

Operating Guideline # 832

Lightweight Building Construction Tactical Considerations

December 6, 2023



PURPOSE:

The purpose of this Operating Guideline is to make firefighters aware of the hazards of lightweight building construction related to firefighting.

ISSUE/RATIONALE:

Buildings constructed using lightweight materials that are not sufficiently protected by sprinklers or effective non-combustible structural protection systems may collapse much sooner than expected. Warning signs that are commonly present in fires that involve legacy construction are not present in these situations.

Unprotected lightweight trusses, fastening systems, wooden "I" beams, lightweight steel frame construction and other engineered construction components are quickly compromised when exposed to heat and flame.

Firefighter fatalities and injuries have occurred as the result of rapid structural failure.

GUIDELINE:

1. All members of the Muskoka Lakes Fire Department should take the 45 minute ["Structural Stability of Engineered Lumber in Fire Conditions"](#) FSRI online course. In this online course, firefighters will examine fire performance data collected during rigorous testing of modern and traditional non-fire-rated floor and roof construction assemblies and the impact of modern construction practices on the safety of building occupants and firefighters. Submit your certificate to training to receive compensation.
2. Firefighters need to recognize that the modern fire environment consists of structures constructed of lightweight building materials, open floor plans, double pane windows, and furnishings made from synthetic materials. Each of these factors impact fire behaviour, but collectively, they lead to faster fire propagation, shorter times to flashover, rapid changes in fire dynamics, shorter escape times for firefighters and occupants, and shorter times to collapse.
3. First arriving incident commanders need to consider the failure times shown in the training package and determine how long the fire has been working against the structure.
4. Consideration of a defensive fire attack may be the best option where no life safety hazard exists.
5. Incident Commanders should always assume that lightweight building construction exists when there is no method of determining otherwise.
6. Avoid having firefighters enter and work above open floor joist systems. As the impact loads created by firefighters' movement, striking or pulling tools, or the concentrated force of an applied hose stream to suppress the fire can, without warning, precipitate a collapse.
7. Avoid having multiple firefighters moving and working within a structure that may have lightweight building floor materials, as they can create impact loads that can overwhelm a weakened structure.
8. Thermal imaging cameras are an essential piece of technology, however floor coverings may mask the heat that is occurring below working firefighters. Firefighters are cautioned to not use TIC's for floor assessments, instead members should use signs of heat signatures

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from floor vents and plumbing fixtures coupled with observing any discolouration in the floor before they advance over a floor.

9. Thermal imagers provide valuable clues in rescue and suppression operations, but care must be taken to ensure that you do not get tunnel vision.

10. Roof operations should be avoided whenever possible, incident commanders need to use the risk matrix model to assess the need for placing firefighters on a roof.

11. Complex geometries, undivided attics, and readily ignitable, fast burning structural components can produce rapid fire growth.

12. Prepare and train members to perform necessary roof operations from the safety of an aerial ladder or platform.

13. Due to the increased fire loads and less dense materials all members must distribute their weight over a ladder when working on a roof.

14. Utilize natural openings and vent the gable ends when possible will be the safest option available to ventilate a structure.

15. Evacuate any building once it is determined that the unprotected truss has been affected by fire.

16. Ensure all members understand the importance of the three horn blasts and the evacuation procedures.

RESPONSIBILITY:

It is the responsibility of all firefighting staff to comply with the provisions of this Operating Guideline.

REFERENCES:

- [Section 21 Firefighter Guidance Note 6-18 Unprotected lightweight building construction](#)
- [Occupational Health and Safety Act](#) clauses 25(2)(a,d,h)
- [UL Fire Safety Research Institute training portal](#)