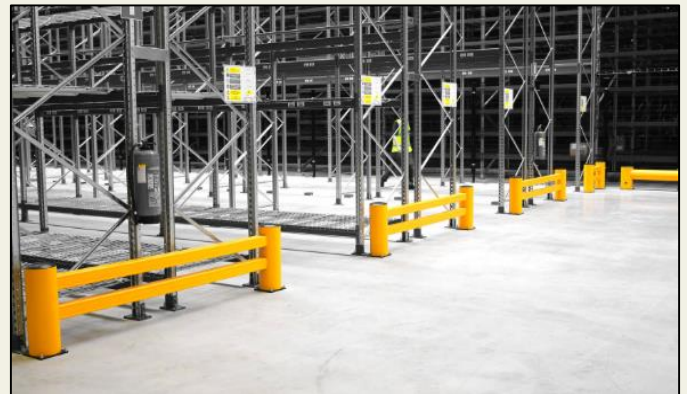
4.1 GENERAL REQUIRED SAFETY MEASURES

- ❖ All the firefighting equipment's should be installed in such manner that it can be easily accessible in case of emergency.
- ❖ Regular housekeeping activities (I.e. Cleaning and Maintenance) can reduce hazards up to certain level.
- ❖ Aisle marking space should be mentioned / provided in the premises as it provides easy identification for the material / man movements.
- ❖ Floor marking lines must be at least 2" wide to ensure maximum visibility, though the agency recommends lines to be 2" to 6" wide.



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- ❖ Every storage warehouse section / shed / building should have at least two emergency exit doorways. Emergency exit should be provided at every 30 meters distance as per IS 1641.
- ❖ No Smoking” sign boards should be displayed at prominent location inside the warehouse block.
- ❖ Adequate illumination and ventilation should be provided to all the areas inside the premises as well as emergency lighting arrangement can be done.
- ❖ Impact damage can be considered due to movement of various material vehicles inside the warehouse. So impact protection rail guards should be provided at periphery of the storage racks.
- ❖ Standard weight limit (SWL) should be decided for the rack storage system and can be displayed at all the racks.
- ❖ Emergency evacuation plan should be made available in the premises in case of emergency fire or related hazard scenario and same should be displayed near the entry/exit area.
- ❖ Waste collection bags or containers should be placed outside the warehouse or inside separate storage/ shed.



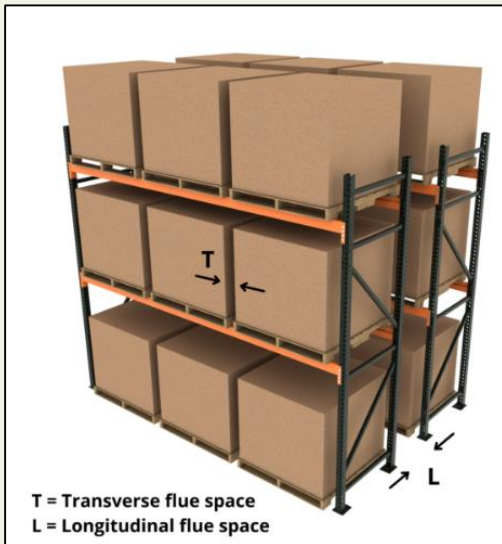
4.2 FIRE & SAFETY MEASURES

- ❖ Some Distance should be maintained between load bearing wall and stored materials. As in case of fire or related hazard situation originated, it'll damage structure also and possibility of transferring fires.
- ❖ Every storage warehouse section / shed / building should have at least two emergency exit doorways. Emergency exit should be provided at every 30 meters distance as per IS 1641.

- ❖ Hazardous / flammable goods or solvents and aerosols/gases stored in separate fire-resistant and temperature controlled areas.
- ❖ Fire resistant doors provision with auto temperature sensing closing arrangement can provide as separation medium from the prevention of fire spreading scenario.



- ❖ Minimum 06 inches of Transverse & Longitudinal flue space should be maintained on either sides of racks. Flue space allows fire vents to flow upwards and it can properly detected by sprinkler or detection system for further mitigation of fire. Keep clear stickers can also place in some cases for requiring flue space protecting.



- ❖ Fire extinguishers are crucial part for the firefighting system and right FEA should be placed at suitable type of fires. FEA's training should be provided to all the workers as well as security guards also. Fire extinguisher installation should be as per NFPA 10 / IS 2190.
- ❖ All the firefighting equipment's should be easily accessible in case of emergency scenario.

Insured should avoid the storage of materials near the fire hydrant equipment's / FEA etc.

- ❖ Compatibility study should be done for the stored materials in the warehouse for the all the stored materials as well as chart should be displayed at strategic location in warehouse block.
- ❖ Spill control kits should be provided at the liquid storage areas as well as PPE's kits should be placed in the warehouse for emergency situation and training should be provided to workers.

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- ❖ Warehouses and factories are always susceptible to fire hazards, so caution is crucial to prevent life and property loss. Integrating periodic fire risk assessments and fire extinguisher training into warehouse and factory fire safety plans can help avoid potential fire hazards.
- ❖ Hydrant system should have enough water storage capacity with auto mode of operation for emergency firefighting as per NFPA or Indian standard.
- ❖ Water sprinkler system can be considered as one of the most effective firefighting tools. Regular maintenance, inspection and testing of water based fire protection system can make huge impact for reduction of fire hazards.
- ❖ Minimum 18 inches distance should be maintained between sprinkler heads and goods storage so it will not block the water flow.
- ❖ Rack sprinkler system can also provide at the warehouse block.



4.3 ELECTRICAL SAFETY MEASURES

- ❖ Electrical installations should be installed / provided as per standard guidelines.
- ❖ The installation and maintenance of electrical wiring and equipment should comply with the provisions mentioned in IS 1646:1982.
- ❖ Charging point or fuel storage for the material vehicles should be placed / made outside the warehouse premises or segregated from the material storage as prevention of fire hazard scenario.
- ❖ Spark arrestor should be provided all the vehicles as per requirements.
- ❖ Flammable materials safety is critical in the warehouses. So storage of flammable materials should not store near the



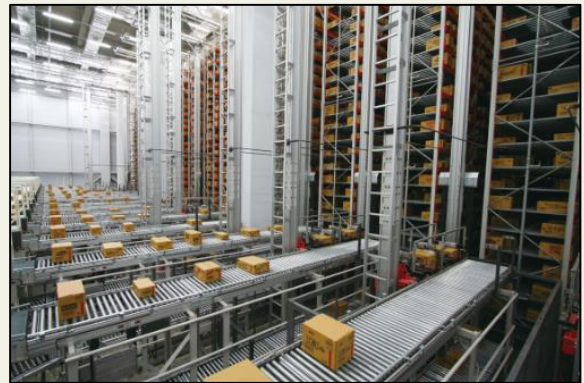
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electrical connections or heating equipment's etc. storage of flammable materials should be at dedicated ventilated areas away from possible ignition sources.

- ❖ In case of go-downs storing fibrous goods, flammable liquids, nitrocellulose, fireworks or explosives, all switches and control equipment should be located outside the go down. All portable lamps used shall be of 24 V with adequate protection.
- ❖ Lock – out Tag – out should be followed in the premises during the electrical maintenance work. Clearance as per the standard guidelines should be maintained during the work permit.

4.4 LOSS PREVENTION MEASURES FOR ASRS WAREHOUSE / MOBILE RACKS / COLD STORAGEES -

- ❖ Flameproof electrical fittings should be installed for the stacker and electrical panels.
- ❖ Regular maintenance and calibration activity should be carried out for all the material Vehicles used in the warehouse.
- ❖ Rack Water sprinkler system can be installed for the storage racks.
- ❖ Fire hydrant points or hose pipes should be easily accessible near the warehouse shed area and dewatering pump arrangement should be made available in case of emergency water logging at stacker movement path after firefighting.
- ❖ Automated material handling equipment (I.e. ASRS) will have additional code requirements to prevent the equipment's motion from prevention of spreading fire.



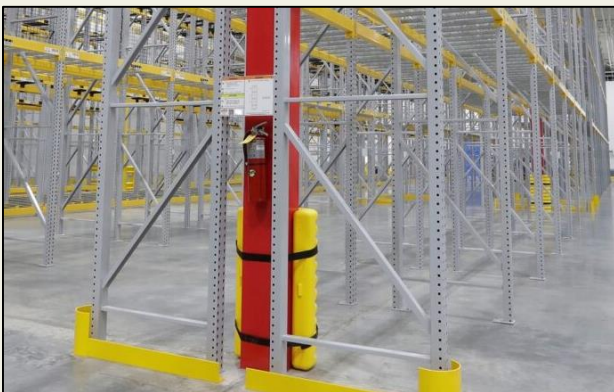
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❖ PUF panel exposure for the internal wall should avoid or insulation material should provide as per standard TAC Guidelines / Indian standard / NFPA Guidelines.

❖ Floors in cold storage warehouses should keep dry and regularly checking done for ice buildup. Ice build-up can be especially problematic on storage racks, ceilings and floors. It's also especially important to make sure all electrical equipment is cleaned and maintained.



❖ Ammonia used for refrigeration in the cold storage blocks which is toxic in nature. Proper PPE should be worn by all personnel working with ammonia refrigeration systems. This includes safety glasses, gloves, face shields, and respiratory protection. An emergency response plan should be in place in case of ammonia leaks or other accidents.



❖ Install and maintain fire suppression classified for cold temperatures. Ensure that sprinklers are

protected from ice plugs forming. Keep extinguishers charged and in easy-to-access locations throughout the facility.

5. CASE STUDIES - FIRE INCIDENTS IN WAREHOUSES -

5.1 INCIDENT 1:

- Type of industry – Consumer glass products from Glass tubes
- Incident date – April, 2021
- Location – Bharuch, Gujarat
- Probable Cause of loss – Solar panel installed on rooftop caught fire due to short circuit which cause fire in warehouse.
- Estimated loss amount – INR 50 Cr.
- Incident brief –
 - At about 10:30 am in morning when approx. 78 numbers of manpower came on duty in morning shift, smoke detection system raised alarm installed at alarm panel at material security gate.
 - Safety officer and on duty staff were immediately informed by security staff and emergency sirens started in the factory.
 - Fire travelled very fast from the raw materials storage area to quality control block attached to warehouse.
 - Insured started firefighting with installed fire hydrant system and at same duration external fire brigade were called.
 - The intensity of fire was such massive that entire warehouse (200 m * 36 m) catches fire within 20 to 25 minutes.
 - There is no fatality / injury happened during the incident.
- Loss prevention measures suggested after incident –
 - Insured has installed water sprinkler system in warehouse block as detection system.
 - Internal separation done by RCC wall from the prevention of fire travel scenario.
 - Warehouse height will increased up to 08 meters.

• Photographs of Incident –



5.2 INCIDENT 2:

- Type of industry – Cotton warehouse
- Incident date – June 1991
- Location – Adilabad, Andhra Pradesh
- Cause of loss – Smoking material thrown by workers
- Estimated loss amount – INR 1.70 Cr.
- Incident brief –
 - The affected warehouse shed has 03 compartments and has barbed wire fencing.
 - The go down normally used for storing the cotton bales had dimensions 135*70*30. The fire affected fire compartment has storage capacity of 5250 nos. of bales.
 - Please note – warehouse block protected by approx. 06 nos. of Fire extinguishers.

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- Security officer at premises noticed fire smoke from the compartment 03 at around 6:30 pm in evening and fire brigade were called immediately and fire brigade arrived around 6:45 pm.
- Another fire tender was also arrived in the premises around 11.45 hours.

5.3 INCIDENT 3:

- Type of industry – Plywood Go down & Spare parts workshop
- Incident date – April 2019
- Location – Patiala, Punjab
- Cause of loss – Not ascertained
- Incident brief –
 - Fire gutted a plywood godown and spare-parts workshop in Patiala on Sunday. No fatality was reported in the incident.
 - More than five-fire tenders were rushed at the premises.
- Highlights of the incident –
 - No causality reported in the incident.
 - Probable source of fire could be short circuit.
 - Lack of fire tenders in same area can lead to delayed in firefighting during the emergency.



6. REFERENCE STANDARDS:

- IS 3594 – Fire safety of industrial buildings: General storage and warehousing including cold storages - Code of practice.
- IS 15105 – Design and installation of fixed automatic sprinkler fire extinguishing systems – Code of practice.
- IS 13039 – External hydrant systems – Provision and maintenance – code of practice.
- IS 15325 – Design and installation of fixed and automatic high and medium velocity water spray systems – Code of practice.
- IS 2189 – Selection, installation and maintenance of automatic fire detection and alarm systems.
- IS 1646 – Fire safety of buildings (General): Electrical Installations – Code of practice.

7. REFERENCES:

- <https://safetyculture.com/topics/warehouse-safety>
- <https://www.nfpa.org>
- <https://law.resource.org/pub/in/bis/S03/is.3594.1991.pdf>
- <https://simplifiedsafety.com/blog/9-safety-hazards-warehouses>
- <https://www.fmglobal.com>
- <https://www.interlakemecalux.com/warehouse-manual/the-warehouse>
- <https://www.apexwarehousesystems.com>

8. PREVIOUS LOSS PREVENTION BULLETINS:

(FROM BEACON INSURANCE BROKERS PVT LTD) –

- 1) Biparjoy cyclone hazards & Precautions (June 2023)
- 2) Hazards in Textile industries (May 2023)
- 3) Molten Metal exposure (Dec 2022)
- 4) Dust hazard exposure (Nov 2022)

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Incorporation: January 31, 2005.

Main objective: Act as composite insurance broker (Life, Non-life & Reinsurance)

- Our presence: Vadodara, Ahmedabad, Ankleshwar, Surat, Rajkot, Delhi, Mumbai, Jaipur, Indore, Gift City (Gandhinagar), Bangalore, Chennai and expanding in eastern (Guwahati) & Northern regions (Kashipur, Lucknow).
- Beacon insurance has a team of qualified MBA'S, Engineer's & Professionals certified from the Insurance Institute of India. The organization is set up to develop core competency in insurance sector. We started our operations in the year 2005. Since then, beacon is effectively managing insurance portfolio of numbers of individuals, small, medium and large corporate.
- Professionals with 20 - 30 years' experience in private and public sector blended with young vibrant team have come up together to emerge beacon as a one of the fastest growing insurance broking company.
- We also have team of around 40 - 45 engineers from the various fields like Mechanical, Electrical, Electronics & Communication, Civil, Computer engineering & Information and Technology, that added advantage to utilize the technical knowledge.
- We have our networks all over India and have in house expertise in all aspects of property, human, liability and other insurance domains. We have strong infrastructure which takes care of all needs of clients for general and life insurance. Beacon is committed to bring changes in the mindset of Indian corporate about effectiveness of implementing insurance as Risk management tool.