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Life Safety Equipment Update

Ontario codes changes highlight need for multiple safeguards

By Jim Widmer

For generations, architects, engineers, and builders have put their confidence in standpipe rack hose stations to safeguard their buildings and its occupants. These systems, comprising a fire hose, a rack, and a nozzle, allow swift response before flames spread. Intended for manual firefighting, they are traditionally found in hallway corridors no more than 30.5 m (100 ft) apart to ensure the hoses reach the most remote areas within a building.

Over recent years, significant changes to provincial building codes have been adopted, requiring a redundant method of fire protection within high-rise buildings. A redundant, or 'balanced,' fire protection design takes into account a variety of life-saving safeguards, including a mix of automated and manual equipment, such as:

- standpipe rack hose stations;
- sprinklers and suppression systems;
- portable fire extinguishers;
- fire alarms; and
- smoke detectors.

However, these code changes later led to unintended decreases in tested and proven forms of fire protection—allowing what some see as a significant decrease in fire protection design.

Beginning in British Columbia and eventually spreading from the West Coast to the Atlantic, fire codes in Canadian provinces have harmonized with the *National Building Code of Canada (NBC)*. This model code (not 'regulation' until it is adopted by a jurisdiction that regulates construction) calls for the inclusion of automated sprinkler systems in high-rise buildings, and standpipe systems in structures over three storeys unless sprinklered throughout. Therefore, for economic reasons, some building owners in jurisdictions that have adopted *NBC* choose to solely rely on sprinklers and not install standpipe rack hose stations.

This philosophy raises concerns for those advocating 'balanced' fire protection, rather than strategies that rely on a single safeguard. For example, the Fire Equipment Manufacturers' Association (FEMA) suggests a combination of standpipe hose stations, automated suppression systems, and portable fire extinguishers to best save lives and protect property.

Currently, Ontario is the only province recognizing this limitation of the *National Building Code*. All other provinces and territories have adopted the *NBC* as law and, therefore, do not require standpipe rack hose stations. While the steps Ontario has taken to further reinforce

fire safety are to be applauded, it is critical to ensure it does not result in an equipment tradeoff and reduction in overall fire protection. Now, more than ever, design professionals, building owners, and facility managers must consider the critical role standpipe hose stations play in safeguarding assets and lives.

Classes of standpipe rack hose

In Section 1-4.28 of National Fire Protection Association (NFPA) 14, *Standard for the Installation of Standpipe, Private Hydrants, and Hose Systems*, standpipe rack hose stations are defined as an arrangement of piping, valves, hose connections, and allied equipment installed in a building or structure. These hose connections are located in such a manner water can be discharged in streams or spray patterns through attached hose and nozzles for the purpose of extinguishing a fire.

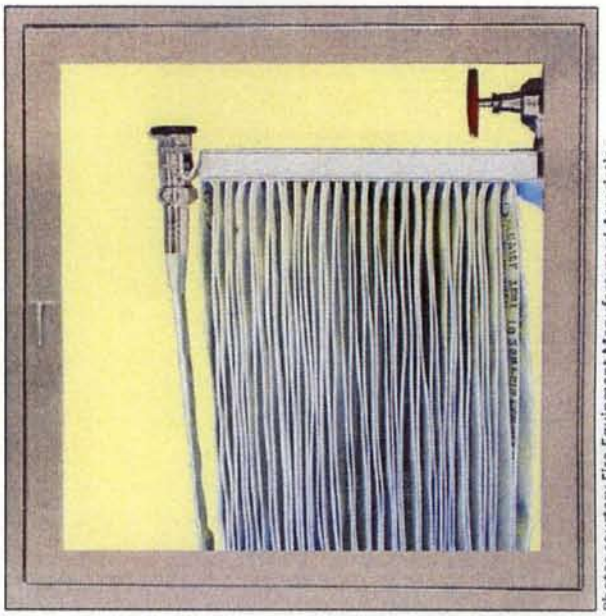
There are three types of standpipe assemblies. Class I systems are 64-mm (2.5-in.) hose connections provided for use by fire departments and those trained in handling heavy water streams. In high-rise buildings without sprinklers and beyond the reach of fire department ladders, Class I systems provide water supply and hose hookups for the primary means of manual, professional, firefighting.

Class II systems (38-mm [1.5-in.]) hose lines are provided for use by trained building occupants until the fire department arrives. A hybrid of Classes I and II, Class III systems are 38 mm and provide hose stations to supply water for use by trained building occupants. Other Class III systems have 64-mm (2.5-in.) hose connections to supply a larger volume of water for use by fire departments and those trained in handling heavy water streams.

Section 3.2.5.10. of the *National Building Code* states standpipe rack hose design, construction, installation, and testing must conform to NFPA 14. While the *Ontario Building Code (OBC)* also follows NFPA standards, the following sections are noted exceptions:

- Section 3.2.9.2.–Standpipe System Design;
- Section 3.2.9.3.–Hose Connections; and
- Section 3.2.9.4.–Hose Stations.

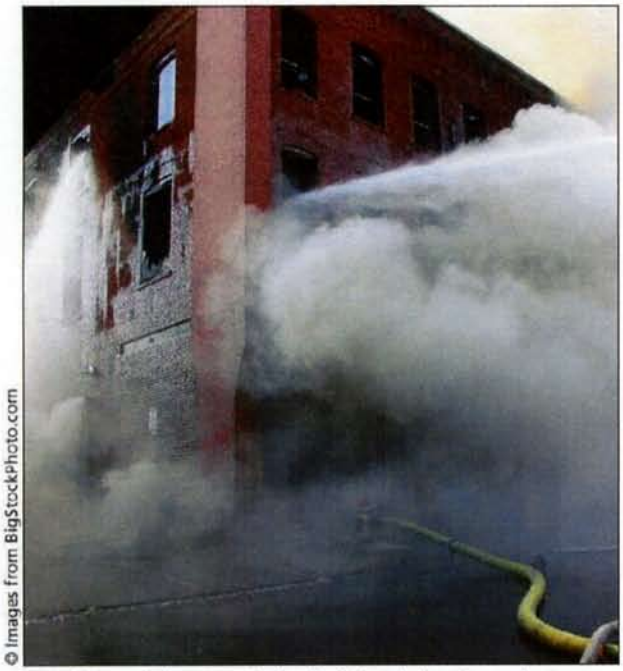
These exceptions require standpipe systems in all buildings three storeys in height, 14 m (46 ft) high measured between grade and the ceiling of the top storey, while requiring standpipe hookups that are 65 mm (2.5 in.) for professional fighting hoses and 38 mm (1.5 in.) for trained person occupant's hose connections on each storey. The use of standpipe rack hose stations in provinces outside of Ontario, following *NBC*, is optional.



Photos courtesy Fire Equipment Manufacturers' Association

Despite the equipment's importance in balanced fire protection strategies, Ontario is the only province or territory always requiring the inclusion of standpipe rack hose stations.

Rather than the linens and natural fibres of old, occupant hoses are now made from synthetic polyester, eliminating the chance for decomposition or mildew.



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Standpipe rack hoses can help a building during the early stages of a fire, but training is required for proper use.

The Fire Equipment Manufacturers' Association recommends standpipe rack hose stations for commercial structures, including:

- office buildings;
- dormitories;
- airports;
- hotels;
- elder care facilities;
- correctional facilities;
- hospitals;
- industrial plants;
- retail malls; and
- any building where fire department response time is expected to exceed five minutes.

Benefits of standpipe rack hose

According to both *NBC* and *OBC*, standpipe hookups must be placed throughout most buildings taller than three storeys. The Fire Equipment Manufacturers' Association sees many benefits of going one step further to include the occupant hose.

According to NFPA's National Fire Incident Reporting System (NFIRS), approximately 93 per cent of deaths and 95 per cent of property damage occur once the fire has progressed beyond the early stage; therefore, the first critical minutes can be the difference between a single flame and loss of lives.

Andrew Wong, certified fire protection specialist with Ontario's Vaughan Fire and Rescue Service, agrees that standpipe hose stations are an essential component to fire safety within buildings. He says the equipment "serves as a means of first-aid firefighting by building occupants, and also facilitates fire suppression operations by firefighters." This is because of several attributes of the equipment, as explained in the following paragraphs.

Building Assessments

Good life safety planning is typically initiated by the design/construction team, along with the security or facility manager. Buildings with special requirements can present several challenges:

1. People typically entering and using the building can be a concern, in the case of elderly and/or handicapped persons, children, or patients with respiratory concerns.
2. Healthcare facilities can require a specific type of portable fire extinguisher due to patient needs, operating room conditions, and an abundance of electrical equipment combined with an oxygen-enriched environment. A fire professional should conduct a site survey, prepare a hazard analysis, and suggest the correct extinguisher for the area.
3. When flammable or combustible materials are kept onsite, special precautions may be required.
4. Telecommunications rooms, computer server data centres, and storage rooms can contain sensitive materials or information requiring extra security measures, making them difficult to access in emergencies.
5. Onsite commercial cooking appliances in kitchens or eating areas require a pre-engineered suppression system over the cooking area.
6. A basement with laundry or other large pieces of equipment can be a particular fire hazard.
7. Wood-frame construction is far more flammable than steel, and can cause an exponential increase in the spread of a fire.
8. The number of floors can be a concern, especially with respect to blocked exit ways and stairwells. One should consider the distance that occupants have to walk, along with the various lighting conditions.

—Pat Jaugstetter, Fire Equipment Manufacturers' Association past-president

Quick suppression

Standpipe fire hose stations do not depend on heat, smoke, or flame to spread before water can be applied to the fire. While calling the fire department is the first step after the onset of a fire, these stations provide onsite protection at the fire's earliest stages, offering quick and effective response to minimize damage and save lives.

Simple operation

The simplicity of the equipment's operation provides the opportunity for trained staff to control or extinguish a fire while it is still small, before it develops sufficiently to activate the sprinkler system.[1] Operation is easy enough for one person—once the valve has been completely opened and the hose pulled entirely off the rack, the water flows. Additionally, this manually activated equipment provides total reliability in case automatic systems fail.

Minimal water damage

Fire hoses installed within standpipe stations can actually minimize water damage, as water is released directly at the fire base versus blanket spray from automatic sprinkler stations. In addition, they can be shut off immediately after the fire is extinguished.

Fighting fires is always a challenge. Having ready access to standpipe hoses can offer the advantage needed in a critical situation.

Sprinklers and other fire suppressants are important, but they are only one component of life safety.

Occupant safety and rescue

In some cases, fire spreads before occupants have time to exit. Standpipe fire hose stations can clear a path of safety otherwise blocked by flames, and provide temporary protection for occupants attempting to escape the building.

Evolution of quality

Although occupant hoses of past generations may not have held up to long-term quality standards, current hoses are manufactured for durability. Rather than linens and other unlined natural fibres, occupant hoses are now made from polyester and are 100 per cent synthetic, eliminating the chance for decomposition or mildew growth. In addition, modern hose designs are manufactured using a tighter weave pattern that, when coupled with its strong adhesive liner, is similar to the quality of hose used to fight forest fires.

Implementing a balanced fire protection plan

Despite the benefits presented with standpipe hose stations, it is important to remember they do not take the place of automated sprinklers or suppression systems.[2] Rather, a balanced fire protection design includes a mix of appropriate actions and fire equipment, linked together, to provide a chain of survival.

Here are the steps that should be initiated in case of a fire:

1. Notify the fire department.
2. Begin evacuation, ensuring everyone is safe.
3. If it is safe to do so, use an occupant fire hose as a first defense against small fires.
4. Automated fire/smoke alarm sounds.
5. Automated sprinkler/suppression system activates.
6. Fire department responds.

Architects, engineers, and builders must now consider the most effective options, and use best practices to safeguard facilities, ultimately protecting property and saving lives. However, safety obviously continues into the operations stage of a project. According to NFPA 25-2000, *Inspection, Testing, and Maintenance of Water-based Fire Protection Systems*, fire hose stations should usually be inspected or checked every 90 days, or as specified by the local authority having jurisdiction (AHJ). The *National Fire Code (NFC)* follows NFPA guidelines for inspection and testing; the *Ontario Fire Code (OFC)* requires hose stations be inspected monthly and valves/hoses be inspected and re-racked annually.[3] (The business owners or regular building occupants are responsible for ensuring the fire hose station is regularly checked and maintained.)

Building occupants must consider the following when determining the need for standpipe rack hose maintenance:

- Are the operating instructions legible?
- Does the cabinet appear to be intact with no discernible cracks or breaks in the glass?
- Is the cabinet door easy to open?
- If a locked cabinet is installed, does the lock function properly?

Knowing Your Fires

In addition to standpipe hose stations and suppression systems, fire extinguishers are an important component of balanced life safety. In fact, according to the United States National Fire Incidence Reporting System (NFIRS), portable extinguishers put out 94 per cent of the fires they are used on, typically within the first two minutes.

However, there are various types of extinguishers available for a building and it is important to know which ones are best for which situations. (In fact, certain classes of fire can be worsened by using the wrong product.)

Fires are divided into several classes, each denoted by a letter code. Underwriters Laboratories of Canada (ULC) marks extinguishers to show which fires they can help contain—equipment that can fight more than one class is marked with multiple letters (e.g. a unit able to contain types A, B, and C, will be marked 'ABC').

Class A

Class A fires are those with ordinary combustibles, such as wood, paper, cloth, trash, and plastics. Extinguishers to combat this fire are marked with a metallic or green triangle. They include water-based, multi-purpose dry chemical, and foam-type equipment, along with some halon extinguishers.

Class B

These fires occur in flammable liquids and gases such as gasoline, petroleum oil, propane, and paint (excluding cooking oil or grease).* Extinguishers are marked with a square and a metallic or red background. Examples include dry-chemical, multi-purpose dry-chemical, carbon dioxide, halon, and foam-type extinguishers.

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Class C

Class C fires involve energized electrical equipment, including motors, transformers, and appliances. Appropriate extinguishers are marked with either a metallic or blue circle; examples include dry-chemical, multi-purpose dry-chemical, carbon dioxide, and halon types.

Class D

Since these fires take place in combustible metals such as potassium, sodium, aluminum, and magnesium, they are limited to specialized applications. Appropriate equipment is marked with either a metallic or yellow star. This marking will be found on special dry-powder extinguishers.

* Due to different behaviour from other types of liquid-fuel fires, cooking oil fires are classified as 'Class K' by the National Fire Protection Association (NFPA).

- Will the hose rack swing out at least 90 degrees from the cabinet?
- Are safety seals broken or missing?
- Is there damage or corrosion to the hose valve?
- Is the valve handle or hose nozzle missing?
- Is the hose folded properly on the hose rack?
- Is the hose connected to the rack nipple or valve?
- Is the hose intact with no breaks, holes, or tears?
- Are all warming labels and tags free from damage?
- Are the valves, hose nozzles, fire extinguishers, and other components easily accessible?

These questions help building occupants identify important concerns with the fire equipment; facility management can contact local fire authorities if a repair or maintenance check is needed.

Notes

[1] In the United States, training a staff person to use a standpipe rack hose station is mandated by the Occupational Safety and Health Administration (OSHA). A recent change to the *Ontario Fire Code* mandated the use of "Standpipe Identification" Section 6.4.2.6 (1) "Fire Hose for Use by Trained Persons Only." This was not intended specifically for fire departments, but for occupants. However, formal training is not mandated in Ontario. *OFC* section 2.8.1.2 does include training language, referencing only the location of fire fighting and safety equipment including alarm panels. There is currently no position to oversee standpipe hose training in Canada, but training is beneficial and relatively simple. The Fire Equipment Manufacturers' Association offers a five to 10-minute online program through the site www.rackhosetraining.com.

[2] For more information on standpipe fire hose stations, including interactive training and maintenance, visit www.rackhosetraining.com. For additional fire-related education materials, visit the Fire Equipment Manufacturers' Association Web site online at www.femalifesafety.org.

[3] Building codes such as *OBC* and *NBC* are considered for the construction of new buildings. Essentially, they serve as an equipment guide—instructing what is needed and where. Fire codes such as *NFC* and *OFC* are maintenance documents, outlining the care of existing building equipment. Part 9 of the *Ontario Fire Code* includes information about retrofit of older buildings.

Jim Widmer is president of the Fire Equipment Manufacturers' Association and vice-president of Potter Roemer. With more than 37 years of experience in the fire protection industry, he serves on the National Fire Protection Association (NFPA) committees for standpipe hose stations (14) and the Life Safety Code *(101). Widmer can be contacted via e-mail at jim.widmer@potterroemer.com.*