Warehouse fire prevention – loss prevention

Risktopic 2-5.004

The foundation of the Warehouse Fire Prevention concept is a comprehensive set of loss prevention programs that control both the causes of fire and the contributing factors to fire severity.

Introduction

Causes include hot work, smoking, inappropriate contractor actions, and arson. Contributing factors include poor housekeeping, impaired fire protection, and inadequate response to fires. Implementing loss prevention programs to control fire causes and contributing factor is essential in any warehouse setting.

Discussion

A Warehouse Fire Prevention program is actually a collection of programs that can be separated into three categories as shown in the Warehouse Fire Prevention triangle in the figure to the right. This document will focus upon the category that addresses Loss Prevention.

As with any occupancy, it is essential to implement standard property loss prevention programs in your warehouse facility. These programs include:

- Hot work permit program
- Smoking control program
- Fire protection impairment control program
- Emergency response program
- Surveillance and security program
- Housekeeping program
- Contractor control program

These programs provide the controls needed to manage sources of ignition, manage trash and debris that can be readily ignited, and secure the premises from unauthorized intruders. They provide additional controls to limit and manage outages of fixed fire protection and support appropriate response in the event of a fire emergency.

Hot work permit program

Cutting, welding and other temporary hot work result in a significant number of major fires each year. Zurich experience shows that the occurrence of serious hot work fires continue to occur each year. The impact of a hot work fire can grow exponentially in a storage occupancy due to the combustible loading.

Outside contractors – While any hot work requires close attention, the largest and most significant hot work fires are caused by outside contractors. It is essential to capture hot work controls in a comprehensive hot work permit program and to apply the program to both employees and outside contractors.

Program application – Developing and implementing a written hot work permit program is an essential component of facility risk management. It should have the support of all levels of management. A program for the control of outside contractors should include measures that require permission to bring hot work equipment onto the premises, and full compliance with the facility's program when hot work is to be performed. Management should periodically verify that the hot work program is in use for both employees and outside contractors. As personnel change, the program should be reviewed and updated.

Hot work permits – An important element of a hot work permit program is the permit itself. Zurich can provide hot work permits in support of the recommended hot work program. Supplies may be obtained free of charge. Contact your Zurich consultant to request a supply of permits.

Work area inspection and fire watch – Another important element of a hot work permit program is a work area inspection before the permit is issues. Appropriate conditions should be in place with flammables and combustible materials removed or protected, portable fire extinguisher or fire hoses provided, and a fire watch posted during and at least 30 minutes following the work.

Smoking control program

Given the amount of combustibles in a warehouse occupancy, it should go without saying that a "No Smoking" policy or some form of smoking control program is essential.

Program elements – The best policy is to eliminate and prohibit smoking at the workplace; however, if this is not feasible the following guidance is offered to assist in developing an effective policy.

- Identify both designated "Smoking" and "No Smoking" areas
- Locate designated smoking in areas detached from the building when located outside or well separated from combustible materials or classified electrical areas when located inside
- Smoking material receptacles should be:
    - Designed to prevent lit cigarettes from falling or rolling away
    - Made of non-combustible material
    - Limited to use with smoking materials only (no trash)
    - Secured to avoid being knocked over
    - Designated location for discarding receptacle contents should also be considered as there is the possibility of ignition from the discarded smoldering smoking materials

Other items to consider for a successful program:

- Management commitment that includes "leading by example"
- Program structure that includes incentives or corrective actions
- New hire and annual training

Smoking laws and regulations – Keep in mind, particularly in the United States, laws can be a factor when determining where smoking is or is not permitted. Many US states have passed laws specifically identifying where smoking is banned.
When smoking policies are initially instituted, employees may be reluctant to comply. This being the case, it takes management commitment to make these programs effective.

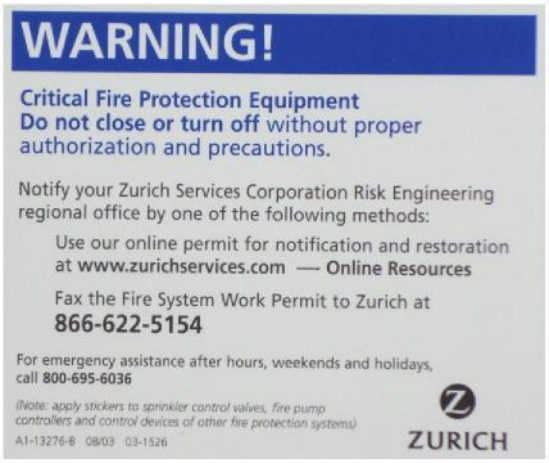
Fire protection impairment control program –

The Zurich Fire Protection Impairment Program is available for use online, by e-mail or by fax. Program materials can be downloaded from our web site www.zurichservices.com, or printed material can be provided. The program should be established in consultation with your local Zurich Consultant.

Impairment examples – A fire protection impairment occurs when any fire protection system is taken out of service. This includes sprinkler systems, underground water mains, fire pumps, fire pump suction tanks, gravity tanks, detection systems, and other fire protection systems commonly found in warehouses.

Warehouse impairment challenges – Warehouses offer a number of special challenges, including but not limited to:

- Large number of fire protection systems
- Potential for significant dollar values under a single roof
- Variety of combustible loadings and high challenge storage arrangements
- Horizontally contiguous fire spread opportunity due to large open floor areas
- Temperature controlled spaces including freezers
- Potential for an impairment to multiple fire systems due to a water supply or fire main outage



Impairment management value proposition – Fire protection systems in warehouse occupancies have proven to be key components to mitigating loss once a fire starts. Properly managing the warehouse space, operations, and any other activities when a fire protection system is out of service is essential as the opportunity for a fire to get out of control during this time, increases exponentially.

Emergency response program

Both experience and common sense tell us that actions taken during an emergency are more effective if carefully planned in advance. This is particularly true with fire emergencies, where prompt, effective actions can reduce property losses.

Sprinkler protection expectations – It is important to understand that fire protection standards such as NFPA 13 "Standard for the Installation of Sprinkler Systems" only expect sprinklers to control or suppress a fire. In all cases, it is anticipated that final fire extinguishment will be achieved through the manual human intervention of public or private fire service personnel.

Water supply duration requirements – It is also important to understand that NFPA 13 only requires a one to 2.5 hour water supply durations for automatic sprinkler systems protecting storage occupancies. Where fire system water supplies are provided from limited on-site supplies (tanks, cisterns, or reservoirs), their limited duration will establish the available time during which effective fire service intervention must be achieved.

Fire service challenges – Fire emergencies in warehouses will be a challenge to any public or private fire service organization. The combination of large floor areas, limited points of access and high ceilings make these facilities much different from the typical structures encountered by the fire service. Add in the heavy combustible loading represented by the storage, uncertainty of fire system performance, limited knowledge of fire location, questions regarding building integrity, and potential for storage collapse, and the fire service officer-in-charge has many reasons not to commit personnel to an aggressive internal fire attack. Where fire service personnel are not trained, equipped, and prepared to perform final fire extinguishment activities, it is possible that water supplies will eventually be exhausted and the warehouse will be lost even though sprinklers performed as intended.

Photo source: FEMA

Pre-incident planning – NFPA 1620 "Recommended Practice for Pre-Incident Planning" provides common guidance for fire service pre-incident planning in any occupancy, and Chapter 20 "Warehouses

and Storage Occupancies" provides specific guidance for pre-incident planning for warehouse. However, it is important to note, that all guidance in this recommended practice is general and must be carefully integrated with complete knowledge of local conditions.

Before an emergency – Before an emergency, proactively engage the public fire service to familiarize them with your site, buildings, storage arrangements, and fire protection systems. Be familiar with NFPA 1620 and the information that will be beneficial to the public fire service.

During an emergency – Most facilities no longer maintain on-site fire brigades; however, that does not mean that your staff will not play critical roles supporting the fire service during an emergency. When a fire alarm sounds, key personnel such as the warehouse manager, facilities staff, and security personnel should mobilized to assist the arriving fire service responders. They can provide access at normally closed site gates, access to fire system facilities, access to buildings, information regarding the location of the fire, status of fire systems, status of building evacuation, status of utilities, and much more. Your staff will be a key asset to the fire service incident commander for the duration of the emergency. They must be organized into an effective fire team even if they will not be directly involved with fighting the fire.

Surveillance and security program

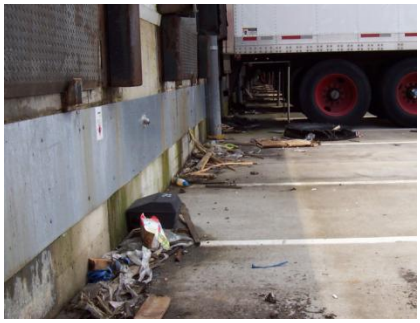
A surveillance and security program will not only help prevent theft of product, but will help prevent against arson. Arson fires can be set by a disgruntled employee or set to cover a criminal activity. Regardless of the intent, it is important that basics steps be implemented to reduce exposures to burglary, vandalism, or set fires. The following is a list of measures to consider, which include both passive and active protection:

- Passive protection
    - Fencing around buildings, with gate that are locked during non-working hours
    - Locking doors, trailers, vehicles, etc.
    - Locking sprinkler control valves in the open position
- Active protection
    - Security officers stationed at gates and conducting rounds during non-operating hours
    - Burglar alarms, which may include door contacts, motion detection, noise detection, etc.
    - Visitor registry and monitoring program
    - Badge access to move from one area of the facility to another
    - Closed circuit television

Housekeeping program

Good housekeeping can be easily overlooked as an important component of a comprehensive warehouse fire prevention program. Poor housekeeping can contribute to the magnitude of any fire. The following are some examples of how inadequate housekeeping can add to a loss:

Aisle storage – When combustible materials are stored in an aisle, a fire can be allowed to spread from rack to rack across an aisle. Aisle storage can slow employee evacuation as well as emergency response. The design of an automatic sprinkler systems is often based on the separation distance (aisle width) between racks. Without the anticipated separation, the sprinkler systems may not provide adequate protection.



Debris accumulation – Inside: Splintered wood pallets, corrugated cardboard, plastic wrap, and similar debris can be readily be ignited by various sources. As these materials are smaller in size, they can burn quickly and contribute to a larger fire.

Outside: Debris can accumulate on the ground at the dock door. Vehicles, smoking,

and electrical faults have be the source of ignition for trash fire that then spread to trailers and the building.

Contractor control program

Many losses in warehouses can be traced directly to human error. Often times, the root cause of the loss can be directly attributed to contractors performing work in an unfamiliar environment. Do not assume contractors are aware of the hazards around them. Contractors should be closely supervised when they are on site. Some common procedures and precautions should include:

- Required orientation program
- Sign-in and sign-out
- Escorts to provide monitoring at all times
- Enforcing all hot work procedures
- Enforcing fire protection impairment procedures
- Inspection and approval of work by on site personnel

Fire protection equipment inspection

Fire protection systems in warehouse occupancies have proven to be key components to mitigating loss. For protection systems to be effective, they must operate efficiently, automatically, and without delay. A carefully managed maintenance program is the key to success.

When components of the sprinkler system malfunction, a fire can grow unchecked. The quick operation of the fire protection system is critical to fire control in the early stages (incipient) of growth. Fires grow very rapidly with no fire protection in place.

- Weekly
    - Unsupervised/unlocked sprinkler control valves should be inspected
    - Water pressure at the risers should be checked and recorded
    - Air pressure on the dry and preaction sprinkler systems should be checked
    - Churn test should be conducted on the booster/fire pump
- Monthly
    - Fire extinguishers should be inspected
    - Sprinkler control valves should be visually inspected to ensure they are open (locked and/or supervised)
- Quarterly
    - Test all sprinkler system water flow alarms
- Semi-annual
    - Test sprinkler waterflow alarms
    - Test supervisory signals such as sprinkler control valve tamper switches
    - Test the actuation system for each gaseous extinguishing system
    - Fire doors should be drop-tested
- Annual
    - All fire protection valves should be exercised
    - Private fire hydrants should be checked to ensure they are in good condition and drained
    - Full flow test should be conducted for the fire/booster pump

- An outside service should inspect the fire extinguishers
- Test smoke detectors, heat detectors and manual pull stations

Details of a complete program can be found in NFPA 25 "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems".

Conclusion

The foundation of the Zurich Consulting philosophy is prevention. No loss can be smaller than the loss that is prevented, and any loss allowed to occur can grow into the worst-case disaster. To avoid the disruption of a small fire or the consequences of a major warehousing disaster, prevention is the key. A comprehensive and management supported loss prevention program can have a huge impact in maintaining a fire safe facility.

References

1. NFPA 13 Standard for the Installation of Sprinkler Systems. National Fire Protection Association, Quincy: NFPA, 2007.
2. NFPA 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems. National Fire Protection Association, Quincy: NFPA, 2008.
3. NFPA 51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work. Quincy: NFPA, 2003.

Related documents

Zurich Services Corportation, additional Risktopics:

1. Warehouse fire prevention: 2-5.001
2. Warehouse fire prevention - maintenance strategy: 2-5.002
3. Warehouse fire prevention – management of change: 2-5.003

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