

CHAPTER 8

SAFETY OF USERS

SECTION 801

HAZARDOUS MATERIALS

Although performance-based design approaches are relatively new to the building construction and fire-safety arenas, such approaches have been in widespread use in the hazardous materials arena for quite some time. Numerous regulatory programs enacted by the federal government in the 1980s and 1990s encouraged or required the use of performance-based risk management techniques for many facilities and processes involving hazardous materials. The documentation associated with these programs served as an excellent resource for use in the development of the hazardous materials provisions found in this code.

The objective and functional statements found in Section 801 are replicated directly from Part III, Chapter 22: Hazardous Materials. This was done to provide correlation and consistency between the building and fire provisions found in the performance code. Additionally, as opposed to replicating the applicable performance requirements in the two chapters, it was decided to simply reference Chapter 22: Hazardous Materials, in Section 801.3.

801.1 Objective

The provisions protect the occupants of the building, people in the surrounding area, and emergency response personnel.

The code is also concerned with some level of property protection as it relates to the building and its contents. This statement is based on the belief that the current prescriptive codes are intended to cover such issues. However, it is questionable whether employees working with an extremely hazardous process are intended to be protected, insofar as they should be made aware of the risks and that protection can be difficult to achieve. Also, property protection may not have been intended to be regulated within the prescriptive code. It may be that the life-safety requirements, such as sprinklers and fire-resistive construction, may also provide some protection to property. This may be an issue for debate when the prescriptive code is analyzed in more detail. The objective for Section 801 is the same as the objective for Chapter 22: Hazardous Materials.

801.2 Functional statements

Functions that need to occur to protect people and property include designs that provide an environment that prevents and mitigates the effects of storing, using (including dispensing of), and handling hazardous materials. These design features may include sprinklers, proper ventilation, spill control, secondary containment, and a specific electrical classification. For the most part, these provisions are geared toward facilities that use large amounts of hazardous materials versus those that use a small amount of a flammable solvent for such things as cleaning small parts on an occasional basis.

Building and facility function also includes certain administrative controls. Hazardous materials processes depend heavily on proper training and procedures. In some cases, this function is more effective than other approaches, insofar as some facilities have a vested interest in keeping the prevention and mitigation features in place because of the large loss associated with business interruption. Administrative controls include the development and maintenance of emergency plans and the assignment of specific duties to personnel who promote fire prevention and take particular actions after a hazardous material spill has occurred. Also, many facilities are subject to the regulations of OSHA and EPA, which in many ways are more performance-based in nature.

Currently, the approach of prescriptive codes to hazardous material requirements is based on the limitation to maximum allowable quantities of hazardous materials within control areas. This is a prescriptive approach that would not easily translate to a performance approach. The risk management techniques used by agencies such as the EPA and OSHA may be very helpful to a performance-based approach for hazardous materials. As mentioned before, these federal guidelines were used to develop the performance requirements found in Chapter 22.

801.3 Performance requirements

The performance requirements are found in Part III Chapter 22. Reference to that location has been provided in Chapter 8.

SECTION 802

HAZARDS FROM BUILDING MATERIALS

This section is concerned with injuries to building occupants related to the building materials themselves. There are two areas this section addresses

- Contact with glass (glazing) and
- Emission of liquids, gases, radiation, or solid particles emitted from building materials.

Glass is used in many occupancies because of its architectural appeal. Depending on how glass is used within a building, it can be hazardous to occupants during everyday use of the building. Glass walls may be mistaken for a path of travel, or the glass can be subject to breakage due to its location and arrangement. Other hazards related to building materials include harmful fumes from carpeting or the use of materials such as asbestos. The New Zealand regulations reflect these other hazards, but in the United States, groups such as the Consumer Products Safety Commission tend to regulate such hazards. However, the performance requirements related to these other hazards were kept within the document to generate discussion.

802.1 Objective

The objective of this provision states that the code intends to protect occupants from injury resulting from the impact of glass or other transparent materials or injury resulting from the breakage of such materials. Additionally, as noted above, this section may also be applicable to such hazards as asbestos in buildings and off-gassing from carpet materials.

802.2 Functional statement

To protect the occupants, glass and similar materials must be used in a manner that avoids the risk of injury. Such injury can come from impact itself or from the breakage of such material, resulting in sharp edges likely to cause cuts. Also, with regard to the other building materials hazards such as asbestos or perhaps insulation, the approach could be to prohibit or perhaps properly seal off the leakage of dangerous chemicals or release of particles.

802.3 Performance requirements

The use of these materials is outlined in the performance requirements. Glass or any other brittle material that building occupants may come in contact with shall break upon impact in a manner unlikely to cause injury. The typical approach is to use tempered glass or other equivalent material able to resist impact. Protection from impact may be via guards or other types of barriers. Avoiding harmful concentrations of materials may necessitate a proper seal, proper ventilation, or perhaps avoidance of material use.

SECTION 803

PREVENTION OF FALLS

This section prevents people from falling over the edge of a floor surface where there is an abrupt change in floor elevation and prevents people from falling from openings in a building's envelope (such as window openings in a wall or a roof surface). Because the prescriptive codes have usually required this edge protection where there has been a change in elevation of 30 inches (762 mm) or more, that threshold has been carried over to this performance code. Essentially, in this case, there is only one design performance level.

803.1 Objective

The threshold used in the prescriptive *International Building Code* is 30 inches (762 mm). Therefore, the objective relates to the need to protect people from the risk of falling more than 30 inches. This means that the performance code, like the prescriptive code, does not intend, generally, to prevent falls on surfaces less than 30 inches apart vertically. However, Section 1901.3.4 requires that the means of egress take into account human biomechanics and expectation of consistency. Therefore, the performance requirements relate to the performance of the guard, not the building pedestrian system.

803.2 Functional statement

The key to this functional statement is “unintentional.” It would require sophisticated and expensive technology to prevent someone from falling who is determined to do so.

803.3 Performance requirements

The performance requirements are such that some sort of protection must be provided that prevents people from going over an edge of a floor surface that is more than 30 inches (762 mm) higher than an adjacent floor surface. The protection must be sufficient to protect against falls by small children as well as adults. Therefore, the protection must be able to withstand the force of an adult as well as withstand the attempts by a small child to somehow squirm through the protection. The concern of children passing through is addressed in the prescriptive code by limiting openings such that a 4-inch diameter sphere cannot pass through any openings to a height of 34 inches. The sphere represents a small child’s head, and the height reflects the height of the children that are being protected.

This section also addresses roofs that have permanent access, such as a hotel roof that contains a pool.

SECTION 804

CONSTRUCTION AND DEMOLITION HAZARDS

This section requires that the public, personnel on a construction site, and property adjacent to a construction site be protected from the hazards typically associated with demolition and construction operations. The provisions parallel those of Chapter 33 of the IBC.

804.1 Objective

The objective statement in this section is self-explanatory. It parallels the intent of Chapter 33 of the IBC, which is to require protection of people and property from the various hazards imposed by construction or demolition operations.

804.2 Functional statement

Functional statements give the user specific information regarding what could possibly be of concern regarding a construction or demolition operation. Namely, excavation operations and large lift operations can damage adjacent property. Nearby pedestrians can be injured without proper precautions. In addition, the provisions address the “attractive nuisance” hazard associated with construction sites by requiring some level of protection against the entry of unauthorized individuals. Finally, prevention measures to avoid hazards such as fires or explosions are necessary. Fires are more likely to occur during construction than during normal use of the building. See the user’s guide for Section 804.3.

804.3 Performance requirements

The hazards associated with construction or demolition operations are related to lift operations, stability of scaffolding, movement of personnel, excavation, other operations that impact an adjacent property, and the ability of a partially completed structure to resist natural hazards such as wind and rain.

Unique fire hazards can exist during construction and demolition operations. Most are associated with the temporary storage and use of flammable and combustible materials on the job site. Even in buildings of noncombustible construction, it is common to find stores of lumber for forms or bracing that represent a significant fuel load. Many finishes and adhesives are flammable in an uncured state and represent a fire hazard if not used in accordance with good safety practices. Also, during construction or demolition, the normal fire safety features of the building are not functional. Fire-resistant construction features are incomplete, and detection or suppression systems are not operational. Temporary equipment such as space heaters, work lights, or welding equipment represent sources of ignition and should be used carefully.

SECTION 805

SIGNS

This section provides criteria for the incorporation of signage into a building or facility. In the prescriptive code, signs are addressed in individual sections by providing provisions for specific features of a building or structure. An incidental description of the physical characteristics and desired placement of the sign often accomplish this. Here we have centralized the performance requirements for signs to apply to any building feature requiring signage, whether that be an exit sign or a marking of a specific feature such as the storage of hazardous materials or an accessible route.

SECTION 806

EMERGENCY NOTIFICATION

This section addresses the need for the notification for some manual action to preserve the safety of people or limit damage to a building or structure or its contents. Some of the conditions that might warrant emergency notification include fires, storms (tornado, hurricane, severe thunderstorm), bomb threats, hazardous materials releases, hazardous conditions from utilities, and any other condition that could lead to injury or property damage.

806.1 Objective

The objective statement identifies the requirement that emergency notification systems be provided to initiate manual intervention needed to limit hazards to people or property.

806.2 Functional statements

The first functional statement introduces the concept that notification should occur in a timely manner so that manual action can be taken without harming those taking the action.

The second functional statement discusses the need to provide sufficient information to first responders so that they can identify, locate, and mitigate hazards efficiently and safely. This overlaps with the requirements of Chapter 20: Emergency Notification, Access and Facilities.

806.3 Performance requirements

The means of notification need to be effective for everyone being notified. Thus, if people with hearing impairments are among those to be notified or if high ambient sound levels are expected, the means of notification must not depend solely on audible information. If the egress plan involves phased evacuation or relocation to safe places within the building, means must be provided to maintain communication to all those who may have to be evacuated later.

In some occupancies, people are expected to be sleeping at times, and notification systems must be designed so that there is reasonable assurance that these people will be awakened. Notification might not be an alarm system per se. For example, notification might be via the odor built into liquefied petroleum gas. Additionally, detection and notification of a failure could be through the observation and reporting of staff. Not all buildings warrant the use of notification devices.

ACCEPTABLE METHODS

Hazardous Materials. The acceptable method for these provisions is found in Chapters 3 and 4 of the *International Building Code*. Also, the prescriptive *International Fire Code* has many detailed provisions for hazardous materials in Chapters 27 through 44.

Hazard from Building Materials. Following Chapter 24 of the IBC is one way of achieving the objectives, functional statements, and performance requirements of this section with regard to glass.

Prevention of Falls. Refer to Chapter 10 of the *International Building Code*.

Construction and Demolition Hazards. Refer to Chapter 33 of the prescriptive IBC.

Signs. The acceptable methods for this particular section are included throughout the building and fire codes. More specifically, Chapters 10 and 11 of the *International Building Code* have provisions directly related to signage. The *International Fire Code* has provisions throughout related to signage.

Emergency Notification. First, the fire and building codes do not require notification in all cases. The need for notification in a performance-based design will be based on whether the occupants need to be notified of a problem in order to provide them with enough time to take specific actions.

Various standards provide guidance on the number and distribution of audible and visible devices that are effective at notifying people in emergencies. Information on the conveyance of meaningful messages is less straightforward. If common devices are used for a range of emergency conditions, some means of differentiating the hazard is needed if the action to be taken is different. The pulsing of notification devices in a specific pattern has been used, but this requires training and signage to be effective. In recent years, new methods of transmitting textual information have been developed, but these must also account for the fact that some people may not understand English instructions. All these possibilities should be considered in the design of an effective notification system.

Refer to Chapter 9 of the *International Building Code* and *International Fire Code* for fire alarm requirements and Chapter 4 of the *International Building Code* for emergency alarms.

