

High-Rise Building Evacuations Fact Sheet

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Fires in recent years have renewed public interest in how to evacuate high-rise buildings quickly and safely. Since modern high-rise buildings are of fire-resistive construction and have reliable enclosed stairways, fires are generally confined to individual office furnishings or the contents of one floor.

Thus, it is important to understand that fire in a high-rise building is not necessarily a cause for panic. Nevertheless, occupants must become well-acquainted with the locations of stairways in the building and the procedures to follow in case of fire. Fire protection systems such as fire alarms, sprinkler systems, and fire suppression systems can prevent disasters.

These **three key emergency preparedness elements** can help ensure safe evacuations in high-rise buildings:

- **Early warning** typically through an alarm or voice communication system;
- **Adequate means of egress** (exit routes); and
- **Occupant familiarity with the fire protection plan** through knowledge and practice.



Do High-Rise Evacuations Differ from Those in Other Buildings?

Evacuating tall buildings requires a lot of people to travel great vertical distances downstairs. For example, in the 1993 terrorist bombing of the World Trade Center, it took 6 to 8 hours for some occupants to exit the building.¹ The physical demands made on high-rise occupants – especially the elderly or those with disabilities or injuries -- can exceed many of their capabilities.

Evacuating high-rise buildings may require specially trained rescue teams to access the building and provide aid due to the building height, layout, number of people, and the inability of some occupants to evacuate without assistance. All of this must be accounted for when considering evacuation routes, escape planning, and emergency management systems.

The National Fire Protection Association's *Life Safety Code*® ([NFPA 101](#)) establishes standards for evacuations that require all new and existing high-rise buildings to have multiple stairwells and elevators. It also requires high-rise buildings to have automatic fire sprinkler systems with a control valve and water flow device on each floor to help control a fire and lessen the need to evacuate all occupants. Typically, the occupants of the fire floor and the floors immediately above and below it should use the exit stairs to evacuate the building as soon as possible. However, these building systems are designed to control a typical fire, not one caused by a catastrophic event, such as a commercial airliner crashing into the building.

Are Regular Emergency Fire Drills Required?

[NFPA 101](#) requires building owners and operators to hold regular emergency drills in "buildings occupied by more than 500 persons, or by more than 100 persons above or below the street level," [[NFPA 101 39.7.2](#)]. This should include training and drills that involve an evacuation of the building.



In high-rise buildings, "all occupancy types" including commercial, residential, and hospital occupants², along with the following industries are specifically required to instruct employees and hold drills whenever practical:

- ambulatory health care facilities;
- detention and correctional facilities;
- day care centers;
- educational institutions and dormitories;
- hospitality and corporate workplaces;
- retail stores;
- residential boarding and care facilities; and
- assembly and manufacturing plants.

Can You Use Elevators During an Evacuation?

Historically, fire codes have stated you should never use an elevator during a fire or similar building emergency. However, the 9/11 attacks on the World Trade Center towers led to new provisions in [NFPA 101 7.14](#) and building codes on the use of elevators in fires and other emergencies. They provide requirements for elevators that serve firefighters and occupant evacuation.³ Where elevators are used for occupant egress, the elevator SHALL NOT count:

- as one of the required means of egress;
- in determining the capacity of the means of egress; and
- to satisfy the arrangement of means of egress requirements.

Fire Service Access Elevators are used by firefighters to fight fires and to evacuate people from the building. These elevators are equipped with emergency signaling devices

and may be supplied with standby power so that they remain operational when regular electrical service is lost. They are designed to be protected from smoke and water. Building codes address where they are required, the number that must be provided, car capacity, and other features.

Occupant Evacuation Elevators, which are less common, allow building occupants to independently evacuate. Building codes include requirements for these types of elevators where they are provided. Like Fire Service Access Elevators, they are designed so that they remain operational in emergencies and are protected from smoke and water. Specialized messaging is required to let building occupants know when the elevators are available for use in an emergency and when other evacuation methods should be followed.

Further information on Fire Service Access Elevators and Occupant Evacuation Elevators can be found in [NFPA 101 7.14](#) and [ASME A17.1/CSA B44](#).

How can you tailor and communicate emergency instructions to building occupants?



High-rise building fire alarm systems are required to have emergency voice communication capability.⁴ Trained emergency personnel assess the emergency and can then broadcast a variety of specific messages to the occupants. The occupants potentially in the greatest danger are the first to be instructed to use the exit stairs to begin their descent. Occupants on other floors might be instructed to stay where they are and await further instruction. In these cases, only occupants on the fire floor and the floors immediately above and below typically receive the message. Should the scale of the emergency increase, the announcements can be expanded to include additional floors, or if need be, the entire building.

Should occupants move to the roof if stair travel is too dangerous?

No. If exiting down the stairs will take too long or appears too dangerous, occupants SHOULD NOT go to the roof of a burning building.⁵ Helicopter rescue from a burning building is an extremely dangerous procedure for pilots, firefighters, and occupants. In severe fires, the large thermal currents generated by the heat from the fire can cause the helicopter to buffet up or down, making it hard to control. Plus, the down thrust from the helicopter rotor can force smoke and super-heated air on top of firefighters.

Because of these dangers, helicopter rescue is not a standard procedure in the U.S. or most foreign countries and is highly unlikely. Therefore, going to the roof of a high-rise building during a fire can be a waste of valuable time and life-threatening.

How to evacuate people with mobility impairments?



All occupants must be covered under any written evacuation plan. If a floor must be evacuated, people with other mobility impairments should relocate to an area of refuge. In buildings with automatic fire sprinkler protection, this may be to an adjacent compartment or office space. In other cases, the building may have areas of refuge. These spaces may be located as stand-alone compartments on the floor, or they may consist of oversized landings in stairwells. Regardless of which feature is available, the fire plan should include having people with mobility impairments wait in one of these designated spaces until fire department personnel can remove them. Often these spaces are provided with a two-way communication device so mobility-impaired people can provide rescue personnel with their location. The building safety plan may incorporate a "buddy" system. In this case, anticipate situations where the "buddy" may not be available in an emergency. In every case, and regardless of one's abilities, people with disabilities should ask their employer for detailed evacuation information and request a role in crafting the plan.

For more information, download the Texas Department of Insurance, Division of Workers' Compensation free publication, [*Emergency Procedures for Employees with Disabilities in Office Occupations Resource Guide*](#).

Should trapped occupants break a window?

Occupants trapped in a high-rise building should try to locate themselves in an area where they can:

- close the door;
- seal the cracks to keep smoke out;
- use a telephone to call the fire department;
- report their exact location in the building; and
- try to be patient.

Emergency rescue of high-rise building occupants can take a long time. Occupants can signal their position to rescue personnel from a window using a light-colored cloth, but it is not advisable to break a window. If an occupant can open the window slightly, it is generally safe to do so to allow fresh air in, but be prepared to close it if smoke comes in. A broken window cannot be adjusted to block smoke from entering the room. Finally, falling glass from a broken window can sever fire hoses and severely injure people who are evacuating, and rescuers and firefighters below. It is extremely dangerous to use a window to escape from anything higher than the second floor.

Should high-rise buildings have an exterior escape device?

Items such as escape chutes and controlled descent devices are permitted to provide escape routes in special structures such as some towers and special manufacturing environments. They are not permitted, nor recommended by U.S.-based codes for commercial and public buildings. Such devices do not come close to the level of protection provided by the other code-mandated features.

Should nearby buildings be evacuated if a neighboring high-rise building is on fire?

There is no need to evacuate a neighboring high-rise building during a typical fire. However, remain vigilant and determine if there is some onset or change in conditions that could result in nearby buildings being threatened by an adjacent fire. In such cases, emergency personnel will have adequate time to order such evacuations.

Are a building's written evacuation procedures adequate for any emergency that may occur?

Plans are made for events that are likely to happen in a building or structure. In large part, evacuation procedures are geared toward an accidental fire occurring in a building. As long as the procedures make clear the actions to take and when to take them, these steps should be adequate for other emergencies.

Although not mandated for all buildings, employers should stage a mock drill once a year. For those on the upper floor of a high-rise building, this may be a good opportunity to practice and experience the high-rise evacuation plan.

Will building egress systems work in a terrorist attack?

Before the September 11, 2001, attack, a suicide pilot at the controls of a Boeing 767 aircraft would not have appeared on anyone's list of credible or foreseeable design hazards. In 1945, the pilot of a B-25 two-engine bomber became disoriented in heavy fog and crashed into the Empire State Building on a Saturday morning when the building was



sparsely populated. Flaming gasoline from the 1400-gallon tanks ignited; 14 persons died and 26 were injured.

When the World Trade Center towers were built in 1970, they were designed to withstand the impact of a Boeing 707 aircraft — the largest aircraft flown at that time. The Boeing 767 aircrafts used in the September 11 attack were considerably larger and carried nearly 20,000 gallons of jet fuel that would have carried the planes across the country to the West Coast without refueling.

Current building evacuation or relocation procedures consider the need to move occupants from harm's way with a fire that grows at a predictable rate. Occupants must remain trained on evacuation procedures, and prepared to move quickly, safely, and efficiently.

As with any situation, all individuals are largely responsible for their safety based on the circumstances. Detailed procedures, verbal instructions, and experience may not be enough during extraordinary events. Each person needs to be prepared to act.

Remembering the acronym **R.E.D.** (for danger) can help:

- **React:** Take any sign of smoke, fire, or other potentially threatening situations seriously. Signs of an immediately dangerous situation may include the sound of fire alarms, the smell of smoke, the sight of flames, warnings from other occupants, and the arrival of the fire department.
- **Evaluate:** Judge the level of the threat. This includes confirming the presence of smoke or fire; evaluating the conditions in the immediate area; making a physical-ability self-assessment to relocate or evacuate; appraising the needs and abilities of others who may need assistance; and considering additional information being received.
- **Decide:** There are only two, but difficult choices: (1) Follow the plan and immediately leave the building, OR (2) Follow the plan, which may include staying in place or descending to the designated level below the fire floor as directed and be prepared to take protective and defensive action. In this case, occupants' action may include alerting the fire department of their location and sealing the doors, windows, and vents that lead into the space. Do not break the windows and be prepared to wait for a considerable time (at least one hour) for rescue by the fire department.



For more information, contact NFPA.org or a Texas Department of Insurance, Division of Workers' Compensation safety training specialist at SafetyTraining@tdi.texas.gov or **1-800-252-7031, option 2.**



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References

- ¹ Fairfax County Fire and Rescue, "Building Evacuation Safety." Web. <https://www.fairfaxcounty.gov/fire-ems/building-evacuation-safety>. Accessed April 12, 2023.
- ² National Fire Protection Association, "Occupancy Classifications in Codes." Web. <https://www.nfpa.org/News-and-Research/Publications-and-media/Blogs-Landing-Page/NFPA-Today/Blog-Posts/2021/05/07/Occupancy-Classifications-and-Model-Codes>. Accessed April 18, 2023.
- ³ National Fire Protection Association, "Emergency Evacuation Planning Guide for People with Disabilities," November 2022, pg. 12., PDF. <https://www.nfpa.org/-/media/Files/Public-Education/By-topic/Disabilities/EvacuationGuidePDF.ashx>. Accessed April 17, 2023.
- ⁴ National Fire Protection Association, "FAQs about building evacuation." Web. <https://www.nfpa.org/Public-Education/Staying-safe/Safety-in-living-and-entertainment-spaces/High-rise-buildings/FAQs-about-building-evacuation#:~:t%E2%80%A6%20%202/6>. Accessed April 17, 2023.
- ⁵ National Fire Protection Association, "FAQs about building evacuation." Web. <https://www.nfpa.org/Public-Education/Staying-safe/Safety-in-living-and-entertainment-spaces/High-rise-buildings/FAQs-about-building-evacuation#:~:t%E2%80%A6%20%202/6>. Accessed April 17, 2023.



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