Second Revision No. 9-NFPA 1700-2025 [Global Comment]

Replace "victim" with "occupant" though the Guide with the exception of Section 13.6.4.3

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Wed Mar 05 22:12:51 EST 2025

Committee Statement

Committee Statement: The technical committee determine that persons occupying a building are not automatically considered victims.

Response Message: SR-9-NFPA 1700-2025

Second Revision No. 22-NFPA 1700-2025 [Detail]

[Chapter 8]

[Replace references to NFPA 1971, NFPA 1975, 1981 & 1982 with NFPA 1970]

[Replace references to NFPA 1964, NFPA 1961 & NFPA 1931 with NFPA 1960]

[Replace references to NFPA 1983 with NFPA 2500]

[Replace references to NFPA 1801 NFPA 1930]

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Mar 10 13:51:19 EDT 2025

Committee Statement

Committee Statement: The technical committee recognizes that certain standards have been consolidated and should be updated in the Guide.

Response Message: SR-22-NFPA 1700-2025

Second Revision No. 17-NFPA 1700-2025 [Section No. 1.4]

1.4 Units of Measure.

Metric units of measurement in this guide are in accordance with the modernized metric system known as the International System of Units (SI). The unit of liter is outside of but recognized by SI and is commonly used in international fire protection. These units are listed in Table 1.4.

Table 1.4 SI Units and Equivalent US Customary Units

SI	US
Distance	
1 cm	0.394 in.
2.54 cm	1 in.
1 m	3.28 ft
0.305 m	1 ft
Area	
1 cm^2	0.155 $in.^2$
6.45 cm^2	1 $in.^2$
1 m^2	10.8 ft^2
0.093 m^2	1 ft^2
Volume	
1 cm^3	~~0.34~~ 0.034 fluid oz
29.6 cm^3	1 US fluid oz
1 L	1.06 US qt
0.95 L	1 US qt
1 m^3	35.3 ft^3
0.028 m^3	1 ft^3
Mass	
1 g	0.0353 oz
28.~~25~~ 35 g	1 oz
1 kg	2.20 lb
0.454 kg	1 lb
Density	
1 g/cm^3	8.35 lb/US gal
0.12 cm^3	1 lb/US gal
1 kg/m^3	0.063 lb/ft^3
Flow	
1 L/sec	15.9 US gal/min
0.063 L/sec	1 US gal/min
Pressure	
1 bar (750 mmHg)	14.5 $lb/in.^2$
0.069 bar	1 lb/in.2 (27.7 in. water column)
1 kPa	0.145 $lb/in.^2$
Energy	
1 J	9.48×10^{-4} Btu
1055 J	1 Btu

SI	US
1 kJ	0.948 Btu
Power	
1 kW	0.~~952~~ <u>948</u> Btu/sec
1.06 kW	1 Btu/sec

Note: Converting from one system of measurement to another usually introduces additional significant figures to a value. The converted values should be rounded off, so that they include no more significant figures than the original measured or reported values.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Mar 10 09:05:38 EDT 2025

Committee Statement

Committee Statement: The technical committee identified metric conversion corrections.

Response Message: SR-17-NFPA 1700-2025

Second Revision No. 19-NFPA 1700-2025 [Section No. 2.2]

2.2 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems,* ~~2022~~ 2025 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems,* ~~2022~~ 2025 edition.

NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes,* ~~2022~~ 2025 edition.

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies,* ~~2022~~ 2025 edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems,* 2024 edition.

NFPA 30, *Flammable and Combustible Liquids Code,* 2024 edition.

NFPA 72®, *National Fire Alarm and Signaling Code®,* ~~2022~~ 2025 edition.

NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems,* 2026 edition.

NFPA 1400, *Standard for Fire Service Training,* 2026 edition.

~~NFPA 1407, *Standard for Training Fire Service Rapid Intervention Crews,* 2020 edition.~~

NFPA 1550, *Standard for Emergency Responder Health and Safety,* 2024 edition.

NFPA 1580, *Standard for Emergency Responder Occupational Health and Wellness,* 2025 edition.

~~NFPA 1584, *Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises,* 2022 edition.~~

NFPA 1585, *Standard for Exposure and Contamination Control,* 2025 edition.

NFPA 1660, *Standard for Emergency, Continuity, and Crisis Management: Preparedness, Response, and Recovery,* 2024 edition.

NFPA 1850, *Standard on Protective Ensembles for Structural and Proximity Firefighting and Self-Contained Breathing Apparatus (SCBA),* 2026 edition.

~~NFPA 1801, *Standard on Thermal Imagers for the Fire Service,* 2021 edition.~~

~~NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting,* 2020 edition.~~

~~NFPA 1931, *Standard for Manufacturer's Design of Fire Department Ground Ladders,* 2020 edition.~~

NFPA 1930, *Standard on Fire and Emergency Services Use of Thermal Imagers, Two-Way Portable RF Voice Communication Devices, Ground Ladders, Fire Hose, and Fire Hose Applications,* 2025 edition.

NFPA 1960, *Standard for Fire Hose Connections, Spray Nozzles, Manufacturer's Design of Fire Department Ground Ladders, Fire Hose, and Powered Rescue Tools,* 2024 edition.

~~NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting,* 2018 edition.~~

~~NFPA 1975, *Standard on Emergency Services Work Apparel,* 2019 edition.~~

~~NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services,* 2019 edition.~~

~~NFPA 1982, *Standard on Personal Alert Safety Systems (PASS),* 2018 edition.~~

~~NFPA 1983, *Standard on Life Safety Rope and Equipment for Emergency Services,* 2017 edition.~~

NFPA 1970, *Standard on Protective Ensembles for Structural and Proximity Firefighting, Work Apparel, Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services, and Personal Alert Safety Systems (PASS),* 2025 edition.

NFPA 2500, *Standard for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services,* 2022 edition.

Supplemental Information

File Name	Description	Approved
1700_SR-19_Section_2.2.docx		

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Mar 10 10:53:29 EDT 2025

Committee Statement

Committee Statement: The technical committee identified updates and consolidation of referenced NFPA standards

Response Message: SR-19-NFPA 1700-2025

Second Revision No. 20-NFPA 1700-2025 [Section No. 2.3.1]

2.3.1 ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D5/D5M, *Standard Test Method for Penetration of Bituminous Materials*, ~~2013~~ 2020 .

~~ASTM D323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)* , 2015a.~~

ASTM D4359, *Standard Test Method for Determining Whether a Material is a Liquid or a Solid*, 1990 (reapproved ~~2012~~ 2024).

ASTM D6413/D6413M, *Standard Test Method for Flame Resistance of Textiles (Vertical Test)*, 2015.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Mar 10 11:09:01 EDT 2025

Committee Statement

Committee Statement: The technical committee identified ASTM references to be updated.

Response Message: SR-20-NFPA 1700-2025

Second Revision No. 24-NFPA 1700-2025 [Section No. 2.3.4]

2.3.4 UL ~~Publications~~ Solutions .

~~Underwriters Laboratories Inc.~~ UL Solutions , 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 19, *Standard for Lined Fire Hose and Hose Assemblies*, 2024.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Tue Mar 11 15:38:45 EDT 2025

Committee Statement

Committee Statement: UL Solutions 4520A identified by the TC for use in Chapter 7.

Response Message: SR-24-NFPA 1700-2025

Second Revision No. 25-NFPA 1700-2025 [Section No. 2.3.5]

2.3.5 Other Publications.

ANSI/APA PRG 320, *Standard for Performance-Rasted Cross-Laminated Timber*, APA — The Engineered Wood Association, Tacoma, WA, 2018.

Babrauskas, V., and J. Krasny, *Fire Behavior of Upholstered Furniture,* NBS Monograph 173, US Department of Commerce, 1985.

Fleischmann, C., and Z. Chen, "Defining the Difference Between Backdraft and Smoke Explosions," The 9th Asia-Oceania Symposium on Fire Science and Technology, *Procedia Engineering*, Vol. 62, pp. 324–330, 2013.

Horn, G. P., et al., "Hierarchy of contamination control in the fire service: Review of exposure control options to reduce cancer risk," *Journal of Occupational and Environmental Hygiene*, Vol. 19 (9), 538–557.

IAFF-UL Solutions. *Considerations for Fire Service Response to Residential Battery Energy Storage System Incidents* . December 23, 2023. iaff.org/wp-content/uploads/IAFF_DOE_ResidentialESSConsiderations_Final.pdf

Kesler R., "Thermal degradation of self-contained breathing apparatus facepiece lenses under radiant thermal loads," *Journal of Fire Sciences*, Vol. 42 (3), 236–247, 2024. journals.sagepub.com/doi/10.1177/07349041241227921

"Occupational exposure as a firefighter," Volume 132, International Agency for Research on Cancer (IARC) Monographs on the Identification of Carcinogenic Hazards to Humans, July 2022.

Lee, B. T., *Heat Release Rate Characteristics of Some Combustible Fuel Sources in Nuclear Power Plants*, NBSIR 85-3195, US Department of Commerce, 1985.

"UL FSRI Home Furnishings Comparison (Natural vs. Synthetic)," YouTube video, Fire Safety Research Institute, October 2020. youtube.com/watch?v=87hAnxuh1g8

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2020.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Tue Mar 11 15:50:05 EDT 2025

Committee Statement

Committee Statement: UL Solutions issued report (IAFF): Considerations for Fire Service Response to Residential Battery Energy Storage System Incidents.is utilized in Chapter 7

Response Message: SR-25-NFPA 1700-2025

Second Revision No. 2-NFPA 1700-2025 [Section No. 2.3.6]

2.3.6 References from Chapter 4.

1. Madrzykowski, D., *Fire Fighter Equipment Operational Environment (FFEOE): Evaluation of Thermal Conditions*, UL Fire Safety Research Institute, Columbia, MD, August 2017.

2. *America Burning, the Report of The National Commission on Fire Prevention and Control*, Washington, DC, May 1973.

3. Gross, D., “Fire Research at NBS: The First 75 Years,” *Fire Safety Science — Proceedings of the Third International Symposium*, pp. 119–133, International Association for Fire Safety Science, 1991.

4. Hurley, M. J., ed., *SFPE Handbook of Fire Protection Engineering*, New York, NY, 5th edition, 2016.

5. *Fire Protection Handbook*, National Fire Protection Association, Quincy, MA, ~~20th~~ 21st edition, ~~2008~~ 2023 .

6. Drysdale, D., *An Introduction to Fire Dynamics*, New York, NY, 2nd edition, 2002.

7. Madrzykowski, D., “Fire Dynamics: The Science of Fire Fighting,” *International Fire Service Journal of Leadership and Management*, Vol. 7, FPP/IFSTA, Stillwater, OK, 2013.

8. Kerber, S., “Analysis of Changing Residential Fire Dynamics and Its Implications on Firefighter Operational Timeframes,” *Fire Technology*, Vol. 48, pp. 865–891, October 2012.

9. Stroup, D. W., et al., *Structural Collapse Fire Tests: Single Story, Ordinary Construction Warehouse*, NISTIR 6959, National Institute of Standards and Technology, Gaithersburg, MD, May 2003.

10. Stroup, D. W., et al., *Structural Collapse Fire Tests: Single Story, Wood Frame Structures*, NISTIR 7094, National Institute of Standards and Technology, Gaithersburg, MD, March 2004.

11. Izydorek, M. S., et al., *Report on Structural Stability of Engineered Lumber in Fire Conditions*, Underwriters Laboratories, Northbrook, IL, September 2008.

12. Kerber, S., et al., *Improving Fire Safety by Understanding the Fire Performance of Engineered Floor Systems and Providing the Fire Service with Information for Tactical Decision Making,* Underwriters Laboratories, Northbrook, IL, March 2012.

13. Madrzykowski, D. and J. Kent, *Examination of the Thermal Conditions of a Wood Floor Assembly above a Compartment Fire,* NISTTN 1709, National Institute of Standards and Technology, Gaithersburg, MD, July 2011.

14. Madrzykowski, D., and S. Kerber, *Fire Fighting Tactics Under Wind Driven Conditions: Laboratory Experiments*, NISTTN 1618, National Institute of Standards and Technology, Gaithersburg, MD, January 2009.

15. Kerber, S., and D. Madrzykowski, *Fire Fighting Tactics Under Wind Driven Conditions: 7 Story Building Experiments*, NISTTN 1629, National Institute of Standards and Technology, Gaithersburg, MD, April 2009.

16. Kerber, S., *Impact of Ventilation on Fire Behavior in Legacy and Contemporary Residential Construction*, Underwriters Laboratories, Northbrook, IL, December 2010.

17. Kerber, S., *Study of the Effectiveness of Fire Service Vertical Ventilation and Suppression Tactics in Single Family Homes*, Underwriters Laboratories, Northbrook, IL, June 2013.

18. Kerber, S., and W. D. Walton, *Effect of Positive Pressure Ventilation on a Room Fire*, NISTIR 7213, National Institute of Standards and Technology, Gaithersburg, MD, March 2005.

19. Kerber, S., and W. D. Walton, *Full-Scale Evaluation of Positive Pressure Ventilation In a Fire Fighter Training Building*, NISTIR 7342, National Institute of Standards and Technology, Gaithersburg, MD, July 2006.

20. Kerber, S., D. Madrzykowski, and D. W. Stroup, *Evaluating Positive Pressure Ventilation In Large Structures: High-Rise Pressure Experiments*, NISTIR 7412, National Institute of Standards and Technology, Gaithersburg, MD, March 2007.

21. Kerber, S., and D. Madrzykowski, *Evaluating Positive Pressure Ventilation In Large Structures: High-Rise Fire Experiments*, NISTIR 7468, National Institute of Standards and Technology, Gaithersburg, MD, November 2007.

22. Kerber, S., and D. Madrzykowski, *Evaluating Positive Pressure Ventilation In Large Structures: School Pressure and Fire Experiments*, NISTTN 1498, National Institute of Standards and Technology, Gaithersburg, MD, July 2008.

23. Zevotek, R., and S. Kerber, *Study of the Effectiveness of Fire Service Positive Pressure Ventilation During Fire Attack in Single Family Homes Incorporating Modern Construction Practices*, UL Fire Safety Research Institute, Columbia, MD, May 2016.

24. Weinschenk, C., and R. Zevotek, *Exploratory Analysis of the Impact of Ventilation on Strip Mall Fires*, UL Fire Safety Research Institute Columbia, MD, April 2020.

25. Madrzykowski, D., S. Kerber, and J. Zipperer, *Scientific Research for the Development of More Effective Tactics — Governors Island Experiments Training: Governors Island Experiments*, July 2012.

26. The Principles of Modern Fire Attack Course, International Society of Fire Service Instructors.

27. Weinschenk, C., K. Stakes, and R. Zevotek, *Impact of Fire Attack Utilizing Interior and Exterior Streams on Firefighter Safety and Occupant Survival: Air Entrainment*, Columbia, MD, December 2017.

28. Knapp, J., T. Pillsworth, and S. White, “Nozzle Tests Prove Fireground Realities, Part 1,” *Fire Engineering*, February 2003.

29. Knapp, J., T. Pillsworth, and S. White, “Nozzle Tests Prove Fireground Realities, Part 2,” *Fire Engineering*, September 2003.

30. Knapp, J., T. Pillsworth, and S. White, “Nozzle Tests Prove Fireground Realities, Part 3,” *Fire Engineering*, September 2003.

31. Willi, J., C. Weinschenk, and D. Madrzykowski, *Impact of Hose Streams on Air Flows Inside a Structure*, NISTTN 1938, National Institutes of Standards and Technology, Gaithersburg, MD, 2016.

32. Weinschenk, C., K. Stakes, and R. Zevotek, *Impact of Fire Attack Utilizing Interior and Exterior Streams on Firefighter Safety and Occupant Survival: Water Mapping*, UL Fire Safety Research Institute, Columbia, MD, December 2017.

33. Zevotek, R., K. Stakes, and J. Willi, *Impact of Fire Attack Utilizing Interior and Exterior Streams on Firefighter Safety and Occupant Survival: Full Scale Experiments*, UL Fire Safety Research Institute, Columbia, MD, December 2017.

34. Horn, G. P., et al., *Cardiovascular and Chemical Exposure Risks in Modern Firefighting*, Interim Technical Report, Illinois Fire Service Institute, University of Illinois-Urbana/Champaign, Urbana, IL, 2016.

35. Horn, G. P., et al., “Thermal Response to Firefighting Activities in Residential Structure Fires: Impact of Job Assignment and Suppression Tactic.” *Ergonomics*, Vol. 61(3), 404–419, 2018.

36. Regan, J., J. Bryant, and C. Weinschenk, *Analysis of the Coordination of Suppression and Ventilation in Single-Family Homes*, UL Fire Safety Research Institute Columbia, MD, March 2020. fsri.org/research-update/technical-report-released-single-family-homes-experiments

37. Stakes, K., et al., *Analysis of the Coordination of Suppression and Ventilation in Multi-Family Dwellings*, UL Fire Safety Research Institute Columbia, MD, June 2020. fsri.org/research-update/technical-report-released-multi-family-dwellings-experiments

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39. Weinschenk, C., *Analysis of Search and Rescue Tactics in Single-Story Single-Family Homes Part I: Bedroom Fires*, UL Fire Safety Research Institute, Columbia, MD, May 2022. fsri.org/research-update/report-release-analysis-search-and-rescue-tactics-single-story-single-family-homes

40. Weinschenk, C., and J. Regan, *Analysis of Search and Rescue Tactics in Single-Story Single-Family Homes Part II: Kitchen and Living Room Fires*, UL Fire Safety Research

Institute, Columbia, MD, May 2022. fsri.org/research-update/report-release-analysis-search-and-rescue-tactics-single-story-single-family-0

41. Weinschenk, C., and K. Stakes, *Analysis of Search and Rescue Tactics in Single-Story Single-Family Homes Part III: Tactical Considerations*, UL Fire Safety Research Institute, Columbia, MD, May 2022. fsri.org/research-update/report-release-analysis-search-and-rescue-tactics-single-story-single-family-1

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43. ~~Barowy, A., et al., "UL 9540A Installation Level Tests with Outdoor Lithium-ion Energy Storage System Mockups," UL Research and Development Report, Northbrook, IL, April 2021. fsri.org/research-update/energy-storage-system-installation-test-report-now-available~~ Madrzykowski, D., and C. Weinschenk, "Fire Safety of Batteries and Micro-mobility Devices," Fire Protection Engineering Magazine, Q4, 2023. fireprotectionengineering-digital.com/fireprotectionengineering/library/item/q4_2023/4155029/?utm_source=newsletter&utm_medium=email&utm_campaign=TXFIR4231206002&utm_content=gt

44. Fleischmann, C., C. Weinschenk, and D. Madrzykowski, "Quantifying the Fire Hazard from Li-Ion Battery Fires Caused by Thermal Runaway in E-scooters," *Fire Technology*, March 2025. doi.org/10.1007/s10694-025-01707-z

~~44~~ 45 . Schraiber, A., et al., *Considerations for Fire Service Response to Residential Battery Energy Storage System Incidents*, UL Fire Safety Research Institute, Columbia, MD, December 2023.

~~45. Madrzykowski, D., and C. Weinschenk, "Fire Safety of Batteries and Micro-mobility Devices," *Fire Protection Engineering Magazine* , Q4, 2023. fireprotectionengineering-digital.com/fireprotectionengineering/library/item/q4_2023/4155029/?utm_source=newsletter&utm_medium=email&utm_campaign=TXFIR4231206002&utm_content=gt~~

46. Sauer, Nathanial G., Benjamin Gaudet, and Adam Barowy, "Experimental investigation of explosion hazard from lithium-ion battery thermal runaway effluent gas," *Fuel* , Volume 378, 2024. doi.org/10.1016/j.fuel.2024.132818.

47. Madrzykowski, D. and Nathaniel Sauer, "Lithium-Ion Battery Heat Release Rate and Explosion Hazards," *Firehouse Magazine* , January 2025. firehouse.com/operations-training/article/55252277/fire-department-response-lithium-ion-battery-heat-release-rate-and-explosion-hazards

48. Barowy, A., et al., *UL 9540A Installation Level Tests with Outdoor Lithium-ion Energy Storage System Mockups* , UL Research and Development, Northbrook, IL, April 2021. fsri.org/research-update/energy-storage-system-installation-test-report-now-available

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~~48~~ 51 . Webb, S., et al., "Challenges and Tactics for Fighting Row House Fires," National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Publication No. 2023-101. cdc.gov/niosh/docs/video/2023-101/default.html

52. Loflin, M., et al., "Preventing Deaths and Injuries of Fire Fighters Working at Basement and Other Below-Grade Fires", National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Publication No. DHHS (NIOSH) Publication No. 2018-154, July 2018. doi.org/10.26616/NIOSHPUB2018154

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Supplemental Information

File Name	Description	Approved
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Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Tue Mar 04 14:57:57 EST 2025

Committee Statement

Committee Statement: Report is identified in Chapter 4 for fighting basement and below grade fires. Updated references in Section 4.6.7

Response Message: SR-2-NFPA 1700-2025

Public Comment No. 11-NFPA 1700-2025 [Section No. 2.3.6]

Second Revision No. 18-NFPA 1700-2025 [Section No. 2.4]

2.4 References for Extracts in Advisory Sections.

NFPA 13, *Standard for the Installation of Sprinkler Systems,* ~~2022~~ 2025 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances,* ~~2022~~ 2025 edition.

NFPA 30, *Flammable and Combustible Liquids Code,* 2024 edition.

NFPA 53, *Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres,* ~~2021~~ 2026 edition.

NFPA 54, *National Fuel Gas Code,* 2024 edition.

NFPA 55, *Compressed Gases and Cryogenic Fluids Code,* 2023 edition.

NFPA 68, *Standard on Explosion Protection by Deflagration Venting,* 2023 edition.

NFPA 70®, *National Electrical Code®,* 2023 edition.

NFPA 72®, *National Fire Alarm and Signaling Code®,* ~~2022~~ 2025 edition.

NFPA 92, *Standard for Smoke Control Systems,* 2024 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations,* 2024 edition.

NFPA 101®, *Life Safety Code®,* 2024 edition.

NFPA 115, *Standard for Laser Fire Protection,* 2020 edition.

NFPA 400, *Hazardous Materials Code,* ~~2022~~ 2025 edition.

NFPA 440, *Guide for Aircraft Rescue and Firefighting Operations and Airport/Community Emergency Planning,* 2024 edition.

NFPA 470, *Hazardous Materials/Weapons of Mass Destruction (WMD) Standard for Responders,* 2022 edition.

NFPA 475, *Recommended Practice for Organizing, Managing, and Sustaining a Hazardous Materials/Weapons of Mass Destruction Response Program,* 2022 edition.

NFPA 610, *Guide for Emergency and Safety Operations at Motorsports Venues,* 2024 edition.

~~NFPA 654, *Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids,* 2020 edition.~~

NFPA 660, *Standard for Combustible Dusts and Particulate Solids,* 2025 edition.

NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems,* 2026 edition.

NFPA 901, *Standard Classifications for Fire and Emergency Services Incident Reporting,* 2021 edition.

NFPA 921, *Guide for Fire and Explosion Investigations,* 2024 edition.

NFPA 1006, *Standard for Technical Rescue Personnel Professional Qualifications,* 2021 edition.

NFPA 1026, *Standard for Incident Management Personnel Professional Qualifications,* 2024 edition.

NFPA 1400, *Standard on Fire Service Training,* 2026 edition.

NFPA 1405, *Guide for Land-Based Fire Departments That Respond to Marine Vessel Fires,* ~~2020~~ 2026 edition.

~~NFPA 1410, *Standard on Training for Emergency Scene Operations,* 2020 edition.~~

NFPA 1660, *Standard for Emergency, Continuity, and Crisis Management: Preparedness, Response, and Recovery,* 2024 edition.

~~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,* 2020 edition.~~

NFPA 1750, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Providing Fire and Emerency Services to the Public,* 2026 edition.

NFPA 1850, *Standard on Protective Ensembles for Structural and Proximity Firefighting and Self-Contained Breathing Apparatus (SCBA),* 2026 edition.

~~NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting,* 2020 edition.~~

NFPA 1900, *Standard for Aircraft Rescue and Firefighting Vehicles, Automotive Fire Apparatus, Wildland Fire Apparatus, and Automotive Ambulances,* 2024 edition.

NFPA 1950, *Standard on Personal Protective Equipment for Technical Rescue Incidents, Emergency Medical Operations, and Wildland and Urban Interface Firefighting,* 2025 edition.

NFPA 1960, *Standard for Fire Hose Connections, Spray Nozzles, Manufacturer's Design of Fire Department Ground Ladders, Fire Hose, and Powered Rescue Tools,* 2024 edition.

~~NFPA 1977, *Standard on Protective Clothing and Equipment for Wildland Fire Fighting and Urban Interface Fire Fighting,* 2022 edition.~~

NFPA 2500, *Standard for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services,* 2022 edition.

NFPA 5000®, Building Construction and Safety Code®, 2024 edition.

Supplemental Information

File Name	Description	Approved
1700_SR-18_Section_2.4.docx		

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Mar 10 09:10:11 EDT 2025

Committee Statement

Committee Statement: The technical committee identified updates and consolidation of referenced NFPA standards

Response Message: SR-18-NFPA 1700-2025

Second Revision No. 16-NFPA 1700-2025 [New Section after 3.3.7]

3.3.8 Battery.

One or more cells connected together electrically in series, parallel, or both, to provide the required operating voltage and current levels. [**855,** 2026]

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Mar 10 08:37:02 EDT 2025

Committee Statement

Committee Statement:	The technical committee identified a need to define "Battery" to be consistent with NFPA 855 for content in chapters7 & 12.
Response Message:	SR-16-NFPA 1700-2025

Second Revision No. 15-NFPA 1700-2025 [New Section after 3.3.18]

3.3.20 Cell.

The basic electrochemical unit, characterized by an anode and a cathode, used to receive, store, and deliver electrical energy. [**70**, 2023]

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Mar 10 08:32:17 EDT 2025

Committee Statement

Committee Statement: The technical committee added the definition for Cell to maintain consistency with NFPA 855.

Response Message: SR-15-NFPA 1700-2025

Second Revision No. 45-NFPA 1700-2025 [Section No. 3.3.28]

3.3.30 Concealed Space.

That portion(s) of a building behind walls, over suspended ceilings, in pipe chases, and in attics whose size might normally range from ~~44.45 mm (1 3⁄4 in.)~~ 1 3⁄4 in. (44.45 mm) stud spaces to ~~2.44 m (8 ft.)~~ 8 ft (2.44 m) interstitial truss spaces and that might contain combustible materials such as building structural members, thermal and/or electrical insulation, and ducting. [**96,** 2024]

Submitter Information Verification

Committee: FCO-AAA

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Committee Statement

Committee Statement: Editorial change to be constant throughout the guide by having US measurements be the lead and SI units in parentheses, including to match the format of the extracted definition from NFPA 96.

Response Message: SR-45-NFPA 1700-2025

Second Revision No. 14-NFPA 1700-2025 [Section No. 3.3.51]

3.3.53* Energy Storage System (ESS).

One or more devices, ~~installed as a system~~ assembled together, capable of storing energy ~~and providing electrical energy into the premises wiring system or an electric power production and distribution network~~ to supply electrical energy at a future time . [~~**70**~~ **855** ,~~2023~~ 2026]

A.3.3.53 Energy Storage System (ESS).

ESS~~(s) can~~ include but ~~is~~ are not limited to the following categories: ~~batteries, capacitors, and kinetic energy devices (e.g., fly wheels and compressed air). These systems can have ac or dc output for utilization and can include inverters and converters to change stored energy into electrical energy.~~

(1) Chemical: hydrogen storage

(2) Thermal: thermal energy storage

(3) Electrochemical:

- (a) Batteries
- (b) Flow batteries

(4) Mechanical:

- (a) Flywheel
- (b) Pumped hydro
- (c) Compressed air energy storage (CAES)

(5) Electrical:

- (a) Capacitors
- (b) Superconducting magnetic energy storage (SMES)

These systems can have ac or dc output for utilization and can include inverters and converters to change stored energy into electrical energy. It is not the intention for ESS to include energy generation systems.

Energy storage systems can include, but are not limited to, batteries, capacitors, and kinetic energy devices (e.g., flywheels). Energy storage systems can include inverters or converters to change voltage levels or to make a change between an ac or a dc system. These systems differ from other storage systems such as a UPS system, which is a power supply used to provide alternating current power to a load for some period of time in the event of a power failure. [**855** , 2026]

Supplemental Information

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Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Mar 10 08:19:25 EDT 2025

Committee Statement

Committee Statement: The technical committee revised the definition for ESS to be consistent with NFPA 855

Response Message: SR-14-NFPA 1700-2025

Second Revision No. 37-NFPA 1700-2025 [Section No. 3.3.221]

~~**3.3.223** Transitional Attack.~~

~~The application of a fire stream from the exterior of a structure to improve conditions prior to interior fire control.~~

Submitter Information Verification

Committee: FCO-AAA
Submittal Date: Mon May 19 11:15:51 EDT 2025

Committee Statement

Committee Statement: No longer used in the Guide.
Response Message: SR-37-NFPA 1700-2025

Second Revision No. 46-NFPA 1700-2025 [Section No. 4.6.5.1]

4.6.5.1 Governors Island 2012.

The Fire Department of the City of New York, along with NIST and UL, conducted a series of experiments in abandoned townhouses with an approximately 600 ft^2 (55.7 m^2) area per floor and unprotected dimensional lumber floor systems between the first level and the basement level. The live burn tests were aimed at quantifying emerging theories about how fires are different today. Tactics examined included vent, enter ~~Isolate~~ , isolate, and search (VEIS), horizontal and vertical ventilation, and interior and exterior fire attack. Fires attacked and controlled from exterior openings from the front and/or rear of the structure resulted in improved conditions throughout the structure [25]. In addition, fire professionals and experts will closely analyze how the introduction of oxygen into these scenarios impacts fire behavior and how this required consideration of new procedures on ventilation strategies during firefighting operations.

Submitter Information Verification

Committee: FCO-AAA

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Committee Statement

Committee Statement: Each action of VEIS separated and Isolate changed to lowercase. SI units added.

Response Message: SR-46-NFPA 1700-2025

Second Revision No. 47-NFPA 1700-2025 [Section No. 4.6.5.2]

4.6.5.2 Spartanburg 2013 and 2014.

The International Society of Fire Service Instructors (ISFSI) in ~~co-operation~~ cooperation with NIST, the South Carolina State Fire Academy and the Spartanburg Fire Department conducted two series of firefighting experiments in acquired structures were conducted as part of the AFG funded "Translating Fire Fighting Research Results into Fire Fighter Training Project". The experiments demonstrated the value of size-up, coordinated ventilation and offensive fire attacks which began on the exterior. These experiments and previous firefighting research, such as the Governors Island studies provided the basis for the ISFSI's Principles of Modern Fire Attack course [26].

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Jun 02 10:06:24 EDT 2025

Committee Statement

Committee Statement: grammatical change from co-operation to cooperation.

Response Message: SR-47-NFPA 1700-2025

Second Revision No. 35-NFPA 1700-2025 [Section No. 4.6.6 [Excluding any Sub-Sections]]

~~In the first edition of NFPA 1700, the importance of search and rescue tactics meeting the incident priority of life safety to the public and first responders was acknowledged, though there was no science-based research available to include. Since then, a study completed by~~ UL FSRI conducted 21 experiments in two identical, purpose-built, single-story, single-family residential structures to quantify the impact of how search and rescue tactics are coupled with ventilation and suppression actions and timing. Each fully furnished 1600 ft^2 (149 m^2) structure included four bedrooms, two bathrooms, and an open-floor kitchen and living room. The structures were instrumented to quantify post-ignition toxic gas and thermal conditions. Temperature, velocity, and pressure were measured to evaluate the fire dynamics. Gas concentrations and heat fluxes were measured to quantify toxic and thermal exposures. The results were published in three separate reports: *Analysis of Search and Rescue Tactics in Single-Story Single-Family Homes Part I: Bedroom Fires* [39], *Analysis of Search and Rescue Tactics in Single-Story Single-Family Homes Part II: Kitchen and Living Room Fires* [40], and *Analysis of Search and Rescue Tactics in Single-Story Single-Family Homes Part III: Tactical Considerations* [41], where the summary of the study presented in 4.6.6.1 can be found.

Submitter Information Verification

Committee:	FCO-AAA
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Committee Statement

Committee Statement:	The TC identified that the first sentence is no longer need in subsequent editions of NFPA 1700.
Response Message:	SR-35-NFPA 1700-2025

Second Revision No. 38-NFPA 1700-2025 [Section No. 4.6.7]

4.6.7 ~~Li-Ion~~ Lithium-Ion Battery Fires.

On April 19, 2019, four firefighters ~~received~~ sustained serious injuries ~~from~~ as a result of cascading thermal runaway within a 2.16 ~~MW/h li-ion~~ MWh lithium-ion battery energy storage system (ESS) that led to a deflagration event. This event was documented in the UL FSRI report, *Four Firefighters Injured ~~In~~ in Lithium-Ion Battery Energy Storage System Explosion – Arizona* [42]. ~~Based on~~ Because of incidents like this, research ~~is being~~ has been conducted to address firefighting concerns ~~of li-ion-powered systems~~ related to lithium-ion (Li-Ion) powered equipment ranging from consumer electronics in homes to commercial battery energy storage systems (BESSs) ~~ESSs to electric vehicles in garages to e-scooters in residences~~ .

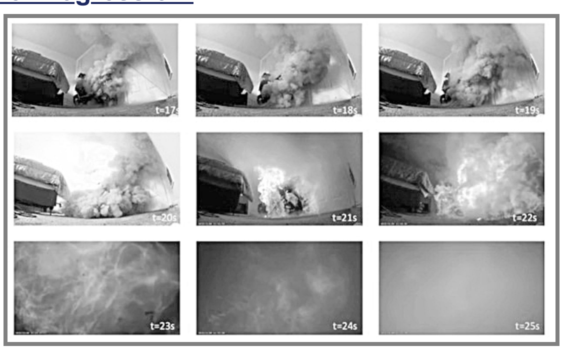
4.6.7.1 Residential Li-Ion Battery Fire and Explosion Hazards.

Lithium-ion batteries (LiBs) can be found in almost every residence. LiB are used in personal electronics, power tools, micro-mobility devices, electric automobiles, and residential energy storage systems. LiBs transition to thermal runaway for many reasons, including poor system design, mechanical damage, overheating, or overcharging. The outcome of thermal runaway may be a fire or an explosion. The gas vented from a LiB undergoing thermal runaway will contain hydrogen and other combustible fuels.

The battery's state of charge is a measure of how much energy the LiB has at that time. Therefore, a fully charged battery will release more energy when it fails, as opposed to a battery that is only partially charged. Similarly, a LiB that goes into thermal runaway, because of overheating tends to generate a lower heat release rate than a LiB that goes into thermal runaway as a result of overcharging. FSRI and UL Solutions collaborated to quantify these concepts with sit-on type LiB powered scooters. For example, an e-scooter battery pack composed of 136, 18650 NCA battery cells with an advertised capacity of 60 V (V), 20 amp-hour (Ah) 1.2 kilowatt-hours (kWh), when forced into thermal runaway by overheating generated a peak heat release rate of 410 kW, while a similar battery forced into thermal runaway by overcharging generated a peak heat release rate of 1600 kW. A battery pack like this is approximately 9 in. (22.86 cm) tall, 6 in. (15.24 cm) wide and 12 in. (30.48 cm) deep. [43,44]

The e-scooter battery described above, when intentionally overcharged in a residential room, was shown to result in blown out window glass and the room of origin transitioning to flashover in less than a minute after the first indication of smoke coming from the LiB pack. See Figure 4.6.7.1 .

Figure 4.6.7.1 LiB Fire Progression.



Within 20 seconds after the first visible smoke, the gases ignite explosively. The rapid fire growth can drive a room through flashover in less than a minute. [44]

4.6.7.2 Residential Li-Ion Battery Energy Storage Systems Fire and Explosion Hazards.

In 2022, there were 19 documented residential Li-Ion BESS fires. This is an emerging hazard for the fire service. The International Association of Fire Fighters partnered with UL Solutions and UL FSRI to conduct a series of large-scale tests sponsored by the US Department of Energy. The objective of this test series was to characterize the challenges for firefighters responding to fires involving residential energy storage systems with a focus on developing size-up and tactical considerations to support the fire service in navigating the modern fireground. [45]

Four large scale experiments were conducted in a fire laboratory utilizing a mockup of a residential LiB energy storage system installed in a representative two-car garage. The experiments used three BESS modules with an equivalent energy capacity of 17 kWh per unit. The impact of ventilation operations were considered for batteries undergoing thermal runaway without prompt ignition, as well as scenarios where batteries were involved in a surrounding room and contents fire. The results provided consideration on size-up, PPE usage, ventilation, the limited effectiveness of gas meters, and the explosive hazard from the gases emitted by the LiBs.

In 2022, FSRI and UL Solutions collaborated to examine the fire and explosion potential of wall mounted residential BESSs. Currently, residential BESSs are intended to be installed in non-occupiable space, although firefighters should be prepared for installations in other locations as well. The test enclosure was designed to represent an attached residential two-car garage. This research effort followed a US Department of Energy project that demonstrated that releases of thermal runaway effluent gases (TREG) from a residential energy storage system could create deflagration hazards [46, 47]

The interior of the walls and ceiling of the garage were finished with 0.625-inch-thick Type X gypsum wallboard on the interior. Wallboard seams were sealed with paper tape and joint compound. Adjacent rooms were constructed on the rear and to one side of the garage to represent the structural reinforcement normally provided by the remainder of the home. The structure was anchored to a concrete pad. A 16 ft (14.88 m) wide by 7 ft (2.13 m) tall steel overhead door was installed at the front of the garage, and a 30 in. (76.2 cm) wide by 80 in. (203.2 cm) tall steel-over-polystyrene core, 20-minute fire-rated interior door was installed in the center of the opposite wall.

Based on the composition and amount of TREG generated by a NCA 18650 cell, bags were filled with simulated TREG with volumes that spanned amounts potentially generated by a partial BESS thermal runaway or equivalently by a 20 V battery pack for a handheld power tool 328 gal (124 liters) of gas up through a 60 V battery pack for a large piece of lawn equipment or a sit on e-scooter 327 gal (1238 liters) of gas. Once the bags were filled with the appropriate mixture and amount of hydrogen, carbon monoxide, carbon dioxide and methene, the bag was remotely ignited, which set off the explosion.

Throughout the experiment series, cosmetic and structural damage to the structure occurred that was repaired between experiments. The garage door served as a pressure relief panel. Figure 4.6.7.2 shows the garage door being blown off of the garage test prop by the gas that could be generated by 100 LiB cells or more. Interior damage included broken seams between the gypsum boards, cracked wall studs, and damage to the interior door and frame.

Figure 4.6.7.2 Garage Explosion.

Explosion of the gas that could be generated by a battery pack containing 100 NCA 18650 cells. The garage door landed 50 ft from the garage. [46]

4.6.7.3 Commercial Li-Ion Battery Energy Storage Systems Fire and Explosion Hazards.

UL Solutions has been conducting experiments to develop installation safety standards for commercial BESSs. During a series of experiments, UL FSRI was invited to examine the experiments from a responding fire departments perspective. Three experiments were conducted in 2020, in the UL Large Scale Fire Test Facility in Northbrook, IL. The experiments included a mockup of an initiating BESS unit and two target BESS units installed within an intermodal shipping container outfitted with deflagration protection vents. All experiments were conducted with an identical lithium-ion (li-ion) battery configuration. The initiating BESS had nine battery modules with a total capacity of 28.9 kWh. The target BESS were loaded to one-third capacity of the Initiating BESS. The fire and explosion hazard was documented from these experiments. With regard to fire service tactical considerations, the study addressed visual cues for size-up, the limitations of thermal imagers and gas monitoring equipment, ventilation tactics, and the level of PPE required. [48]

~~**4.6.7.1** Fire Service Response to Residential Battery ESS Incidents.~~

~~Fire service response to battery ESS incidents should include the following considerations:~~

~~Commercial ESSs [43]~~

~~Residential ESSs [44]~~

~~Micromobility fires in structures [45]~~

Supplemental Information

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SR-38_4.6.7_final.docx		
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Submitter Information Verification

Committee: FCO-AAA
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Committee Statement

Committee Statement: The technical committee revised the first draft on the overview of responding to LI-ion battery incidents.

Response Message: SR-38-NFPA 1700-2025

Second Revision No. 39-NFPA 1700-2025 [Section No. 4.7.3]

4.7.3

Since the program started, more than 800 investigation reports have been produced. Based on the trends discovered in the investigations, [49] NIOSH has issued special reports such as "Preventing Injuries and Deaths of Fire Fighters Due to Structural Collapse," [50] "Fire Fighter Fatality Investigation and Prevention Program: Leading Recommendations for Preventing Fire Fighter Fatalities, 1998–2005," and "Preventing Deaths and Injuries of Fire Fighters Working Above Fire-Damaged Floors." All of the completed investigations and the special reports can be downloaded from cdc.gov/niosh/fire/default.html ~~[46]~~ . NIOSH has also developed resources in the form of posters and a video on row house firefighting tactics ~~[47]~~ , "Challenges and Tactics for Fighting Row House Fires," [~~48~~ 51], and "Preventing Deaths and Injuries to Firefighters Working at Strip Mall Fires" [~~49~~ 52].

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Fri May 23 23:19:55 EDT 2025

Committee Statement

Committee Statement: Added reference from NIOSH regarding fighting basement and below grade fires.

Response Message: SR-39-NFPA 1700-2025

Public Comment No. 8-NFPA 1700-2025 [Section No. 4.7.3]

Second Revision No. 48-NFPA 1700-2025 [Section No. 5.4]

5.4 General.

~~Fire-fighting~~ Firefighting personnel should have an understanding of combustion and fire dynamic principles and be able to use them for fire scene size up and assessment of fire conditions both upon initial arrival and continuously over the course of the incident. This chapter addresses the basic and fundamental knowledge of fire science needed to assist the reader to sufficiently understand the following chapters. The user of this guide is urged to consult the reference material listed in Annex D for additional details.

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Committee: FCO-AAA

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Committee Statement

Committee Statement: Hyphen removed in "fire-fighting"

Response Message: SR-48-NFPA 1700-2025

Second Revision No. 36-NFPA 1700-2025 [Section No. 7.5.4.1 [Excluding any Sub-Sections]]

Type IV building materials include noncombustible materials for the exterior walls and interior building elements composed of solid or laminated wood without concealed spaces. Older structures can have solid-sawn wood construction. Traditional Type IV structures can still be found and constructed. The growing trend is to use mass timber products in Type IV A, IV B, and IV C.

Submitter Information Verification

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Committee Statement

Committee Statement: The TC updated the section to include the new Mass Timber classifications.

Response Message: SR-36-NFPA 1700-2025

Second Revision No. 10-NFPA 1700-2025 [Section No. 7.5.4.1.1.1]

7.5.4.1.1.1 Type IVA.

Type IVA construction permits greater heights and areas based on full interior protection of gypsum board. Characteristics include the following:

(1) Height up to 18 stories in Occupancy M, Occupancy B, and Occupancy R

(2) Unlimited area ~~[ft ^{2} (m ^{2})]~~

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Wed Mar 05 22:22:33 EST 2025

Committee Statement

Committee Statement: The technical committee determined that size parameter is not required.

Response Message: SR-10-NFPA 1700-2025

Second Revision No. 11-NFPA 1700-2025 [Section No. 7.5.4.1.1.2]

7.5.4.1.1.2 Type IVB.

Type IVB construction permits greater heights and areas based on full interior protection of gypsum board. Characteristics include the following:

(1) Height up to 12 stories in Occupancy M, Occupancy B, and Occupancy R

(2) Limited area ~~[ft ^{2} (m ^{2})]~~

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Wed Mar 05 22:26:51 EST 2025

Committee Statement

Committee Statement: The technical committee determined that size parameter is not required.

Response Message: SR-11-NFPA 1700-2025

Second Revision No. 21-NFPA 1700-2025 [Section No. 8.4]

8.4 Thermal Testing Requirements for Firefighter Protective Clothing and Equipment.

The criteria for thermal limitation, time exposed, and test method is compiled from the most current edition of the applicable standard at the time of publication. The firefighter should be aware of these minimum requirements and how their equipment is tested as it compares to their work environment. Additionally, standards are continually evolving, and gear and equipment can be used that is tested to different criteria or no criteria. *(See Table 8.4.)*

Table 8.4 Thermal Testing Requirements for Firefighter Protective Clothing and Equipment

Firefighting Gear and Equipment (NFPA Reference Standard-Edition)	**Thermal Limitations**	**Time Exposed**	**Standard Test Method**
Helmet flaps (~~1971–2018~~ 1970–2025)	500°F (260°C)	5 minutes	Heat and thermal shrinkage resistance — convective oven
	7.39 Btu/ft^2 (84 kW/m^2)	Minimum TPP — 20	Thermal protective performance (TPP) test
	Open flame	12 to 15 seconds	Flame resistance test — Bunsen burner
Face shield and goggle components (~~1971–2018~~ 1970–2025)	Open flame	15 seconds	Flame resistance test — Bunsen burner
Helmet (~~1971–2018~~ 1970–2025)	Open flame	15 seconds	Flame resistance — Bunsen burner
	Open flame and 0.88 Btu/ft^2 (10 kW/m^2)	60 seconds followed by 15 seconds	Bunsen Burner and radiative source
Hood (~~1971–2018~~ 1970–2025)	500°F (260°C)	5 minutes	Heat and thermal shrinkage resistance — convective oven
	7.39 Btu/ft^2 (84 kW/m^2)	Minimum TPP — 20	Thermal protective performance (TPP) test
	Open flame	12 to 15 seconds	Flame resistance test — Bunsen burner
Protective coat and trousers (~~1971–2018~~ 1970–2025)	500°F (260°C)	5 minutes	Heat and thermal shrinkage resistance — convective oven
	7.39 Btu/ft^2 (84 kW/m^2)	Minimum TPP — 35	Thermal protective performance (TPP) test
	Open flame	12 to 15 seconds	Flame resistance test — Bunsen burner
Gloves (~~1971–2018~~ 1970–2025)	500°F (260°C)	5 minutes	Heat and thermal shrinkage resistance — convective oven
	Open flame	12 to 15 seconds	Flame resistance test — Bunsen burner
Boots (~~1971–2018~~ 1970–2025)	500°F (260°C)	5 minutes	Heat and thermal shrinkage resistance — convective oven
	Open flame	12 seconds	Flame resistance test — heptane fueled pan fire

Firefighting Gear and Equipment (NFPA Reference Standard-Edition)	**Thermal Limitations**	**Time Exposed**	**Standard Test Method**
Station/work uniform (~~1975–2019~~ 1970–2025)	500°F (260°C)	10 minutes — hot air circulating	Heat and thermal shrinkage resistance — convective oven
	510°F (265°C)	10 seconds — flame resistance test 3 in. × 12 in. rectangle specimen	Thermal stability (sticking) — convective oven
	Exists in ASTM D6413/D6413M	12 seconds	Direct flame — flame resistance of textiles (vertical test)
SCBA ensemble (~~1981–2019~~ 1970–2025)	350°F (177°C)	15 minutes	Environmental test
	Oven test 500°F (260°C)	5 minutes	Oven test — complete SCBA
	Precondition at 1500°F–2102°F (815°C–1150°C) followed by open flame contact	5 minute oven test	Elevated temperature test — complete SCBA
	Open flame	10 seconds	
SCBA facepiece (~~1981–2019~~ 1970–2025)	Precondition at 203°F (95°C) followed by open flame contact	15 minutes	Heat and flame test
	Open flame	10 seconds	
	500°F (260°C)	5 minutes	Elevated heat and flame resistance test
	1.32 Btu/ft^2 (15 kW/m^2)	5 minutes	Radiant heat test panel
Pass devices (~~1982–2018~~ 1970–2025)	350°F (177°C) oven test	15 minutes	Heat and immersion resistance test
	500°F (260°C) oven test	5 minutes	High-temp functionality test
	Precondition at 203°F (95°C) oven test followed by 1500°F–2102°F (815°C–1150°C)	15 minutes	Heat and flame resistance test
	Open flame	10 seconds	
Thermal imagers (~~1801–2021~~ 1930–2025)	203°F (95°C)	15 minutes	Heat and flame test
	Open flame	10 seconds	
	500°F (260°C)	5 minutes	Heat resistance test
Escape ropes (~~1983–2017~~ 2500–2022)	752°F (400°C)	5 minutes 300 lb (136 kg) dead load	Elevated temperature rope test
	1112°F (600°C)	45 seconds 300 lb (136 kg) dead load	Elevated temperature rope test
Hose* (1960–2024)	500°F (260°C)	5 minutes	UL-19 hot block test
	158°F (70°C)	96 hours	Oven aging test

Firefighting Gear and Equipment (NFPA Reference Standard-Edition)	Thermal Limitations	Time Exposed	Standard Test Method
	–4°F (–20°C)	24 hours	Cold bending and flexibility test
Nozzles (1960–2024)	135°F (57°C) and –25°F (–32°C)	24 hours	Hot conditioning then function test Cold conditioning then function test and rough-handling tests
Ladders (~~1931–2020~~ 1960–2024)	At 300°F (149°C)	N/A	Pass all of the tests while maintaining 75% strength

~~*The NFPA Technical Committee is currently investigating changes to the thermal protection requirements for fire hose.~~

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Mar 10 13:08:26 EDT 2025

Committee Statement

Committee Statement: NFPA Standards referenced in table are updated to recognize current consolidated standards issued.

Response Message: SR-21-NFPA 1700-2025

Second Revision No. 49-NFPA 1700-2025 [Section No. 8.9]

8.9 Thermal Imager — TI~~C~~ (NFPA ~~1801~~ 1930).

See 8.8.2, “Heat and Flame Test” [203°F (95°C) convective oven for 15 minutes followed by 10 second direct flame contact] and 8.7.2, “Elevated Heat and Flame Resistance Test” [convection oven at 500°F (260°C) for 5 minutes].

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Jun 02 10:12:14 EDT 2025

Committee Statement

Committee Statement: TIC changed to TI to be consistent throughout the guide and with NFPA1930.

Response Message: SR-49-NFPA 1700-2025

Second Revision No. 50-NFPA 1700-2025 [Section No. 8.11]

8.11 ~~RIT~~ RIC Bag.

While no standards exist for ~~RIT~~ RIC kits, fire department personnel should have a working knowledge of the minimal thermal performance of ~~RIT~~ RIC parts, including bag, escape rope, cylinder, hoses, regulator, spare facepiece, and related equipment. Examples of these items can be found throughout this chapter.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Jun 02 10:18:31 EDT 2025

Committee Statement

Committee Statement: RIT changed to RIC to be consistent with definition in chapter 3, along with NFPA 1400 (1407) requirements.

Response Message: SR-50-NFPA 1700-2025

Second Revision No. 27-NFPA 1700-2025 [Section No. 9.1 [Excluding any Sub-Sections]]

This chapter addresses the sources of information that can be used to initiate <u>and review</u> strategic decisions. Initial strategic decisions should eliminate opportunities in which firefighters are working in offensive firefighting positions during defensive fire conditions and should ensure firefighters are using the correct strategy for the given incident conditions. Incident strategy is defined as the intended position from which fire control and/or search tactics take place within or outside of the defined incident hazard zone. In an offensive strategy, the fire attack can begin on the exterior or interior, dependent on the conditions, though fire control and search tactics will ultimately be completed in the interior spaces within the hazard zone. In a defensive strategy, fire control will be conducted from the safest, most effective positions outside of the areas already lost; a search for life can only be conducted in areas that have not already been lost (exposures) and only when the interior conditions, resources, and safety system allows.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun May 18 21:07:27 EDT 2025

Committee Statement

Committee Statement: The technical committee recognizes that reviewing strategic decisions is constantly needed.

Response Message: SR-27-NFPA 1700-2025

Second Revision No. 28-NFPA 1700-2025 [Section No. 9.2]

9.2 Purpose.

The purpose of this chapter is to define key variables in an assessment process to determine either an offensive or defensive strategy. It is important to understand that size-up, incident factors, and risk management principles drive the incident strategy.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun May 18 21:10:27 EDT 2025

Committee Statement

Committee Statement: The technical committee determined that "principles" focus the decision making process.

Response Message: SR-28-NFPA 1700-2025

Second Revision No. 29-NFPA 1700-2025 [Section No. 9.3]

9.3 Application.

The intent of this chapter is for firefighting personnel to conduct initial and ongoing assessments to choose an initial strategy, evaluate the effectiveness of the current strategy, and change strategies when the conditions, risk management principles , and actions dictate.

9.3.1

Initial decisions should ensure that firefighters are using the appropriate positioning and tactics for the defined strategy and incident conditions.

9.3.2

In an offensive strategy, the fire attack can begin on the exterior or interior, depending on the conditions, though fire control and search tactics will ultimately be completed in interior spaces within the hazard zone. Examples of offensive strategic objectives include the following with the order dependent upon size-up and conditions presented:

(1) Evacuation: Confirmed occupant loads requiring immediate evacuation from a building threatened by rapid fire development or structural collapse.

(2) Rescue: Occupant(s) in known or suspected location(s) requiring immediate rescue.

(3) Fire Attack: Possible occupant(s) in unknown location(s) requiring rapid fire extinguishment/control to support primary search and ventilation operations and/or property conservation requiring rapid fire extinguishment/control to prevent additional loss. Fire conditions and building stability support interior operations.

9.3.3

In a defensive strategy, fire control will be conducted from the safest, most effective positions outside of the areas already lost. A search for life can only be conducted in areas that have not already been lost (exposures) and only when the interior conditions, resources, and safety systems allow. Examples of defensive strategic objectives include the following with the order dependent upon size-up and conditions presented:

(1) Confine (surround and drown): Building instability or extent of fire conditions preclude interior operations.

(2) Protect (exposures): Extension of fire to exposures is foreseeable and requires mitigation.

(3) No Attack: Due to the products involved in the fire or imminent situational hazards, the best option is to allow the fire to continue to burn.

Supplemental Information

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9.3_word_file.docx		
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Submitter Information Verification

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Committee Statement

Committee Statement:	The technical committee identified a number of factors that impact strategic decisions.
Response Message:	SR-29-NFPA 1700-2025

Second Revision No. 51-NFPA 1700-2025 [Section No. 9.4.2]

9.4.2 Computer Aided Dispatch (CAD) Resources.

This information may give the officer details on resources, amount, estimated on-scene time, arrival order, dispatched occupancy type, and pre-existing structural hazards.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Jun 02 10:21:41 EDT 2025

Committee Statement

Committee Statement: Acronym for CAD indicated for only instance used in the guide.

Response Message: SR-51-NFPA 1700-2025

Second Revision No. 30-NFPA 1700-2025 [Section No. 9.5.1]

9.5.1

The initial fire control strategy should be assessed through size-up of the overall conditions upon arrival. The incident strategy should be continuously evaluated throughout the incident until the hazard has been mitigated, the ~~victims~~ occupants have been located and removed, and property loss has been stopped.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun May 18 21:28:21 EDT 2025

Committee Statement

Committee Statement: The technical committee determined that persons in a building do not automatically make them victims.

Response Message: SR-30-NFPA 1700-2025

Second Revision No. 52-NFPA 1700-2025 [Section No. 9.6.1]

9.6.1

A visual assessment of all four sides of the structure looking at smoke conditions, fire conditions, ventilation profile, openings, life safety and occupant (victim) potential, and immediate threats to firefighters is essential to assessing the fire dynamics occurring within the building to the extent practicable. This assessment should be completed as early as possible during the incident because information gathered from it could directly drive a strategy and/or change in action. Early recognition of safety concerns drives risk management and strategy. The assessment should be conducted by the IC specifically or through tactical level assignments covering the critical sides when the geography or size will not allow completion by the incident commander (IC).

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Jun 02 10:24:26 EDT 2025

Committee Statement

Committee Statement: Assessment should be for either occupants or potential victims based on factors presented.

Response Message: SR-52-NFPA 1700-2025

Second Revision No. 31-NFPA 1700-2025 [Section No. 9.6.5]

9.6.5

Considerations should include the following:

(1) Number of stories, A and C sides or B to D sides

(2) Basement type, as follows:

(a) No access basement — no external basement access, internal access only)

(b) Limited-access basement — external window access to basement only, walkup or lookout basement

(c) Full-access basement — external door or large escape window access, walkout or daylight basement

(3) Basement finish, as follows:

(a) Finished — provides protection to structural floor components, has the potential for livable space, and often contains compartmentation

(b) Unfinished — does not typically provide protection to structural floor components and may not have livable space (but does not eliminate the potential for ~~victims~~ occupants)

(4) Basement fuel load

(5) Presence of occupant escape systems

(6) Utilities, including the following:

(a) Electrical source and storage (e.g., PV systems, battery energy storage systems)

(b) Fuel gas tanks

(c) Natural gas service (location of shutoff)

(d) Fuel tanks, either oil or propane (above or below ground)

(7) Pre-existing structural hazards

(8) Hazardous grade changes

(9) Roof type and construction

(10) Presence of fire protection features (e.g., hydrants, FDC, fire pump)

(11) Presence of electric vehicles in garage or as an exposure

Supplemental Information

File Name	Description	Approved
1700_SR-31_9.6.5.docx		

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun May 18 21:31:27 EDT 2025

Committee Statement

Committee Statement:	The technical committee recognizes that any elevation changes from the B to D side is important.
Response Message:	SR-31-NFPA 1700-2025

Second Revision No. 32-NFPA 1700-2025 [New Section after 9.10]

9.11 Incident Action Plan (IAP).

An appropriate IAP addresses the top five factors contributing to LODD found in NIOSH reports:

(1) Improper risk assessment

(2) Lack of incident command

(3) Lack of accountability

(4) Inadequate communications

(5) Failure to follow established SOPs/training

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun May 18 21:50:56 EDT 2025

Committee Statement

Committee Statement: The technical committee identified a need to outline the Top 5 factors contributing factors to LODD most commonly found. This is to support previous first draft revisions to the scope and purpose of chapter 9.

Response Message: SR-32-NFPA 1700-2025

Second Revision No. 34-NFPA 1700-2025 [Section No. 9.10.2]

9.10.2

The ability to control fire conditions in conjunction with locating ~~victims~~ occupants is the greatest consideration when determining the overall incident strategy.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun May 18 21:56:08 EDT 2025

Committee Statement

Committee Statement: The technical committee determined that occupying a structure does not automatically make a person a victim.

Response Message: SR-34-NFPA 1700-2025

Second Revision No. 33-NFPA 1700-2025 [Section No. 9.10.4]

9.10.4

In a defensive strategy, fire control actions will be conducted from the safest, most effective positions outside of the area already ~~los~~ lost .

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun May 18 21:53:42 EDT 2025

Committee Statement

Committee Statement: Typo correction

Response Message: SR-33-NFPA 1700-2025

Second Revision No. 53-NFPA 1700-2025 [Section No. 11.5.3]

11.5.3

~~Fire engine cabs~~ All interior crew and driving compartments should be kept shut during operations and aired out briefly when operations have ended. After the fire has been extinguished, involved and contaminated rooms should be ventilated for a sufficient time prior to entry without respiratory protection for investigation purposes. Known carcinogens and hazardous chemicals can attach themselves to PPE and exposed skin. Proper use of PPE, including SCBA, is important and can minimize the smoke exposure risks to firefighters. Members, apparatus, and equipment in the hot zone should be decontaminated. PPE that has been contaminated should be removed while using respiratory protection and placed in an area remote from operating personnel. This procedure will limit the exposure of operating personnel to the off gassing of contaminants from the PPE. Contaminated gear should not be removed from the warm zone unless decontaminated or bagged. Personnel working with equipment contaminated during a structure fire should use nitrile or latex emergency medical services (EMS) gloves and particulate filtering facepiece (N95 minimum) during the cleaning process.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Jun 02 10:29:50 EDT 2025

Committee Statement

Committee Statement: Terminology updated to be consistent with NFPA1900.

Response Message: SR-53-NFPA 1700-2025

Second Revision No. 42-NFPA 1700-2025 [Section No. 11.6 [Excluding any Sub-Sections]]

On returning to quarters, firefighters should ensure gear is cleaned in accordance with Chapter ~~7~~ 6 of ~~NFPA 1851~~ NFPA 1850 immediately after the fire has been extinguished and firefighting operations have concluded. Contaminated equipment should be initially cleaned on scene prior to being stored on the fire apparatus. Contaminated apparatus should be cleaned prior to leaving the scene.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun Jun 01 22:20:31 EDT 2025

Committee Statement

Committee Statement: The TC recognizes the NFPA 1851 is now part of the consolidated standard NFPA 1850

Response Message: SR-42-NFPA 1700-2025

Second Revision No. 54-NFPA 1700-2025 [Section No. 11.13.3.1.2]

11.13.3.1.2

To reduce exposure to airborne particulates and gasses from off- gassing PPE, the SCBA facepiece should remain in place while doffing remaining PPE components.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Jun 02 10:33:44 EDT 2025

Committee Statement

Committee Statement: Hyphen removed from "off gassing" to be consistent throughout the chapter.

Response Message: SR-54-NFPA 1700-2025

Second Revision No. 41-NFPA 1700-2025 [Section No. 11.13.3.1.5]

11.13.3.1.5

Certain parts of the PPE ensemble cannot be effectively deconned on scene due to their typically porous nature (e.g., hoods and gloves). These parts of the ensemble should be switched out on the scene until they can be properly cleaned in accordance with ~~NFPA 1851~~ NFPA 1850 .

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun Jun 01 22:16:48 EDT 2025

Committee Statement

Committee Statement: The TC recognizes the NFPA 1851 is now part of the consolidated standard NFPA 1850.

Response Message: SR-41-NFPA 1700-2025

Second Revision No. 40-NFPA 1700-2025 [Section No. 11.13.3.2.3]

11.13.3.2.3

Contaminated turnouts, including hood, gloves, boots, and helmets, should be cleaned in accordance with ~~NFPA 1851~~ NFPA 1850 or they should be sent out to a designated station or an ISP for cleaning.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun Jun 01 22:14:33 EDT 2025

Committee Statement

Committee Statement: The TC recognizes the NFPA 1851 is now part of the consolidated standard NFPA 1850.

Response Message: SR-40-NFPA 1700-2025

Second Revision No. 43-NFPA 1700-2025 [Section No. 11.14 [Excluding any Sub-Sections]]

Rehabilitation is an intervention to mitigate ~~against~~ the physical, physiological, and emotional stress of firefighting ~~—~~ in order to sustain a member's energy, improve performance, and decrease the likelihood of on-scene injury or death. *(See ~~NFPA 1584~~ NFPA 1580 .)*

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun Jun 01 22:23:26 EDT 2025

Committee Statement

Committee Statement: The TC recognizes the NFPA 1584 is now part of the consolidated standard NFPA 1580

Response Message: SR-43-NFPA 1700-2025

Second Revision No. 55-NFPA 1700-2025 [Section No. 11.14.3.2]

11.14.3.2

Hygiene practices should be implemented directly into the rehab process for the following considerations:

(1) Skin must be decontaminated so that contamination isn’t further distributed through the following:

(a) Eating

(b) Touching other body parts

(c) Exposing members of the rehab team

(2) Turnout coats, pants, helmets, hoods, and SCBA should be removed to allow the following:

(a) Distance from PPE that may be potentially off- gassing chemicals absorbed during the fire event

(b) Cooling of the firefighter through sweat evaporation from the skin

Supplemental Information

File Name	Description	Approved
1700_SR-55_11.14.3.2.docx		

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Jun 02 10:36:14 EDT 2025

Committee Statement

Committee Statement: Hyphen removed from "off gassing" to be consistent throughout the chapter.

Response Message: SR-55-NFPA 1700-2025

Second Revision No. 23-NFPA 1700-2025 [Sections 12.5, 12.6, 12.7, 12.8, 12.9, 12.10, 12.11, 12.12,...]

12.5 Residential Occupancies .

12.5.1 One- and Two-Family Dwellings and Townhomes.

More fires occur in these structures than any other occupancy type. The types of construction vary extensively, but the key commonality is that they are usually occupied by a single family.

12.5.1.1

These fires can generally be controlled by one or two properly operated handlines. Depending upon the situation, the fire control could be initiated by an interior or exterior water application.

12.5.1.2

Using the reach of the stream, the initial water application should be made at the level and side of the building where fire is encountered.

12.5.1.3

The incident commander should consider the extent and location of fire involvement prior to the commencement of a primary search.

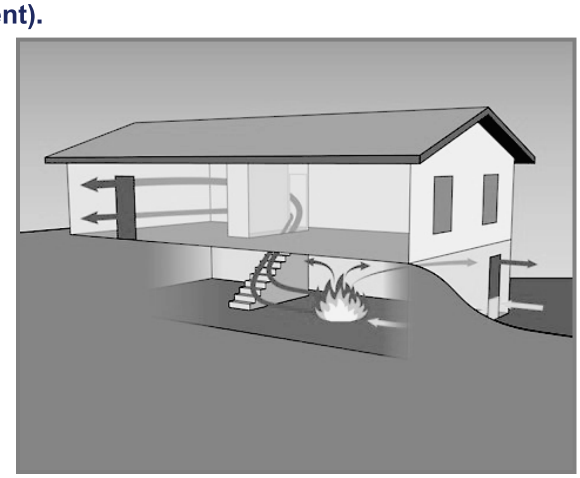
12.5.1.4

Generally, vertical travel of heat and smoke occurs in interior stairwells in multistory residences. This can create rescue and egress challenges, especially when upper floor windows are opened or compromised.

12.5.1.5

It is critical that the size-up identify a structure with an additional level in the rear (potential for low intake and high exhaust) — such as three levels in the rear and two levels in the front — and the location of the fire. If the fire is on a lower level, it could set up a flow path with an intake on the level of the seat of the fire and an exhaust at the street level for the structure. Figure 12.5.1.5 illustrates a structure fire with a low intake on grade with the seat of the fire and a high exhaust (vertical vent). As a result, the typical interior access to the seat of the fire has become the exhaust portion of the flow path. Door control is one means of controlling the flow to prevent the exhaust portion of the flow path from extending to the floors above the fire. If door control is not an option, getting effective water on the seat of fire prior to interior operations should be considered to reduce the risk of operating in the exhaust portion of the flow path and reduce the risk of floor collapse. *(See also Section 12.7.5.)*

Figure 12.5.1.5 Structure Fire with Low Intake on Grade with Seat of Fire and High Exhaust (Vertical Vent).



~~**12.5.6**~~

~~Exterior fire spread can occur through interior ceiling openings, and auto-exposure through eaves and soffit vents can result in fire spread to the attic.~~

~~**12.5.7**~~

~~Non-code-compliant renovations may lead to basement occupants being trapped in this area of the structure.~~

12.5.1.6

Effective exterior fire control on an exterior fire, such as a fire involving a deck, garage, porch, or a vehicle, that may have extended into the structure needs to occur prior to or simultaneously with interior operations. Interior operations prior to effective suppression on an exterior fire could result in firefighters being overtaken by a fire that they cannot control from an interior position.

12.5.1.7

Townhomes are a type of single-family dwelling that involves multiple stories and is attached to one or more similar single-family dwellings by shared walls. As long as the shared wall integrity is maintained, tactical considerations for a detached single-family dwelling are applicable. ~~is structurally independent from adjacent single-family dwellings and separated by a common fire-resistive-rated wall assembly. As long as the wall integrity is maintained, the fire-specific considerations applicable to the single-family dwelling are applicable to the townhouse.~~ Consideration should be given to confirming the integrity of the fire-resistive-rated wall assembly and extension has not occurred to adjacent townhouse units.

12.5.2* Large Estate Dwellings.

Building construction trends continue to evolve, producing larger and more open floor plans in residential structures that commonly include lightweight construction and engineered elements. It is not uncommon to encounter residential structures with areas similar to commercial buildings. These dwellings may contain features that affect fuel load and access such as indoor pools, movie theaters, or bowling alleys. Large estate dwellings are structures that exceed 3000 ft^2 (279 m^2), have open floor plan designs, and use lightweight construction and engineered structural elements. Such features increase the potential for large area fires and early collapse, necessitating increased firefighting resources and adjustments to fire tactics as recommended by Section 12.5.2.

12.5.2.1

As with any fire, strategy and tactical decisions should be based on available resources and tactical priorities. Given the size and configuration of large estate dwellings, communication of complex geometries may be a challenge and should be prepared for in advance. Operating units should make every effort in their initial 360-degree assessment and ongoing size-up to identify the fire area and building construction features. Searching for the fire should incorporate a charged line, thermal imaging camera, door control, crew integrity, and communication with the IC to maintain situational awareness and crew accountability.

12.5.2.2

Due to the large open floor plan and fuel load, it is recommended to control fires in large estate dwellings with high-volume fire flows using the reach of the stream and the cooling ability of the increased flows.

12.5.2.3

Door control and other means to isolate spaces can be used to slow fire extension in large estate dwellings.

12.5.2.4

ICs should consider the need for additional resources to complete primary and secondary searches of large estate dwellings in a reasonable amount of time. Searches must be conducted in coordination with suppression activities.

12.5.2.5

Large windows in large estate dwellings present a significant inadvertent ventilation risk. The failure of such windows can result in rapid ventilation of the fire, which can cause rapidly deteriorating conditions and extreme fire conditions.

12.5.2.6

Large objects, such as light fixtures, artwork, and other decorations suspended in open areas, can pose an additional hazard to firefighters.

12.5.2.7

Large open areas include long spans typically using lightweight truss construction. These structural characteristics can lead to early structural failure, primarily roof and floor collapse. ICs should thoroughly consider the risks and benefits before assigning crews to perform interior and roof operations such as vertical ventilation.

12.5.2.8

Multiple large open stairwells, the presence of elevators shafts, and large open floor plans can facilitate rapid spread of fire.

12.5.2.9

Large estate dwellings often present numerous obstacles regarding access to the structure. Lengthy setbacks from public access, gates, and other impediments can complicate apparatus placement and result in long hose lays for supply and fire control lines.

12.5.3 Multifamily Dwellings.

Multifamily dwellings include row houses and garden apartments.

12.5.3.1

Initial considerations to multifamily dwelling fires include the elements listed in 12.5.3.1.1 through 12.5.3.1.6.

Global SR-9

12.5.3.1.1 Size-Up.

Size-up ensures that the best initial action is taken to extinguish the fire and protect any potential ~~victims~~occupants. The initial strategic decision should be to ensure firefighters are working in the correct strategy for the given incident conditions. An initial size-up and 360-degree follow up assessment are critical. A 360-degree assessment by the initial IC may not be possible due to size, obstacles, and complexity; however, it must be completed through tactical assignments or positions, especially at the rear or C side. Size-up must include the suspected location, level, and extent of the fire, potential searchable spaces, and best access to the fire area for hose line advancement. Size-up should direct a fire attack from the most advantageous position with the most effective water volume, regardless of the strategy.

12.5.3.1.2 Initial Actions.

The first arriving units should prioritize hose streams to control the fire. If a confirmed fire is reported from the first arriving resources, additional resources should be requested immediately. Placement of apparatus becomes paramount in many cases due to setbacks, parking lots, and a multitude of access issues.

12.5.3.1.3 Rescue.

The residents in greatest danger should be an immediate priority. If large numbers of residents require immediate rescue, resources become critical and delayed extinguishment of the fire is often the result. Even in the face of rescues or removals, emphasis must be placed on extinguishment. Effective suppression creates and maintains survivable spaces; delayed extinguishment creates greater danger to ~~victims~~ occupants and firefighters.

12.5.3.1.4 Evacuation.

The difference between rescue and evacuation must be clear. The evacuation of residents is those that are not in immediate danger. Evacuation of residents not in the immediate fire area may not be an initial priority. Sheltering residents in place may be the most practical method of protection until fire control is complete and additional resources are on scene.

12.5.3.1.5 Water Supply.

Apparatus placement should be considered due to the possible need of several water sources and the distance required to reach the fire.

12.5.3.1.5.1 Tank Water.

Research studies and fireground experience have shown that an apartment fire with flames extending out of the windows and to balconies and eaves two to three stories above it can be controlled with less than 300 gal (1135.6 L) of water from an effective exterior stream. Given the potential for rapid fire growth, incident commanders should consider the use of tank water for a rapid exterior attack. An example of a fire that was quickly extinguished with a single hand line with exterior fire control followed by interior fire control is shown in Figure 12.5.3.1.5.1 with a total water usage of 185 gal (700 L).

Figure 12.5.3.1.5.1 Tank Water Use for Initial Fire Attack. ***(Courtesy of UL Fire Safety Research Institute.)***

12.5.3.1.6 Laddering.

Active fires in these structures will often increase the demand of ground ladders to effect rescue and provide access and egress for firefighters. Incident commanders should proactively consider early placement of ground ladders.

12.5.3.2

Using the reach of the stream, the initial water application should be made as close to the fire as possible, including at the level and side of the building where fire is encountered. The proper placement of the initial hose line is of vital importance. Effective suppression creates and maintains survivable spaces.

12.5.3.3

The incident commander should consider the extent and location of fire involvement prior to the commencement of interior fire control and primary search. Flow path control tactics, which can limit the introduction of heat and smoke into the common stairway or hallways, should be considered. For ground level garden apartments, the use of exterior patio doors for entry to the fire apartment as opposed to entry from the hallway should be considered to maintain the integrity of the stairway.

12.5.3.4

Generally, vertical travel of heat and smoke occurs in interior stairwells in multistory residences. This can create rescue and egress challenges, especially when upper-floor windows are opened or compromised. Fire extension through confined spaces, such as in balloon-framed row houses, may have smoke showing from an upper floor opening when in fact the fire is in the basement or cellar. The bravo and delta exposures should be assessed for fire extension and fire wall integrity.

12.5.3.5

Exterior fires can move through eaves and soffit vents, resulting in fire spread to the attic.

12.5.3.6

Non-code-compliant renovations may lead to basement occupants being trapped in this area of the structure.

12.5.3.7

Common attic areas can facilitate horizontal fire spread.

12.5.4 Large Multistory Residential Buildings.

These are multistory buildings that were designed and constructed with multiple dwelling units on each floor for multifamily occupancy.

12.5.4.1

Lightweight construction is routinely found in this type of building, and early collapse should be anticipated.

12.5.4.2

Exposure protection should be an early tactical priority.

12.5.4.3

Large common attics and other concealed spaces that permit undetected rapid fire propagation could exist. Early use of thermal imagers and opening of spaces to detect fire spread is critical.

12.5.4.4

Protection of exit pathways should be a tactical priority.

12.5.4.5

The layout of the building and the number of occupants may present significant rescue challenges.

12.5.4.6

The incident action plan (IAP) should include consideration of flow path management that facilitates evacuation of occupants.

12.5.5 Manufactured and Modular Dwellings.

Manufactured and modular dwellings are built off-site, may not have the same fire resistance as site-built structures, and may propagate fire rapidly due to the geometry of the building. These buildings may be susceptible to early failure due to numerous lightweight building construction materials.

12.5.5.1

Due to the building construction, fire conditions may result in considerable destruction of the floor, resulting in firefighters falling through the floor.

12.5.5.2

In a ventilation limited condition, an earlier flashover condition should be anticipated.

12.5.5.3

The utilization of exterior stream placement is a tactic that should be considered as all of the compartments in the structure are generally accessible from the exterior.

12.5.5.4

Vertical ventilation is not a recommended tactic due to the potential for early collapse.

12.5.5.5

A portion of the skirting below a manufactured home should be pulled back to check for horizontal fire spread below the floor prior to making entry.

12.5.6 Abandoned and Vacant Structures.

Abandoned and vacant structures are buildings that are no longer in use and are, in many cases, in an unknown state of condition or compromise, which could result in weakened or deficient structural components, such as holes in floors. In some instances, fires may have already occurred in these structures, creating more dangerous situations. The following should be considered when controlling fires in these structures:

(1) Exterior fire control should be considered prior to entry.

(2) Early collapse should be anticipated.

(3) Gutted, deteriorated, and modified interiors can result in unpredictable and increased fire activity and may impede normal firefighting operations.

(4) Occupancy by squatters and transients should be considered; as such, an evaluation of occupant survivability and rescue potential should be made.

12.5.7 Buildings Converted to Residential or Multiple Dwellings.

These are buildings that have been converted from single-family residences, warehouses, retail, and all other types of occupancies for use by multiple families within the same structure. These living units may be located above or adjacent to commercial occupancies.

12.5.7.1

Many of these conversions have been completed without code compliance. This can result in delayed detection, limited egress paths, maze-like conditions with limited access for firefighting operations, increased fire load, rapid fire propagation, and unpredictable fire travel.

12.5.7.2

Living units may be found at all levels including the basement and the attic, resulting in extremely limited access for fire operations. This increases the hazard to life and complicates search operations.

12.5.7.3

The structure may be overcrowded and the number of residents may far exceed the original anticipated occupancy load.

12.5.7.4

Due to the difficulty in conducting rescues and evacuations, it is essential to limit fire spread with a coordinated fire control as soon as practical.

12.5.7.5

Additional resources may be needed due to the challenges presented by potential multiple rescues and fire control within a converted structure.

~~**12.12** Multi-Unit Residential Buildings.~~

~~These are buildings that were designed and constructed for multi-family occupancy.~~

~~**12.12.1**~~

~~Lightweight construction is routinely found in this type of building, and early collapse should be anticipated.~~

~~**12.12.2**~~

~~Exposure protection should be an early tactical priority.~~

~~**12.12.3**~~

~~Large and common attics and other concealed spaces may exist that permit undetected rapid fire propagation. Early use of thermal imagers and opening of spaces to detect fire spread is critical.~~

~~**12.12.4**~~

~~Protection of exit pathways should be a tactical priority.~~

~~12.12.5~~

~~The layout of the building and the number of occupants may present significant rescue challenges.~~

~~12.12.6~~

~~The incident action plan (IAP) should include consideration of flow path management that facilitates evacuation of occupants.~~

12.6 Commercial Occupancy Types.

12.6.1 Strip Malls.

The complexes are generally multiple retail establishments and are located adjacent to each other in a line. The separate retail businesses are separated by dividing walls and may have a common attic space and roof.

12.6.1.1

The existence of a common attic space (i.e., cockloft) may lead to rapid horizontal fire propagation. Generally, any visible fire on the ground floor will be in a wider area with the cockloft.

12.6.1.2

The examination of void space above ceilings in the adjacent occupancies should be considered.

12.6.1.3

In many cases, hydrants may not be close to the fire occupancy. This may require long hose lays.

12.6.1.4

These structures usually have no windows, only doors, in the rear. The rear doors should be forced open early in the incident to create a ventilation flow path and to provide a means of egress for occupants. Door control should be implemented so that ventilation may be coordinated with water application.

12.6.1.5

These buildings usually have a considerable roof load due to multiple HVAC units as well as other equipment. The additional load increases the possibility of early roof collapse.

12.6.1.6

According to a NIOSH report, “Preventing deaths and injuries to firefighters working at strip mall fires,” additional potential hazards for strip mall occupancies include entanglement in and being struck from drop ceiling assemblies, wiring, and HVAC ducting; high heat release rate fuel loading; disorientation due to maze-like conditions; and facade collapse.

12.6.2 Large-Space Buildings.

Large-space buildings are structures with large, noncompartmentalized spaces that typically have atypical construction features, such as churches, skating rinks, bowling alleys, gymnasiums, and concert halls.

12.6.2.1

A fire of any significance in a large-space building will challenge the resources of many departments. It is not possible to convert deadly defensive conditions into survivable offensive conditions in these structures. Deep-seated fires with large fuel loads or structural involvement are rarely, ~~(~~ if ever ~~)~~ , extinguished from interior, offensive positions.

12.6.2.2

Large, noncompartmentalized areas with their fuel load and available air can lead to well-developed fires.

12.6.2.3

Large open areas require long spans typically using truss construction. These structural characteristics can lead to early structural failure and roof and floor collapse.

12.6.2.4

Fire control for large-space buildings may require multiple large flow streams from the most advantageous position, with consideration of collapse zones.

12.6.2.5

Large structures may have unique roof characteristics that can be hazardous for vertical ventilation operations. If the fire in the structure is ventilation-limited, ventilation must be coordinated with effective water on the fire. Given the limited effectiveness of vertical ventilation based on the volume of the fire area against the potential vent openings early in the fire event, resources may be better served to provide information to the IC from a position where the roof can be observed.

12.6.2.6

Controlling the advancement of firefighters into large structures is vital because there is an increased potential of firefighters becoming disoriented or lost inside the structure. The best possible tactics from offensive positions are focused on fire control with appropriate water volumes from positions of advantage to provide an effective fire attack and manage firefighter safety. If interior operations are needed, special tactics and equipment such as search ropes should be considered.

12.6.2.7

Air management and accountability are foundational elements embedded into the tactics and safety system that is managed by the IC and the ICS.

12.6.3 Warehouses.

Warehouse and storage fires are complex incidents involving many factors that expose firefighters to challenges and hazards and can require significant resources to mitigate. Due to the size of the interior spaces, potential fuel loads, and challenges in getting enough water into these occupancies, any advanced fire will be incredibly difficult to extinguish from interior offensive conditions.

12.6.3.1

Key risk factors for warehouse fires include the following:

(1) Construction features including construction type, total building size, details of fire-rated enclosures, and presence of large open fire areas

(2) Types and hazard levels of material stored

(3) Details on storage configurations such as height and type (e.g., rack storage, floor storage)

(4) Presence, type, and suitability of fire protection and detection systems

(5) Any available methods to facilitate ventilation such as roof vents, smoke control, and exhaust systems

(6) Available water supply sources and adequacy

(7) Equipment and machines related to material handling

(8) Automatic-closing fire doors

12.6.3.2

Preplanning of warehouse and storage occupancies is a critical aspect of enabling an effective fire response.

12.6.3.3

High fuel loads, large open areas, and complex floor layouts can make size-up and determining the exact location of the fire difficult. These factors may require more staffing to properly execute effective fire control and support work.

12.6.3.4

Large open areas with complex and confusing floor plans can cause firefighter disorientation and hamper search operations and hose movement. Air management and accountability have to be embedded into the tactics and safety system managed by the incident commander (IC) and the incident command system (ICS).

12.6.3.5

High fuel loads and long structural spans can cause structural collapse. Structural conditions should be continually evaluated.

12.6.3.6

Localized collapse of storage racks and storage piles are a safety hazard to firefighting personnel.

12.6.3.7

Fire sprinkler systems may control, confine, or suppress fires, which can reduce damage, maintain structural stability, and provide time for the establishment of manual firefighting operations.

12.6.3.7.1

When a building has an operating fire sprinkler system, “first water” is on the fire. Fire sprinkler systems are designed to confine the fire in the sprinkler area and pre-wet the fuel in the exposed areas around the fire for up to 2 hours without fire department intervention.

12.6.3.7.2

Location and access to the fire department connection (FDC) should be a component of the initial incident actions. The FDC should be pumped at a minimum of 150 psi (1034 kPa) or the marked system pressure on the outside of the building.

12.6.3.7.3

Assessment of the sprinkler riser pressures can provide valuable information regarding the sprinkler system’s ability to control the fire growth or whether the fire is expanding. Sprinkler control valves and associated water supplies should be verified to be in service, and systems should not be shut down until the IC determines adequate hose lines and units are in place to complete final extinguishment.

12.6.3.7.4

Personnel must remain in position at the sprinkler control valve and be prepared to open it on the orders of the IC if the fire redevelops. Manual firefighting efforts should be supplemental to the efforts of the fire sprinkler system and typically are used for final extinguishment and overhaul. Fire sprinklers are designed to work most effectively with no or minimal ventilation. Smoke removal and HVAC systems should be shut off until the sprinkler system is ultimately shut down.

12.6.3.8

Warehouse and storage occupancies can result in high fire flow demands. Potential sources of water include public hydrants, water supply shuttles (tanker or tender), and large diameter hose lays. If available, private water supplies are also an option, though these systems are typically sized to supply fire sprinkler system demands; accessing them should be done carefully, such that the effectiveness of the sprinkler systems is not impacted. Likewise, interior standpipe systems typically draw water from the sprinkler system. Use of such systems could also hamper the effectiveness of the sprinkler system.

12.6.3.9

When the warehouse or storage facility is equipped with a fire sprinkler system, the first or second arriving engine should feed the FDC.

12.6.3.10

If the warehouse or storage building has multiple fire divisions, fire doors can be closed around the fire area to reduce the spread of fire and related fire gases and smoke.

12.6.3.11

Uninvolved fire-rated areas adjacent to the fire can be used as forward staging areas for staffing and equipment.

12.6.3.12

Consideration for handline use (in non-sprinkler-controlled fires) should include the following:

(1) Due to the high fuel loads and large areas involved, larger volume hand lines [≥2½ in. (≥63.5 mm)] that can reach the base of the fire should be considered.

(2) Large areas and complicated storage layouts can make the use of traditional pre-connected lines ineffective; interior hose stretches and fire attack positions should always match the smoke conditions and the air management plan and capabilities inside of a structure.

12.6.3.13

For large fires where the fire has vented through the roof, defensive operations are recommended. If defensive operations are initiated, personnel should be evacuated from the interior and roof areas and appropriate collapse zones should be established and enforced. Aerial water streams and ground-level monitors can be used to control the spread of fire and protect exposures.

12.6.3.14

Rooftop ventilation operations, especially involving fires with high fuel load materials and when roof supports include lightweight construction or unprotected steel members, can be hazardous with due to potential for structural collapse. This is especially true for buildings not equipped with fire sprinkler systems. Use of existing ventilation facilities including skylights, melt out vents, and smoke control systems can be effective. Positive pressure ventilation may not be practical due to the large volume areas involved with warehouse and storage occupancies. Sprinkler controlled fires should be kept as ventilation-limited as possible until the sprinkler system is shut down as directed by the IC.

12.6.3.15

Products of combustion from stored materials can contain hazardous or toxic components. Appropriate PPE and SCBA should be used at all times, and environmental monitoring of air and effluent water should be considered.

12.6.3.16

Controlling the advancement of firefighters into warehouses or storage facilities is important because there is an increased potential of firefighter disorientation and of command losing their location.

12.6.3.17

Air management and accountability should be a critical consideration.

12.6.4 Hospital/Health Institution.

These fires normally involve buildings of noncombustible construction that are fully or partially sprinklered. Fire control is usually a lesser concern in fully sprinklered structures but is a critical concern in partially or nonsprinklered facilities with combustible construction. The movement and control of smoke (smoke management), conducting interior horizontal evacuation to safe area, and the control of medical gas systems are key tasks that must be considered.

12.6.4.1

When the hospital or health institution is equipped with a fire sprinkler and/or standpipe system, the first- or second-arriving engine should feed the fire department connection (FDC).

12.6.4.2

If the building is of combustible construction or not fully sprinklered, applying water to the fire area as quickly as practical from the interior or exterior is a critical task. Emphasis must be given to getting the first stream on the fire.

12.6.4.3

It is essential to have a smoke control plan to manage the smoke within the noninvolved fire areas to minimize the exposure to occupants.

12.6.4.4

The medical gases supply to the fire area should be isolated or terminated as soon as practical.

12.6.4.5

Sheltering in place is an option for patients based on fire conditions, building characteristics, and available response resources.

12.7 Structures with Special or Specific Circumstances.

12.7.1 Basement.

Basement or belowgrade fires can be extremely difficult to control and extinguish once they are past the incipient stage. Access and ventilation opportunities are limited, floor plans are not standard, and fuel loads can be extraordinary and unpredictable. Firefighters are injured and killed at these fires when the floor beneath them collapses or they are caught in the exhaust portion of the flow path of the fire.

Global SR-9

12.7.1.1

The following factors should be determined:

(1) Basement type, as follows *(see Figure 12.7.1.1)*:

  (a) No-access basement (i.e., no external basement access, internal access only)

  (b) Limited-access basement (i.e., external window access to basement only, walk up or lookout basement)

  (c) Full-access basement (i.e., external door or large escape window access, walkout or daylight basement)

(2) Finished or unfinished, as follows:

  (a) Finished: provides protection to structural floor components with a potential for livable space

  (b) Unfinished: provides no protection to structural floor components or livable space, but does not eliminate potential for ~~victims~~occupants

Figure 12.7.1.1 Diagrams Representing Exterior No-Access Basement (left), Limited-Access Basement (middle), and Full-Access Basement (right). ***(Courtesy of UL Fire Safety Research Institute.)***

12.7.1.2

A thermal imager can be used on the exterior to assess the thermal conditions at windows, vents, and doorways to assess the potential for a fire within the basement. Note: thermal imagers cannot see through walls or barriers, only the thermal conditions at the material’s surface.

12.7.1.3

Smoke showing from chimney or vent pipes may indicate a basement fire.

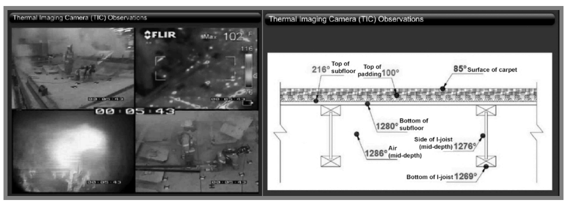
12.7.1.4

Observing the position of the neutral plane at the first-floor entryway door of a building might indicate a basement fire. An example of an observable indication of a basement fire is smoke filling an entire first floor door opening of a structure without the presence of a neutral plane. Such an observation may also indicate a fire located on the first floor, which is ventilated elsewhere and is providing fresh air to the fire. Additional openings on the first floor might also affect the level of the neutral plane at the front door. Basement fires are more likely to be ventilation-limited upon fire department arrival, and control of the flow path on the first floor by managing openings is critical.

12.7.1.5

A thermal imager may be used to assess the temperature of the interior basement door and to look for heat sources around ground-floor penetrations, such as heating registers and pipe penetrations. A thermal imager should not be used to assess the structural stability of the floor from above. Additionally, the use of a thermal imager on the ground floor surface is not a conclusive way to assess elevated temperatures in the basement area. The images inFigure 12.7.1.5 illustrate the thermal imaging view and temperatures just prior to collapse of the first floor in a basement fire research experiment.

Figure 12.7.1.5 Exterior Thermal Imaging. ***(Courtesy of UL Firefighter Safety Research Institute.)***



12.7.1.6

During a suspected basement fire, risk analysis should consider firefighter safety issues prior to placing personnel above the basement level because sounding the floor and thermal imagers are not reliable means of determining the structural integrity of the floor system, especially in buildings using lightweight construction materials.

12.7.1.7

When initiating fire control, when possible, firefighters should control the basement fire from an exterior opening on the same level as the fire. If not possible, use of special nozzles or appliances may be used to flow water into the basement from the safest positions possible, including through exterior basement window openings, door openings, vent holes, or holes cut above the fire. The application of a water spray pattern that cools the hot gases is the most effective way to control a basement fire. There are many nozzles or application devices that provide an effective spray pattern such as spray nozzles, penetrating nozzles, and distributor nozzles.

12.7.1.8

Any potential ventilation operations including opening of doors to the basement or breakage of windows should be performed in a controlled manner once an incident action plan is established and at the direction of the IC. Controlling flow path through ventilation management is essential in conducting rescue operations and limiting fire spread. Positive pressure ventilation should be used with caution due to its effect on flow path and fire spread because of limited exhaust vent sizes.

12.7.2 Concealed Space Fires.

These fires involve balloon frame construction, void spaces, attics, knee walls, and other concealed spaces within a structure. Concealed fires present many hazards and are challenging to safely extinguish. Concealed fires may have been burning undetected for extended periods of time, which may lead to structural collapse shortly after fire department arrival.

12.7.2.1

A search for fire shall be conducted with the protection of a charged hose line. The structure should be assessed from both the interior and exterior simultaneously to ensure rapid detection of signs of concealed space fires. Ventilation should be controlled during the search for fire.

12.7.2.2

Thermal imagers should be used from the interior and exterior of the structure to assess for temperature in concealed spaces.

12.7.2.3

Void fires in combustible buildings may consume structural support members and lead to collapse and rapid fire growth.

12.7.2.4

Water should be applied effectively, while limiting the introduction of air, into the void space. For example, flowing water from a hose stream through a small opening or the use of penetrating nozzles should be considered for water application in a safe manner.

12.7.2.5

Complete overhaul to expose hidden spaces where fire may have traveled is essential to the prevention of fire spread.

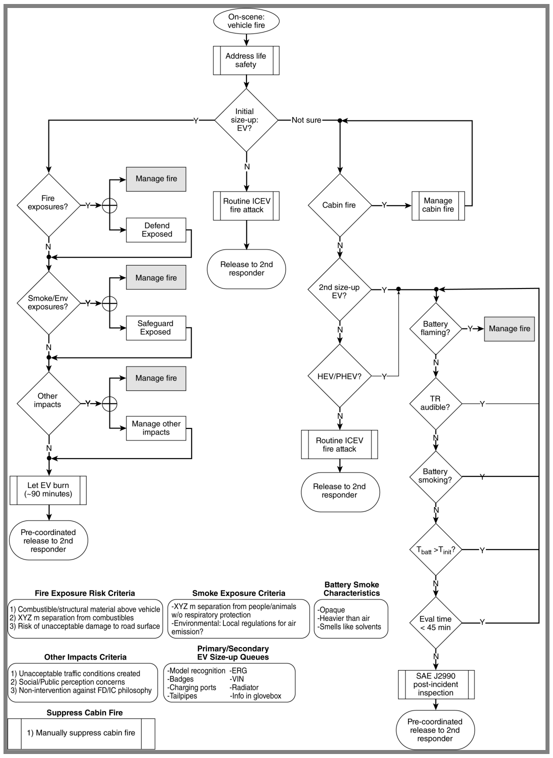
12.7.3* Garages.

Most garages contain a significant fuel load and fire control hazards due to internal combustion engine and electric vehicles, powered equipment, ignitible liquids, battery energy storage systems, and various fuels. Detached garage roofs may be inferior construction, including the lightweight truss. Storage in and suspended from the overhead supports is common and will add to a collapse hazard.

A.12.7.3

A basic approach to managing electric vehicle (EV) fires in garages or near structures has been developed by the Fire Safety Research Institute as shown in Figure A.12.7.3 .

Figure A.12.7.3 EV Decision Matrix. ***(Source: UL FSRI.)***



As with any fire incident, the operation starts with size-up and addressing the incident priorities of life safety, incident stabilization, and property conservation. In addition, it is important to coordinate the protection or isolation of the exposures to the garage, in this case, the remainder of the structure. If the car is on fire upon arrival, it will be difficult if not impossible to determine if the car is an EV or if the batteries are involved. Therefore, regardless of whether the car is an EV or and internal combustion engine vehicle (ICEV), it is important to wear full PPE, stay up wind, stay uphill, and approach the vehicle fire from a corner, if possible, to minimize the risk of being struck by struts, airbags, and other potential projectiles, and use the reach of the stream to knock down the fire in the cabin and on the exterior of the car. After flowing for a minute or two, the amount of fire should be reduced, or possibly extinguished if batteries were not involved. This is the time to shut down the hose stream and conduct a second size-up to determine if there is an EV battery fire. Signs of this could include persistent flames similar to flammable gas fires from under the car or wheel wells, pulsing or jet flames, or the generation of white smoke that is heavier than air. If the EV needs to be approached, consider a narrow fog stream to control the flames to protect people or responders in the area.

Anecdotal information and preliminary research results show that a passenger car battery fire can be managed with a single hose stream (~150 gpm) and about 2000 gallons of water.

Another finding based on experience and research results indicated that if firefighting tactics are used that extinguish the flames from the battery fire but the batteries are still in thermal runaway, it is important to remember that the gases being released by the batteries are flammable and have the potential to explode. Therefore, it may be best to control but not extinguish the fire and protect the exposures if the car is in an area where the unburned batteries gases could accumulate. Several EV firefighting research studies are underway in the United States and internationally. These studies are examining how to effectively and safely use water streams, under car nozzles, EV fire blankets, cutting nozzles, and water additives. In addition, the studies are examining how to assess the EV post fire to enable release to the tow companies (second responders).

12.7.3.1

Due to the storage of flammable compressed gases, the potential for a flash fire and boiling liquid expanding vapor explosion (BLEVE) in these spaces is relatively high. Battery energy storage systems and electric vehicles may serve as other sources of explosion hazards.

12.7.3.2

The height of a garage may accommodate a hydraulic lift that may have a vehicle in a raised position. Failure of a hydraulic line could cause the lift to fail.

12.7.3.3

Overhead garage doors can open or close during a fire and could collapse or trap firefighters.

12.7.3.4

Handlines should flow at least 150 gpm (568 L/m) to knock down and extinguish fires in garages from a relative area of safety. The use of exterior streams through as small an opening as possible, having a charged line flowing into an open vent as soon as possible, or the use of a piercing nozzle, in the case of a closed garage, should be considered.

12.7.3.5

Applying exterior water streams to attached garages should be considered, particularly in avoiding fire propagation into the main structure. Firefighter safety and fire control, in most cases, is enhanced by an exterior stream application. Using exterior streams and maintaining closed doors between the attached garage and the main structure may limit the extent of fire spread into the main structure.

12.7.3.6

Attached garage fires where venting has occurred or where the garage door to the exterior is open should be considered exterior fires. An exterior fire that may have spread into the structure needs exterior fire control to occur prior to interior operations to be effective. Interior operations prior to effective suppression on an exterior could result in firefighters being overtaken by a fire that they cannot control from their position.

12.7.3.7

Crews should consider alternative access modes before opening, cutting, or removing overhead doors. If an overhead door is the best access, small openings can be cut in the door and fire streams applied through these openings to manage the ventilation of the compartment while extinguishing the fire. Thermal imagers and penetrating (i.e., piercing) nozzles can be effective in suppression operations.

12.7.3.8

Adjacent or attached structures should be assessed to identify any fire extension. Interior doors should be closed to confine the fire and slow extension into the living space when possible.

12.7.3.9

An interior charged hose line should also be placed at potential fire spread openings in order to confine the fire.

12.7.3.10

Vertical ventilation should not be used due to the potential for early collapse. Incident commanders should thoroughly consider the risks and benefits before assigning crews to perform such roof operations.

12.7.3.11

Positive pressure ventilation should be considered in the living space to create a pressure differential, thereby inhibiting fire spread.

12.7.4 Attic.

Fast-moving fires with limited access are characteristics of attic fires. A critical aspect of these types of fires are structural collapse.

12.7.4.1

Many attic fires originate on the exterior of the structure from an adjacent structure fire, garage fire, motor vehicle fire, trash fire, porch or deck fire, mulch or vegetation fire, or wildland fire.

12.7.4.2

Use of plastics or combustibles such as vinyl siding in exterior wall assemblies can facilitate rapid fire spread into the attic space.

12.7.4.3

Exterior fires can transition to attic fires either directly via eave/soffit and wall vents or indirectly by burning through eaves/soffits, exterior walls and/or windows, and plumbing or electrical penetrations.

12.7.4.4

Rapid application of water from the exterior can inhibit exterior fire spread into the attic.

12.7.4.5

It should be recognized that residential occupancies equipped with fire sprinkler systems typically do not extend the protection to the attic area.

12.7.4.6

Continuous plastic ridge vents can melt and collapse on the opening of a peaked roof, creating an effective seal. Once the ridge vent seals, the eaves act as both the inlet and exhaust of air for the fire. The resultant restrictions in airflow can lead to a ventilation-limited fire with the extent of the fire potentially hidden during size-up. Smoke pulsing from the eaves can be an indicator that the ridge vent has melted, creating a seal.

12.7.4.7

Attic fires are typically ventilation-limited due to limited natural ventilation openings. Controlled openings created below the neutral plane (e.g., through the ceiling below the attic space) will not cause immediate growth and can provide access for suppression operations.

12.7.4.8

For ventilation-limited fires, effective methods for the application of fire suppression water include a small hole in the ceiling and water from below, water introduced into the attic through the gable ends, and water applied to the underside of the roof by way of the eaves. While these methods are far less effective for well-vented attics, they are still preferable to flowing aerial streams directed into roof openings.

12.7.4.9

Wetting interior sheathing as part of offensive or defensive operations slows fire spread and reduces the potential for rapid fire growth, facilitating ventilation and access to the attic.

12.7.4.10

In the absence of effective fire suppression, vertical ventilation can result in uncontrollable fire growth, fire blowback into the occupied space, and smoke explosions. Vertical ventilation should be limited until fire suppression water is controlling or supporting the suppression of the attic fire.

12.7.4.11

When fire in the attic space burns through the sheathing or out of the gable ends, the fire may become well-ventilated. In these cases, crews should be repositioned from the interior and transitioned to exterior operations. Traditional “top down” use of aerial devices and master streams through these openings fail to apply water to the underside of the roof deck or onto any burning material or contents that are not directly beneath or in the immediate vicinity of the hole. As an alternative, consider using aerial devices or portable ladders and handlines to open up the eaves and flow water into the attic from the “bottom up.” This approach may result in controlling the fire enough to permit firefighting crews to transition back inside the structure to complete searches, suppression, and overhaul.

12.7.4.12

Attic construction affects hose stream penetration. The most effective water application takes into consideration the construction within the attic, using the natural channels created by the rafters or trusses to direct the water onto the vast majority of the surfaces.

12.7.4.13

Potential for structural collapse should be continually evaluated. Modern lightweight attic construction can collapse rapidly when exposed to fire conditions. If collapse becomes a concern, firefighters should not be placed in the collapse zone. When transitioning to the interior after large amounts of water were flowed into the attic, it should be recognized that insulation will hold water and allow the ceiling to collapse in sections A defensive strategy should be strongly considered when the use of an offensive strategy would result in firefighters performing firefighting operations under or above trusses that are compromised by fire or fire operations. If lightweight truss construction is exposed to fire and no rescue operations are required, a defensive strategy is highly recommended, as early collapse is likely.

12.7.4.14

Knee wall construction creates interconnected concealed spaces where the wooden structural members provide a relatively large surface area of exposed fuel along with air flow conducive to spreading fire. Knee walls in a finished attic create the potential for ventilation-limited fires with large amounts of fuel heated to near its ignition point in the spaces that surround interior operating crews. Subsequent ventilation at the roof or by breaching the knee wall from the interior provides the flow path to rapidly grow the fire to flashover. When the barrier between the concealed spaces and the occupied space fails or is breached, interior operating crews may become trapped between the newly created flow path and their means of egress. Even though there is a delay between making the breach and the change in conditions, once initiated, the transition to untenable conditions in the area of operation occur very rapidly.

12.7.4.15

The application of water should be applied on a knee wall fire at the source and toward the direction of spread before committing to the attic. Applying water utilizing the same path the fire took to enter the concealed space may be the most effective method at slowing fire growth, applying water through an exterior soffit or with the utilization of a piercing nozzle. Water application to the knee wall will not be effective until the source below it is controlled with direct water application. Consideration should be given to opening the floor below the knee wall.

12.7.4.16

The most effective approach for interior operations on knee wall fires is to control the source fire, cool the gasses prior to making large breaches in the barrier, and then aggressively open the knee walls to complete extinguishment, focusing on wetting the underside of the roof decking. The use of thermal imagers and penetrating (piercing) nozzles can be effective tools in suppression operations.

12.7.5 Variable Grade (Hillside) Building.

These are buildings that have access to grade at various levels. As an example, the front of the structure may appear to be a single-story building from the front but from the rear may appear to be a two or-more-story structure. These structures create challenges involving accessibility, flow paths, stream application, and firefighter safety, as well as the potential for rapid changes in fire conditions. Uncontrolled ventilation on any grade level can rapidly change the flow path on stairwells and hallways.

12.7.5.1

Early identification of a variable-grade building, including floor designations, operating areas, and unit assignments, should be clearly communicated and understood by all operating units and incident command.

12.7.5.2

Entering the structure above the fire creates the potential of being within the exhaust portion of the flow path.

12.7.5.3

If practical, entry should be made at or below the level of the fire.

12.7.5.4

Ventilation, tightly coordinated with fire control involving water streams, to control flow paths is essential in these occupancies. The potential impact of unintended ventilation creates a significant exposure to firefighters and should be recognized.

12.7.5.5

Interior stairwells have the potential for vertical flow paths.

12.7.5.6

The different elevations create significant access challenges and create issues in the application of both interior and exterior fire streams.

12.7.6 High-Rise.

Fires in high-rise buildings require preplans, significant resources, and comprehensive SOPs/SOGs. Tasks that are normally considered routine for most fire departments, such as locating and controlling the fire, evacuating occupants, and performing ventilation, are more complex in high rises.

12.7.6.1

Access to floor levels that are beyond the reach of aerial apparatus is generally limited to interior stairways. The use of tactical tools such as high-rise nozzles, wind control devices, smoke curtains, and door control may be needed to enable suppression and search crews to access the fire floor. The use of elevators during fire operations should be designed for fire service operations and closely monitored with safety precautions.

12.7.6.2

Occupants may be exposed to the products of combustion while they are evacuating or unable to descend past a fire on a lower floor. Exits may be limited, which is further complicated by the simultaneous use for egress and for firefighting operations.

12.7.6.3

The ability to contain and control the fire is increasingly dependent on the construction of the building and the ability of sprinkler and/or standpipe systems to deliver water to the fire area.

12.7.6.4

Ventilation can be much more complicated and critical in ~~highrises~~ <u>high-rise buildings</u> than in other types of structures. Vertical ventilation is often limited to stairways or elevator shafts, both of which may also have to be used to evacuate occupants. Horizontal ventilation, by breaking out windows, presents the risk of falling glass to those outside the building. Stack effect in the building can cause smoke movement in an upward (i.e., positive) or downward (i.e., negative) direction in vertical shafts. Accumulations of smoke remote from the fire areas can be found at the upper and lower floors of the building.

12.7.6.5

Reflex time, or the amount of time it takes to react and take action, is usually much higher in high-rise buildings than in non-high-rise buildings. It often takes longer to travel from the ground floor to the fire floor than it takes to respond from the fire station to the building. Firefighters may have to climb dozens of floors before they can even reach the fire floor.

12.7.6.6

Communications, command, and control can be very difficult in a high-rise fire. Radio transmissions through a building’s concrete and steel infrastructure may be compromised. The size and complexity of these buildings require large forces of firefighters and well-coordinated operations in a very complex tactical environment. The establishment of an operations post and staging area on the floor below the fire can enhance communications, command, and control. Effective coordination and control of strategy and tactics are essential.

12.7.7 Buildings Under Construction/Demolition.

These buildings present particular challenges involving fire control. Building structural elements may be exposed to fire and propagation, which could result in early collapse. Fire systems such as sprinkler and alarm systems may not be operational.

12.7.7.1

Rapid fire propagation should be anticipated. Significant wind conditions could lead to a wind-driven fire. The call for additional resources should be considered early within the incident.

12.7.7.2

Large fire flows including master stream appliances should be deployed for fire spread and control.

12.7.7.3

Access to these structures is often limited.

12.7.7.4

Fire protection features such as separation doors, wall board protection, sprinklers, and stand pipes may not be operable.

12.7.8 Photovoltaic Systems.

12.7.8.1 General.

As a result of the significant increased use of PV systems on residential and commercial structures, firefighters and fire safety officials have raised concerns about the potential risks when PV systems may be part of the fire hazard or impact fire department operations. To help address these concerns, UL conducted fire and electrical performance experiments to identify and quantify the electrical shock hazard that may be present to firefighters during the suppression, ventilation, and overhaul activities associated with a fire involving the PV equipment.

12.7.8.2 Fireground Considerations.

12.7.8.2.1

The electric shock hazard due to application of water is dependent on voltage, water conductivity, distance, and spray pattern. A slight adjustment from a solid stream toward a fog pattern (i.e., a 10-degree cone angle) reduced measured current below perception level. Salt water should not be used on live electrical equipment. A 20 ft (6.1 m) distance had been determined to reduce potential shock hazard from a 0.95 Btu/sec (1000 Vdc) source to a level below 0.002 W/volt (2 mA), which is considered safe. It should be noted that pooled water or foam may become energized due to damage in the PV system.

12.7.8.2.2

Outdoor weather-exposure-rated electrical enclosures are not resistant to water penetration by fire hose streams. A typical enclosure will collect water and present an electrical hazard.

12.7.8.2.3

Firefighter’s gloves and boots afford limited protection against electrical shock provided the insulating surface is intact and dry. They should not be considered equivalent to electrical PPE.

12.7.8.2.4

Turning off an array is not as simple as opening a disconnect switch. Depending on the individual system, there may be multiple circuits wired together to a common point such as a combiner box. All circuits supplying power to this point must be interrupted to partially de-energize the system. While the array is illuminated, parts of the system will remain energized. Unlike a typical electrical or gas utility, on a PV array there is no single point of disconnect.

12.7.8.2.5

Tarps offer varying degrees of effectiveness to interrupt the generation of power from a PV array, independent of cost. Heavy, densely woven fabric and dark plastic films reduce the power from PV to near zero. As a general guide, if light can be seen through a tarp, it should not be used. Caution should be exercised during the deployment of tarps on damaged equipment as a wet tarp may become energized and conduct hazardous current if it contacts live equipment. Also, firefighting foam should not be relied upon to block light.

12.7.8.2.6

When illuminated by artificial light sources such as fire department light trucks or an exposure fire, PV systems can produce electrical power sufficient to cause a lock-on hazard. Severely damaged PV arrays can produce hazardous conditions ranging from perception to electrocution. Damage to the array may result in the creation of new and unexpected circuit paths. These paths may include both array components (e.g., module frame, mounting racks, conduits, and so forth) and building components (e.g., metal roofs, flashings and gutters). Care must be exercised during all operations, both interior and exterior. Contacting a local professional PV installation company should be considered to mitigate potential hazards.

12.7.8.2.7

Damage to modules from tools may result in both electrical and fire hazards. The hazard may occur at the point of damage or at other locations depending on the electrical path. Metal roofs present unique challenges in that the surface is conductive, unlike other types such as shingle, ballasted, or single ply.

12.7.8.2.8

Severing of conductors in both metal and plastic conduit results in electrical and fire hazards. Care must be exercised during ventilation and overhaul.

12.7.8.2.9

Responding personnel must stay away from the roofline in the event of modules or sections of an array sliding off the roof.

12.7.8.2.10

Fires under an array but above the roof may breach roofing materials and decking allowing fire to propagate into the attic space.

Supplemental Information

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Committee Statement: The technical committee group recommendations in Sections 12.5-12.23 into three major areas of Residential, Commercial, Special Circumstances. Content found in the existing sections resorted under one of the three designated major areas.

Response Message: SR-23-NFPA 1700-2025

Second Revision No. 13-NFPA 1700-2025 [New Section after 12.23.16]

12.8 Battery Technologies.

12.8.1 General.

Li-Ion batteries (LiBs) have become more prevalent in many products ranging in size from small items like drills and scooters to large-scale power grid support. These smaller devices are used every day in all applications and are consequently being stored, charged, sold and repaired inside residential and commercial occupancies. These batteries can be found just about anywhere and can cause or contribute to fires and explosions.

12.8.2 Preplanning.

12.8.2.1

Preplanning is recommended to locate potential LiB hazards and understand BESS safety features ahead of arriving on scene to a fire. Commercial ESS can have varying fire and explosion mitigation features and levels of performance monitoring. In residential occupancies, identifying the presence of residential BESS systems, electric vehicles, and personal LiB powered devices can be difficult once a fire event has started. Additionally, there are few indicators to differentiate a LiB related fire from a typical residential fire.

12.8.2.2

For commercial BESS, fire departments and responding firefighters should do the following

(1) Be aware of BESS installations within their response jurisdictions.

(2) Engage responsible permitting agencies within the jurisdictions to develop a notification process so the fire department is aware of the installation.

(3) Fire department officials should be engaged in the review of the proposed BESS installation, hazard mitigation assessment (HMA), and fire protection system design. NFPA 855 provides the required fire protection for BESS and outlines the basic requirements for an HMA.

(4) Fire department officials should be engaged in the development of the emergency response plan. Guidance for and an example of an emergency response plan is provided in NFPA 855 .

12.8.2.3

For residential occupancies, education to improve public awareness of LiB hazards is recommended. In jurisdictions where permitting is required for the installation of ESS, PV, and electric vehicle chargers, the permits can be pulled and reviewed to locate hazards. Firefighters should also be observant about the introduction of BESS in their residential response coverage areas.

12.8.3 Size-Up.

12.8.3.1

The consideration for LiB should be a part of any incident size-up. The ability to recognize the potential for the presence or involvement of lithium-ion batteries on the fireground is a critical component of the size-up. The presence of LiBs should drive the incident risk management plan, strategy, and action to prevent harm to the customers and manage the safety of all firefighters on scene.

12.8.3.2

During size-up, additional indicators beyond the appearance of any battery gas from thermal runaway should be considered to assess the likelihood of battery involvement. Potential indicators that suggest a residence may have an energy storage system installed include the presence of the following:

(1) A photovoltaic system

(2) An additional connection at the electric meter

(3) An electric vehicle

12.8.3.3

These pieces of equipment may also be identified by their labeling if mounted on the exterior of the structure. If present, the homeowner or resident may also be interviewed to identify the presence or specific location of an energy storage system.

12.8.3.4

Roofing should be closely scrutinized, as it may be challenging to recognize building-integrated photovoltaic panels (i.e., “solar shingles”).

12.8.3.5

White/gray gases and/or vapors are only produced from the batteries when they experience thermal runaways without burning, so continued leakage of these from a structure may indicate ongoing thermal runaways and that the batteries have not yet ignited. It is critical to recognize that this smoke appearance and related potential deflagration hazard is contrary to previous size-up guidance that implies “lazy” or non-turbulent white smoke is an incipient fire and does not cover this potential deflagration risk.

12.8.3.6

Firefighters should be aware that portable gas meters may not detect thermal runaway effluent gases from batteries. Firefighters should remain outside of the hazard zone if there is a suspected case of batteries in thermal runaway and there are no indicators of an active fire due to a high potential for explosion.

12.8.3.7

Thermal runaway effluent gases from batteries ignite readily and can increase the flammability of the smoke in a ventilation-limited fire. Although unburned battery gases have distinct visual and olfactory characteristics, they can appear similar to, and potentially be mistaken for, smoke from a room and contents fire. It is important to be aware that sparking hand tools and powered saws for cutting ventilation holes can create ignition sources for unburned battery gases. Firefighters are at the greatest risk for explosion hazards in the driveway and at doors, windows, and other vent points. Firefighters should consider the area in front of the garage door as high risk for projectiles.

12.8.3.8

Environmental conditions such as wind velocity and direction, terrain, and lighting conditions may impair the ability to identify the distinct battery thermal runaway effluent. Structural factors include the tightness of the seal around the garage door and any penetrations through the exterior walls.

12.8.3.9

The components of battery gas stratify near the ceiling and the floor in a room where batteries are experiencing propagating thermal runaways. This tends to leave a characteristic visible region between a smoky layer at the floor and a smoky layer at the ceiling. As thermal runaway does not release as much thermal energy as a flaming fire, there is not as much thermally driven gas movement. As such, the gases may appear stagnant or slow-moving. It is important to recognize that this can represent an immediate flash fire or deflagration hazard.

12.8.3.10

Even after a transition to flaming, including a possible deflagration, the layer of battery gas near the floor may still be recognizable and unique to a post-thermal runaway condition.

12.8.3.11

Sounds and smells may also indicate the presence of LiBs in thermal runaway. In a Federal Aviation Administration database full of hundreds of LiB incidents, the sound of thermal runaway is described as “popping,” “clapping,” “banging,” and “hissing.” The smells of thermal runaways are repeatedly described as “electrical” and “plastic.”

12.8.4 Strategic Decision-Making for Battery Involved Incidents.

12.8.4.1

Should a life safety hazard exist or be reasonably possible, consideration for rescue should be planned within a defined timeline based on the best size-up information available. Rescue conditions may not last for very long and firefighters should be prepared for conditions to change rapidly.

12.8.4.2

Experience has demonstrated that any structure or contents in or around lithium-ion batteries or a lithium-ion ESS that is burning should be considered a significant challenge. Commercial lithium-ion ESS with fire conditions should be considered for a defensive strategy. When handling residential structures with fixed lithium-ion ESS, mobile devices, vehicles, or smaller devices involved in fire, the focus should be on the removal of life safety concerns in the immediately exposed rooms or structures and then a defensive strategy should be considered. The selection of a defensive strategy is supported by the potential for explosion and unpredictable changes in fire conditions.

12.8.5 Strategy.

An offensive strategy should be considered when the size-up has determined the potential for occupants is present and when the conditions allow the execution of a primary search. The offensive strategy may only last as long as it takes to execute that primary search. If lithium batteries are discovered during offensive operations, consideration should be made regarding whether the lithium-ion hazard can be removed to allow the continuation of interior operations or if a change in strategy to defensive operations should be considered.

12.8.5.1

The standard elements of a defensive strategy are critical in instances of significant impingement or thermal runaway of lithium-ion battery devices or systems that provide concerns for explosive and toxic events. This includes identifying what is savable and prioritizing protecting exposures.

12.8.6 Incident Action Plan.

The incident action plan (IAP) and tactics for incidents involving LiBs should consider a long duration incident and the need for adequate resources, including water supply, to manage the fire, exposures, and safety concerns. Exposures and safety concerns include the following:

(1) Occupant safety

(2) Environmental impact

(3) Firefighter exposure, including PPE

(4) Decontamination

12.8.6.1

Hazardous materials response agencies should be requested to provide technical assistance and coordination of the removal, cleanup, or disposal of the batteries with a qualified contractor or partner. In instances where a facility or structure responsible party or subject matter expert is present, the firefighters should request any emergency response plans that may exist. If the manufacturer of the batteries is known, the utilization of emergency response guide(s) is required to support the IAP and actions at the incident.

12.8.6.2

Fires involving LiBs are very difficult to extinguish due to the construction and protection built into most conventional battery systems. LiBs that are burning can contribute significantly to the fire load inside a structure in a manner that seems unique or unexpected.

12.8.7 Tactical Considerations.

12.8.7.1 Commercial Occupancies.

Tactical considerations for commercial occupancies include the following:

(1) Engage the responsible representative on the site of the response.

(2) Review the emergency response plan for that site.

(3) Work with site personnel to evaluate the incident priorities with life safety as the highest priority.

(4) Enact the emergency response plan. This is important as many newer BESS are designed to contain the effects of the thermal runaway event and to permit the battery to burn out, or consume the energy, while not allowing propagation. The application of water could cause additional failures or interfere with the designed system.

(5) Monitor for the effectiveness of the designed system.

(6) Check for extensions beyond the BESS.

(7) Continue to monitor conditions and consult with on-site personnel until the fire incident is resolved.

12.8.7.2 Residential Occupancies.

Tactical considerations for residential occupancies include the following:

(1) Information should be obtained via the occupant or other means for potential of Li-Ion battery involvement.

(2) The incident priorities should be evaluated with life safety as the highest priority.

(3) The use of water is the best option for cooling or attempted extinguishment. This may require copious amounts of water to extinguish the fire in and around the batteries and apply water directly on them to diminish heat and cool the batteries.

(4) Water should be applied from the most advantageous and safe position as determined by the strategy and conditions, until the fire conditions become dormant and no longer produce flame, gases, and smoke from the battery or device. Firefighters should use the reach of the stream to keep themselves at a safe distance.

(5) It is important to note that water may not prevent a battery from entering thermal runaway. It may provide cooling to adjacent cells and reduce propagation.

(6) This requires a water supply in all positions that have tactical relevance to the fire attack and cooling. It should be expected that these batteries will burn for hours.

(7) Dry chemical and carbon dioxide extinguishers are ineffective when used on LiBs experiencing thermal runaway. Foam or water additives have not shown any improvement in extinguishment capability or capacity. Water has been shown to be the best extinguishment and cooling agent available.

(8) The gases released by lithium-ion batteries burning or experiencing thermal runaway are flammable and toxic. The gases that are released are not soluble in water and the hydrogen that exits the water is still flammable. Full PPE and the use of a SCBA during any operations in and around lithium-ion battery fires is required.

(9) It may be difficult to discern if a lithium-ion pack or cell is damaged or compromised. The resulting heat signatures may not be differentiated by the use of thermal imagers. A thermal imager is not a reliable means to determine if a lithium-ion battery pack or cell has been compromised or in an imminent state of thermal runaway.

12.8.8 Overhaul/Rekindle prevention

12.8.8.1

LiBs are known to unexpectedly re-ignite with no warning minutes, hours or even days after all visible fire has been extinguished.

12.8.8.2

LiBs and devices that contain them which have been involved in fire, found within a fire area, or subject to elevated temperatures, should be removed from the area especially when firefighters are still operating.

12.8.8.3

Once the fire is controlled and overhaul is beginning, an effort should be made not to bury potential batteries with drywall or other building materials.

12.8.8.4

In the area of LiBs or devices that contain them, firefighters should conduct a diligent search for stray battery cells. These cells may have become dislodged from the pack during the fire or by the hose stream during fire extinguishment.

12.8.8.5

When possible, the location and extent of involvement of LiBs should be noted and the findings reported to future crews and investigators. Absent of a public safety hazard, batteries and associated components should remain onsite in a supervised and safe area until properly documented and analyzed by investigators.

12.8.8.6

Firefighters in full PPE should move the LiBs by using non-conductive tools, a shovel with a wooden or fiberglass handle or other means that does not require firefighters to use their gloved hands. Firefighters should never place battery packs or cells in pockets.

12.8.8.7

When batteries or devices that contain them are moved outside, effort should be made not to affect another structure or bystanders with the potential for fire and toxic gas.

12.8.8.8

When removal of batteries is not feasible, firefighters should have a charged hose line in place for the entirety of the incident.

12.8.8.9

Firefighters should never place themselves in an elevator with batteries or cells to attempt to remove them from the building.

Supplemental Information

File Name	Description	Approved
SR-13.docx		

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Sun Mar 09 23:11:29 EDT 2025

Committee Statement

Committee Statement: The technical committee identified a need to address Battery Technologies, including BESS. This s to finalize the committee input posted with the first draft.

Response Message:	SR-13-NFPA 1700-2025

Second Revision No. 3-NFPA 1700-2025 [Section No. 13.4.1]

13.4.1

Life safety is and always will be of utmost importance to the fire service, and accomplishing search and rescue must be paramount on the fireground. All strategies and tactics should focus on ensuring the life safety threat to any occupants is handled quickly upon arrival. Simultaneous search and fire attack operations should be conducted when resources and staffing will support it.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Wed Mar 05 20:16:11 EST 2025

Committee Statement

Committee Statement: The technical committee recognizes equal importance on search and rescue along with fire attack.

Response Message: SR-3-NFPA 1700-2025

Public Comment No. 3-NFPA 1700-2024 [Section No. 13.4.2.3.4.1]

Second Revision No. 4-NFPA 1700-2025 [Section No. 13.4.2.2]

13.4.2.2

The fire department can impact the ~~survivability~~ survival of trapped occupants through one of two ways: removing the occupant from the hazard or removing the hazard from the occupant. Removing the hazard from the occupant does not reduce the urgency or priority of a search.

13.4.2.2.1

Finding occupants is the first step to removing them, therefore searches need to begin as soon as feasible. Simultaneously, coordinating fire control and ventilation measures will reduce present hazards, aiding in the search and the overall mission of life safety.

13.4.2.2.2

Prior to fire control, the best protection for ~~victims~~ occupants is isolation from the fire, smoke, and convective currents.

13.4.2.2.3

After fire control, ventilation of the structure, especially the ~~victim~~ occupant removal pathways and compartments, should be considered.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Wed Mar 05 20:37:43 EST 2025

Committee Statement

Committee Statement: The technical committee recognizes the priority of the primary and secondary search even when the hazard has been reduced or removed.

Response Message: SR-4-NFPA 1700-2025

Public Comment No. 1-NFPA 1700-2024 [Section No. 13.4.2.2 [Excluding any Sub-Sections]]

Second Revision No. 5-NFPA 1700-2025 [Section No. 13.4.2.3.1.1]

13.4.2.3.1.1

A size-up for life hazard should include the following:

(1) ~~Volume and extent~~ Location, volume, and extent of the fire or smoke conditions

(2) Identification of the most threatened or exposed searchable spaces within the structure

(3) Most effective manner to access threatened or exposed searchable spaces within the structure

(4) Rescue or removal plan based on interior conditions, egress or access points, and the least possible amount of exposure to thermal or toxic insult

(5)* Positive reports of trapped occupants should prompt firefighters to ask where and identify a specific location

A.13.4.2.3.1.1(5)

Per the Firefighter Rescue Survey, the "Just the Numbers" summary of the first 4000 responses indicates positive reports of trapped occupants are 80 percent accurate and will help determine entry point to start their search.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Wed Mar 05 20:46:51 EST 2025

Committee Statement

Committee Statement: The technical committee identifies that fire location and positive reports of trapped occupants are important size-up factors for search and rescue.

Response Message: SR-5-NFPA 1700-2025

Public Comment No. 2-NFPA 1700-2024 [Section No. 13.4.2.3 [Excluding any Sub-Sections]]

Second Revision No. 8-NFPA 1700-2025 [Section No. 13.5.1.1.1]

13.5.1.1.1

A primary search is intended to be a rapid but thorough search of locations where it is believed ~~savable victims~~ viable occupants may be present. Factors like structure type, fire conditions, and time of day will help firefighting personnel determine these priority locations at a given incident. Primary search locations can include the following:

(1) Common paths of travel

(2) Main entry and egress points of the structure

(3) Bedrooms

(4) Closets

(5) Bathrooms

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Wed Mar 05 21:48:38 EST 2025

Committee Statement

Committee Statement: The technical committee determined persons occupying a building are not automatically a victim.

Response Message: SR-8-NFPA 1700-2025

Second Revision No. 7-NFPA 1700-2025 [Section No. 13.5.1.2.1]

13.5.1.2.1

A secondary search is slower and more in depth than a primary search to ensure all spaces within the structure have been covered. A secondary search is typically conducted after coordinated suppression and ventilation, which improves visibility to improve effectiveness. Having a crew separate from that of the primary search conduct the secondary search to avoid bias should be considered. During the secondary search, it is important to check every possible location an occupant could be. ~~hiding, including the following:~~

~~Closets~~

~~Cabinets~~

~~Under beds~~

Supplemental Information

File Name	Description	Approved
1700_SR-7_13.5.1.2.1.docx		

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Wed Mar 05 21:37:38 EST 2025

Committee Statement

Committee Statement: The technical committee recognizes the improved secondary search conditions, while removing a list that is not inclusive of all areas for occupants to be found.

Response Message: SR-7-NFPA 1700-2025

Public Comment No. 5-NFPA 1700-2024 [Section No. 13.5.1.2.1]

Second Revision No. 6-NFPA 1700-2025 [New Section after 13.5.1.3.3]

13.5.1.3.4

The decision to commence a window- versus a door-initiated search should consider the following:

(1) The location and extent of the fire

(2) The structure construction and occupancy type

(3) The time of day

(4) Any signs of life and any positive reports of occupants trapped

(5) Other concurrent fireground operations

13.5.1.3.5

Whether the search continues beyond the room of entry, regardless of whether the search was door- or window-initiated, depends on the conditions found and the ability to isolate, as needed.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Wed Mar 05 21:25:28 EST 2025

Committee Statement

Committee Statement: The technical committee identified a need to provide further guidance to aid decision making on when the extend the search beyond initial room of entry.

Response Message: SR-6-NFPA 1700-2025

Second Revision No. 44-NFPA 1700-2025 [Section No. A.7.4.1.1]

A.7.4.1.1

Traditional post-WWII home construction was typically one story in height with an area of 1000 ft^2 (90 m^2) ~~(1000 ft^2)~~, consisting of many small volume rooms with 8 ft^2 (2.4 m^2) ~~(8 ft^2)~~ ceilings. Fires within these small homes tended to become ventilation controlled fairly quickly as the available oxygen was consumed by the fire. In contrast, modern homes have areas that run from 2500 ft^2 to 4500 ft^2 (230 m^2 to 420 m^2) ~~(2500 ft^2 to 4500 ft^2)~~ with open concept floor plans, great rooms, or foyers with two-story high ceilings. The same fire within a larger volume will tend to grow in scale and be sustained given the available oxygen and the ability of buoyant smoke to spread, mix with air, and be collected in the upper regions of the great room due to the sloped (angled) ceiling well above the fire. Like the smaller volume home, the larger fire will eventually become ventilation controlled. The difference between the two scenarios is the lack of protective compartmentation, degree of fire development, and ultimate danger to occupants and responders due to rapid fire progress upon the reintroduction of air.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Mon Jun 02 09:42:20 EDT 2025

Committee Statement

Committee Statement: Editorial change to be constant throughout the guide by having US measurements be the lead and SI units in parentheses.

Response Message: SR-44-NFPA 1700-2025

Second Revision No. 26-NFPA 1700-2025 [Section No. D.1.1]

D.1.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

~~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,*~~ ~~2020~~ ~~edition.~~ NFPA 1750, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Providing Fire and Emergency Services to the Public,* 2026 edition.

Submitter Information Verification

Committee: FCO-AAA

Submittal Date: Thu May 15 12:24:41 EDT 2025

Committee Statement

Committee Statement: The TC recognizes that NFPA 1710 is scheduled to be consolidated into NFPA 1750 , and having the same revision cycle as NFPA 1700.

Response Message: SR-26-NFPA 1700-2025