DEPARTMENT STORES AND SHOPPING MALLS

INTRODUCTION

Losses at department stores and shopping malls have emphasized four significant factors that contribute heavily to the loss potential at these locations. These factors are:

- Dividers and fixtures of combustible construction that are unsprinklered or arranged such that normal sprinkler distribution is obstructed. Fires within these concealed spaces are difficult to detect in the incipient stage. Once established, a fire is difficult to control, causes operation of an excessive number of sprinklers, and increases the probability of smoke and water damage.
- Escalators, inclinators and atriums are open to all floors. The heating, ventilating, and air conditioning (HVAC) systems are not arranged to automatically shutdown or are not programmed to change to a smoke removal/control mode of operation. As a result, smoke from a fire spreads uncontrolled throughout the store or mall.
- Unsealed floor penetrations by pipe, conduit and ducts, and the lack of basic floor drainage and waterproofing contribute to allowing the water from the sprinklers and hose streams to pass through to the floors below.
- Exposure of the department store (also known as anchor stores) from mall occupancies, and the mall from other stores.

For the purpose of this document, a tenant is a business (a store, restaurant, office area, etc.) other that the anchor store within the mall property. Tenants usually have a smaller staff and smaller floor area than the anchor stores and usually share utilities, such as sprinkler systems, HVAC, and plumbing.

POSITION

Because shopping malls and department stores are open to the public and have frequent employee and tenant turnover, it is difficult to keep all parties abreast of *OVERVIEW*. It is therefore very important that management retains a core of employees who are capable of maintaining the building and equipment, providing loss prevention and fire protection equipment inspections, handling impairments, providing surveillance, and supervising hot work and new construction. Management should also provide employee training, smoking regulations, and programs for handling insurance recommendations.

Construction

Cut off department stores from the shopping malls with a free-standing, 4 h rated fire wall built in accordance with NFPA 221 and PRC.2.2.1. Protect all openings to the mall with double, 3 h rated fire doors, one on either side of the opening.

Use 2 h fire rated fire barrier walls, extending from floor to underside of the roof deck or flooring system, to separate the tenant spaces within the shopping mall.

Cut off all stock rooms and receiving areas from the rest of the facility with 1½ h rated fire partitions. Protect all openings with single, 1 h rated fire doors.

Cut off dock areas, trash rooms, carpenter shops, etc. with 3 h rated fire wall. Protect all openings with single, 3 h rated fire doors. Use 3 h rated fire shutters for the trash compactor openings.

Cut off elevators, mechanical, and electrical switchgear rooms with 2 h rated fire walls. Protect all openings with single, 1½ h rated fire doors. Locate electrical transformers in a cut off transformer vault with a 3 h rated fire walls. Install electrical equipment in accordance with the *National Electrical Code*,® NFPA 70 Article 450.

Enclose stairways, elevators, chutes and other vertical openings with 2 h rated fire barrier walls; protect all openings with single, 1½ h rated fire doors. Provide 2 ft (0.61 m) deep draft curtains or smoke barriers around escalator openings in department stores. (See Figures 1 and 2.)

Pitch the floor in front of all openings between the mall and stores away from the store. Fill in all openings in the floors for pipes, conduits, and ducts with an equivalent listed fire rated filler. Waterproof the floors and provide a pitch to drains to collect any water.

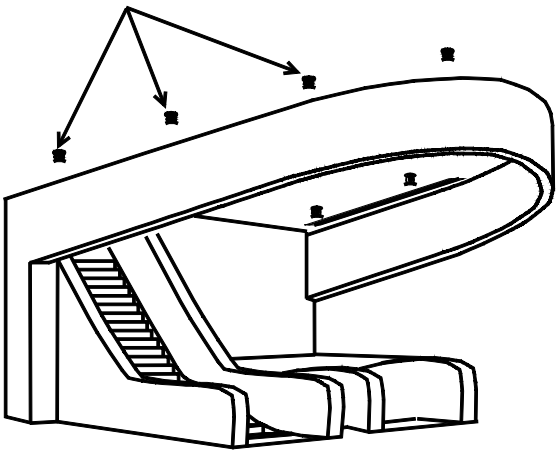

Figure 1. Draft Curtains And Sprinklers Around Escalator Openings.

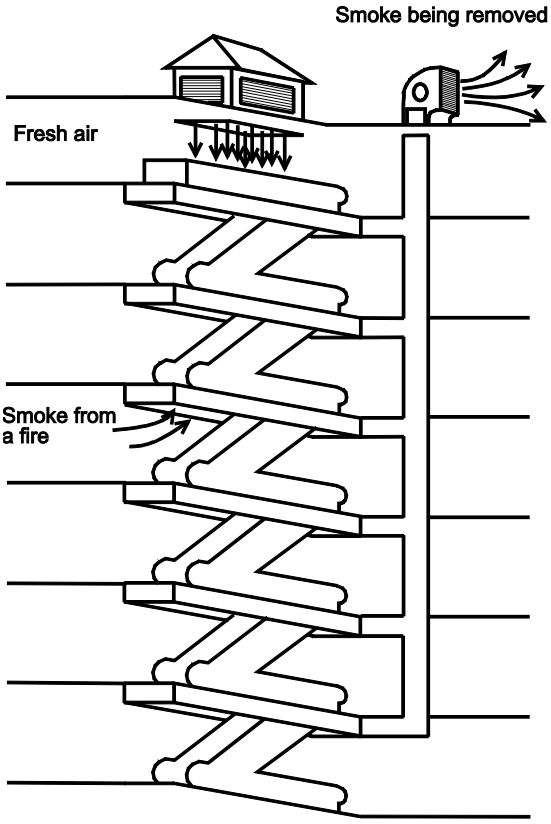

Figure 2. Smoke Control System Around Escalators.

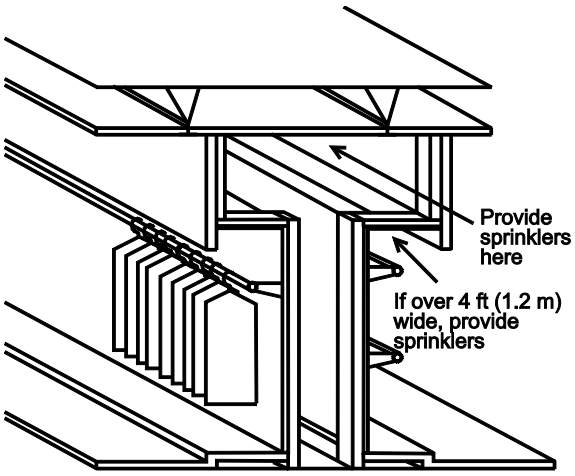

Figure 3. Concealed Spaces Created By Dividers.

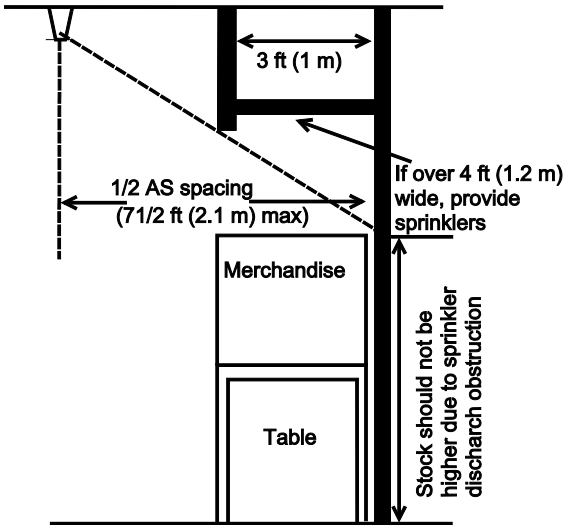

Figure 4. Sprinkler Obstruction Created By Soffits.

Construct suspended ceilings and their supports of a material that is listed, having a flame spread and smoke development rating of 25 or less. Use listed, noncombustible insulation and adhesives for pipes and ducts. Use UL Class I or equivalent filters for the HVAC system. Use material with a rating of 25 or less for flame spread and smoke development.

Construct dividers and fixtures of noncombustible material and arrange them so they will not block sprinkler discharge. (See Figures 3 and 4.) Protect all concealed spaces created by these dividers and fixtures with automatic sprinklers and keep the spaces free of combustibles. Provide access openings to permit servicing of the sprinklers. Provide heat where necessary to prevent freezing of the pipes. Install wiring and electrical fixtures within the partitions in accordance with the National Electrical Code,® NFPA 70, using listed equipment.

Smoke Control

Install a mechanically operated smoke removal system for the mall area and one for the tenant areas. (See PRC.2.1.4.) Design these systems to restrict the movement of smoke throughout the building. Size the system covering the mall for a minimum of six air changes per hour for malls (excluding the tenant spaces) having a volume of up to 600,000 ft^3 (17,000 m^3), and a minimum of four air changes per hour for larger malls. The volume of the mall is considered the area from the entrance to the tenant spaces to the roof.

Size the smoke control system so that no single control system is larger than the sprinkler system area or 52,000 ft^2 (4830 m^2).

Arrange the smoke control systems for automatic actuation by either a smoke detection system or upon sprinkler waterflow, and for manual operation. Install smoke detectors in the return air duct of the heating and air-conditioning system if the system operates at a volume greater than 10,000 cfm (4.7 m^3/s). Install the detector ahead of any fresh air intakes. Install smoke detectors on the tenant side of all openings into the mall where open-type security gates are installed.

If a fire is detected in the mall area, arrange for the smoke control system for the mall to go into 100% exhaust and the systems covering the tenant area remain in normal operation. If a fire is detected in a tenant area, arrange for that area to go into 100% exhaust, and the supply air to that zone to shut down. All adjoining tenant area zones should remain in normal operation, and the mall system should be in 100% fresh air supply.

Arrange the fresh air intakes so that exhausting smoke cannot re-enter the facility. Also arrange the fresh air intakes so any smoke from an exposing fire cannot enter the facility.

Fire Protection

Provide a minimum 10 in. (250 mm) looped yard main equipped with hydrants and sectional control valves around the mall or department store in accordance with NFPA 24. Install curb box control valves on all hydrants. Provide a 4 in. (100 mm), 2 way, fire department connection on the underground main. (See PRC.14.5.0.1.) For shopping malls, connect the loop to two reliable water supplies (either two connections to two different, adequate, public water mains, or one connection from an adequate, public water main, gravity tanks, and a fire pump and tank.) (See PRC.14.0.1.)

Install a wet pipe sprinkler system throughout the mall and department store in accordance with NFPA 13 and PRC.12.1.1.0. Design the sprinkler system for Ordinary Hazard Group 2 for the sales area, mechanical rooms, elevator rooms, electrical rooms, the open mall areas and penthouses. Install sprinkler protection in all concealed spaces created by soffits, displays and partitions. Soffits or other equipment, such as ducts and conveyors that are greater than 4 ft (1.2 m) wide, require sprinkler protection under them. The maximum depth of an unprotected soffit should conform to NFPA 13. Protect stock rooms and storage areas in accordance with NFPA 13 and PRC.12.1.1.0. Protect stock areas containing flammable, combustible liquids or aerosols, the quantity and protection should be in accordance with NFPA 30 and NFPA 30B and PRC.8.1.0 and PRC.10.2.1.

Protect loading docks exposed to freezing conditions with a dry pipe system designed to Ordinary Hazard Group 2 for large docks. Where allowed by health officials, small docks could be protected with an antifreeze system with a maximum capacity of 40 gal (151.2 L).

Protect parking garages with a dry pipe sprinkler system design per NFPA 88A and PRC.17.14.3.

Provide an individual control valve on all sprinkler systems for each tenant area in an accessible location to allow work to be conducted in that area without impairing the protection to the adjacent tenants. In multistory shopping malls, install individual control valves for each level. Install a separate control valve in trash chutes, escalator pits, and elevator shafts. Protect the valve from freezing.

Install 1 in. (25 mm) inside hose connections on a basis of one connection for every 10,000 ft^2 (930 m^2) of floor area. Equip each hose connection with 75 ft (25 m) of 1½ in. (40 mm) listed, woven-jacketed lined fire hose and an adjustable spray nozzle. Locate these connections in areas where large quantities of combustible materials can be found, such as loading docks, receiving areas, display storage areas, storage rooms, or trash baling rooms.

Protect all cooking range hoods with automatic fire extinguishing systems, such as those using carbon dioxide, dry chemical, foam-water, or sprinkler. Guidance can be found in NFPA 96. Provide these systems with an alarm to a constantly attended station and turn off the gas or electricity to the cooking equipment. Do not manifold exhaust ducts.

Surveillance

Provide a central station holdup alarm service or combination proprietary holdup alarm service and recorded watch service for protection of the central cash handling area, jewelry, fur, coin and other high value retail departments during normal operating hours. During nonoperating hours, store precious stones, more expensive gold jewelry, and coins in a listed safe and store furs in a fur vault. Provide a UL certified Limited Mercantile Central Station burglar alarm or equivalent for locations outside North America to cover the central cash handling area, jewelry and coin safe, fur vault, display cases, and storage drawers.

Provide a UL certified, central station signaling system or combination proprietary alarm service in accordance with NFPA 72 and PRC.11.1.1.0 and recorded watch service to monitor sprinkler system waterflow, extinguishing system discharge, smoke detectors, all 2½ in. (65 mm) or larger valves, low building temperature, fire pump and tank alarms if provided, and intrusion detection for the mall and department stores.