# 6-26 Structural Firefighting Tactics

Ensure firefighter safety during structural firefighting by employing proper and safe tactics.

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## Background

Structural firefighting is very dangerous work as firefighters may be working in close proximity to fire. Extinguishing the fire quickly is the most effective way of eliminating the hazard. An adequate water supply, proper flow rates, effective firefighting tactics and coordinated ventilation are essential to extinguish a fire safely.

## Concerns/Hazards

Improper or inadequate firefighting tactics create extreme risk for firefighters, as the hazardous conditions may increase.

## Actions for Employers

Employers should:

- inform firefighters of the hazards of structural firefighting due to factors such as:
  - o building construction and structural considerations
  - wind driven fires
  - o ventilation limited fires vs fuel limited fires
- train firefighters on mitigating the hazard through measures such as:
  - o understanding modern fire science and fire dynamics
  - appropriate use of water supply, hoseline placement and operation, nozzle operation and pumper operations
  - o understanding tactical ventilation, flow path and door control
  - modern and evidence-based structural firefighting tactics
  - Utilizing the reach of the hose stream off surfaces to assist in fire extinguishment
- develop procedures related to:
  - building construction and structural collapse
  - o modern structural firefighting tactics
  - water supply, hoseline placement and operation, nozzle operation and pumper operations
  - o tactical ventilation, flow path and door control
  - wind driven fires
  - o ensuring minimum flow rates and proper nozzle selection

## **Building Construction & Structural Considerations**

Consider the following when developing procedures for firefighter safety:

- modern building construction is more susceptible to early collapse due to lightweight construction, weaker building connections and open spaces
- modern building contents are more commonly made of synthetic materials that have a higher heat release rate that lead to earlier rapid fire progression
- ensure that a 360 degree size-up (visualizing all sides of the building) is completed prior to committing crews to interior operations; and ensure that the 360 degree size-up identifies building construction, building integrity and building collapse indicators
- the dangers and limitations of roof operations and vertical ventilation in light of modern building construction and fire science

## Fire Science & Fire Dynamics

Consider the following when developing procedures for firefighter safety:

• understand modern fire science, fire behaviour and fire dynamics and utilize the information when making tactical decisions

- ensure that as part of the size-up process, the colour, volume, density & velocity of smoke is evaluated (reading smoke), used as part of decision-making, and continually reevaluated throughout the incident, understanding that smoke is unburned fuel
- consider the tactical value of water application from the exterior of the structure to knock down visible fire prior to entering for interior firefighting operations, when applying water to the seat of the fire will be delayed
- consider applying effective water to smoke and surface cooling with water return while advancing towards the seat of the fire to prevent rapid fire progression, operating in a flow and move or stop and flow fashion
- utilize a thermal imaging camera, if available, to determine suppression effectiveness and maintain situational awareness
- utilize modern fire science to understand survivable spaces, areas of refuge and how to effectively utilize vent-enter-isolate-search
- understand effective water streams and air entrainment utilizing door control and the effects they will have on the fire

## Water Supply & Minimum Flow Rates

Consider the following when developing procedures for firefighter safety:

- critical flow (volume) rates (the minimum flow in litres or gallons per minute) required to extinguish a given size fire
- the available water supply and its potential limitations
- the effects of nozzle stream patterns when determining the proper nozzle to use for fire suppression
- the use of nozzles with lower reaction forces at higher flow rates (volumes) and lower pressures to improve the safety and effectiveness of firefighters by reducing the physical demands of interior firefighting (i.e. smooth bore nozzles)
- when using nozzles with lower reaction forces at higher flow rates (volumes) and lower pressures; that the nozzles are used with the appropriate hose (having high volume/low pressure nozzles and high pressure/low volume hose may lead to hose kinking which is potentially dangerous to firefighters)
- determine the number and size of hoses required to control the fire as quickly as possible

## Ventilation and Flow Path

Consider the following when developing procedures for firefighter safety:

- air flow path and how to perform flow path control
- tactical ventilation that coordinates fire suppression and ventilation
- the impact that open doors and windows have on fire spread
- door control during structural firefighting to limit the entrainment of oxygen
- how to identify the potential for wind-driven fires and take tactical steps to manage winddriven fires
- the limitations of vertical ventilation ensure that it is undertaken as a tactic only when appropriate

## Applicable Regulations and Acts

Read:

- Occupational Health and Safety Act
  - clause 25(2)(a) for providing information and instruction to a worker
  - o clause 25(2)(d) for making workers aware of hazards
  - clause 25(2)(h) for taking every precaution reasonable in the circumstances to protect workers

#### Applicable Standards

NFPA 1142 Standard on Water Supplies for Suburban and Rural Firefighting

NFPA 1700 Guide for Structural Fire Fighting

NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Career Fire Departments (for information on flow rates, water supply and hoselines only)

NFPA 1720 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments (for information on flow rates, water supply and hoselines only)

#### Related

Firefighter Guidance Note 6-6 Rapid Fire Progression

Firefighter Guidance Note 6-18 Unprotected Lightweight Building Construction

National Institute of Standards and Technology (NIST) Fire Research Division <u>Fire Research</u> <u>Division | NIST</u>

National Institute of Standards and Technology (NIST) National Fire Research Laboratory Fire NIST

Underwriters Laboratories Fire Safety Research Institute <u>Home | UL's FSRI – Fire Safety</u> <u>Research Institute</u>

Bureau of Alcohol, Tobacco, Firearms and Explosives Fire Research Laboratory <u>Fire Research</u> <u>Laboratory | Bureau of Alcohol, Tobacco, Firearms and Explosives (atf.gov)</u>