NFPA 1403

Standard on Live Fire Training Evolutions

2007 Edition

NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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NFPA 1403

Standard on

Live Fire Training Evolutions

2007 Edition

This edition of NFPA 1403, *Standard on Live Fire Training Evolutions*, was prepared by the Technical Committee on Fire Service Training. It was issued by the Standards Council on December 1, 2006, with an effective date of December 20, 2006, and supersedes all previous editions.

This edition of NFPA 1403 was approved as an American National Standard on December 20, 2006.

Origin and Development of NFPA 1403

The ongoing training of fire fighters is the cornerstone of good fire protection in today's world. However, the benefits derived from live fire training can be negated by the injuries and deaths suffered by fire fighters under unsafe and poorly supervised training conditions.

Following a tragic training accident in 1982, which resulted in the deaths of two fire fighters, the Committee on Fire Service Training was urged to address the issue of live fire training evolutions in structures. The committee proceeded to develop NFPA 1403 in order to provide recognized safe practices for conducting such training evolutions.

The first edition, titled *Live Fire Training Evolutions in Structures*, was issued in 1986. It was well received and served as the basis for live fire training evolutions throughout the United States. The document was updated in a 1992 edition. In the 1997 revision, the committee combined NFPA 1403 with NFPA 1406, *Outside Live Fire Training Evolutions*, into a single document.

The committee appointed a task group to review the functionality of the 1997 edition in preparation for the 2002 revision. The task group recommended a general updating of the standard. Edits were made to reflect increased experience with live fire training evolutions. The previous numbering of chapters and paragraphs changed to reflect requirements in the 2000 edition of the *Manual of Style for NFPA Technical Committee Documents*.

The 2007 edition of the standard contains updated training requirements for live fire training structures, exterior props, and Class B fires. This edition also contains several editorial changes.

In Memoriam, September 11, 2001

We pay tribute to the 343 members of FDNY who gave their lives to save civilian victims on September 11, 2001, at the World Trade Center. They are true American heroes in death, but they were also American heroes in life. We will keep them in our memory and in our hearts. They are the embodiment of courage, bravery, and dedication. May they rest in peace.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for all fire service training techniques, operations, and procedures to develop maximum efficiency and proper utilization of available personnel. Such activities can include training guides for fire prevention, fire suppression, and other missions for which the fire service has responsibility.

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NFPA 1403

Standard on

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex E. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division number when the reference is to the original document. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex E.

Chapter 1 Administration

1.1* Scope.

1.1.1 This standard shall contain the minimum requirements for training all fire suppression personnel engaged in fire-fighting operations under live fire conditions.

1.1.2 The minimum requirements for training shall comprise a basic system that can be adapted to local conditions to serve as a standard mechanism for live fire training.

1.2* Purpose. The purpose of this standard shall be to provide a process for conducting live fire training evolutions to ensure that they are conducted in safe facilities and that the exposure to health and safety hazards for the fire fighters receiving the training is minimized.

1.3 Application.

1.3.1 Procedures for live fire training evolutions that involve marine structures or vessels and ground cover or wildland fires shall not be covered in this standard.

1.3.2* Procedures for suppression of fires set for the sole purpose of training individuals for fire cause and origin investigation shall not be covered in this standard.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

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

NFPA 30, *Flammable and Combustible Liquids Code,* 2003 edition.

NFPA 58, *Liquefied Petroleum Gas Code,* 2004 edition.

NFPA 59, *Utility LP-Gas Plant Code,* 2004 edition.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications,* 2002 edition.

NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting,* 2007 edition.

NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting,* 2007 edition.

NFPA 1975, *Standard on Station/Work Uniforms for Fire and Emergency Services,* 2004 edition.

NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services,* 2007 edition.

NFPA 1982, *Standard on Personal Alert Safety Systems (PASS),* 2007 edition.

2.3 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 1410, *Standard on Training for Initial Emergency Scene Operations,* 2005 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program,* 2007 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary,* 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.2 Shall. Indicates a mandatory requirement.

3.2.3 Should. Indicates a recommendation or that which is advised but not required.

3.2.4 Standard. A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

3.3 General Definitions.

3.3.1 Acquired Prop. A piece of equipment such as an automobile that was not designed for burning but is used for live fire training evolutions.

3.3.2 Demonstration. The act of showing a skill.

3.3.3 Emergency Medical Services. The provision of treatment, such as first aid, cardiopulmonary resuscitation, basic

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life support, advanced life support, and other pre-hospital procedures including ambulance transportation, to patients. [**1500,** 2007]

3.3.4 Evolution. A set of prescribed actions that result in an effective fireground activity. [**1410,** 2005]

3.3.5 Instructor. An individual qualified by the authority having jurisdiction to deliver fire fighter training, who has the training and experience to supervise students during live fire training evolutions.

3.3.6 Instructor-in-Charge. An individual qualified as an instructor and designated by the authority having jurisdiction to be in charge of the live fire training evolution.

3.3.7 Live Fire. Any unconfined open flame or device that can propagate fire to the building, structure, or other combustible materials.

3.3.8 Participant. Any student, instructor, safety officer, visitor, or other person who is involved in the live fire training evolution within the operations area.

3.3.9 Safety Officer. An individual appointed by the authority having jurisdiction as qualified to maintain a safe working environment at all live fire training evolutions.

3.3.10 Student. Any person who is present at the live fire training evolution for the purpose of receiving training.

3.3.11 Training Structure.

3.3.11.1 ***Acquired Structure.*** A building or structure acquired by the authority having jurisdiction from a property owner for the purpose of conducting live fire training evolutions.

3.3.11.2* ***Live Fire Training Structure.*** A structure specifically designed for conducting live fire training evolutions on a repetitive basis.

Chapter 4 Acquired Structures

4.1 Student Prerequisites.

4.1.1* Prior to being permitted to participate in live fire training evolutions, the student shall have received training to meet the job performance requirements for Fire Fighter I in NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, related to the following subjects:

(1) Safety
(2) Fire behavior
(3) Portable extinguishers
(4) Personal protective equipment
(5) Ladders
(6) Fire hose, appliances, and streams
(7) Overhaul
(8) Water supply
(9) Ventilation
(10) Forcible entry

4.1.2* Students participating in a live fire training evolution who have received the required minimum training from other than the authority having jurisdiction (AHJ) shall not be permitted to participate in any live fire training evolution without first presenting prior written evidence of having successfully completed the prescribed minimum training to the levels specified in 4.1.1.

4.2 Structures and Facilities.

4.2.1* Any acquired structure that is considered for a structural fire training exercise shall be prepared for the live fire training evolution.

4.2.2* Preparation shall include application for and receipt of required permits and permissions.

4.2.3* Ownership of the acquired structure shall be determined prior to its acceptance by the AHJ.

4.2.4 Evidence of clear title shall be required for all structures acquired for live fire training evolutions.

4.2.5* Written permission shall be secured from the owner of the structure in order for the fire department to conduct live fire training evolutions within the acquired structure.

4.2.6 A clear description of the anticipated condition of the acquired structure at the completion of the evolution(s) and the method of returning the property to the owner shall be put in writing and shall be acknowledged by the owner of the structure.

4.2.7* Proof of insurance cancellation or a signed statement of nonexistence of insurance shall be provided by the owner of the structure prior to acceptance for use of the acquired structure by the AHJ.

4.2.8 The permits specified in this chapter shall be provided to outside, contract, or other separate training agencies by the AHJ upon the request of those agencies.

4.2.9* All hazardous storage conditions shall be removed from the structure or neutralized in such a manner as to not present a safety problem during use of the structure for live fire training evolutions.

4.2.9.1 Closed containers and highly combustible materials shall be removed from the structure.

4.2.9.2 Oil tanks and similar closed vessels that cannot be removed shall be vented to prevent an explosion or overpressure rupture.

4.2.9.3 Any hazardous or combustible atmosphere within the tank or vessel shall be rendered inert.

4.2.10 All hazardous structural conditions shall be removed or repaired so as to not present a safety problem during use of the structure for live fire training evolutions.

4.2.10.1 Floor openings shall be covered.

4.2.10.2 Missing stair treads and rails shall be repaired or replaced.

4.2.10.3 Dangerous portions of any chimney shall be removed.

4.2.10.4 Holes in walls and ceilings shall be patched.

4.2.10.5* Low-density combustible fiberboard and other unconventional combustible interior finishes shall be removed.

4.2.10.6* Extraordinary weight above the training area shall be removed.

4.2.11 All hazardous environmental conditions shall be removed before live fire training evolutions are conducted in the structure.

4.2.11.1 Debris creating or contributing to unsafe conditions shall be removed.

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4.2.11.2* Roof ventilation openings that are normally closed but can be opened in the event of an emergency shall be permitted to be utilized.

4.2.11.3 Utilities shall be disconnected.

4.2.11.4 Any toxic weeds, insect hives, or vermin that could present a potential hazard shall be removed.

4.2.11.5 All forms of asbestos deemed hazardous to personnel shall be removed by an approved asbestos removal contractor.

4.2.12 Exits.

4.2.12.1 Exits from the acquired structure shall be identified and evaluated prior to each training burn.

4.2.12.2 Participants of the live fire training shall be made aware of exits from the acquired structure prior to each training burn.

4.2.13 Buildings that cannot be made safe as required by this chapter shall not be utilized for interior live fire training evolutions.

4.2.14 Adjacent buildings or property that might become involved shall be protected or removed.

4.2.15 Utility services adjacent to the live burn site shall be removed or protected.

4.2.16 Trees, brush, and surrounding vegetation that create a hazard to participants shall be removed.

4.2.17 Combustible materials, other than those intended for the live fire training evolution, shall be removed or stored in a protected area to preclude accidental ignition.

4.2.18 Property adjacent to the training site that could be affected by the smoke from the live fire training evolution, such as railroads, airports or heliports, and nursing homes, hospitals, or other similar facilities, shall be identified.

4.2.19 The persons in charge of the adjacent properties identified in 4.2.18 shall be informed of the date and time of the evolution.

4.2.20* Streets or highways in the vicinity of the training site shall be surveyed for potential effects from live fire training evolutions, and safeguards shall be taken to eliminate possible hazards to motorists.

4.2.21 Fire lines shall be established to keep pedestrian traffic in the vicinity of the training site clear of the operations area of the live burn.

4.2.22* Awareness of weather conditions, wind velocity, and wind direction shall be maintained, including a final check for possible changes in weather conditions immediately before actual ignition.

4.2.23 The instructor-in-charge shall determine the rate and duration of waterflow necessary for each individual live fire training evolution, including the water necessary for control and extinguishment of the training fire, the supply necessary for backup lines to protect personnel, and any water needed to protect exposed property.

4.2.23.1 The minimum water supply and delivery for live fire training evolutions shall meet the criteria identified in NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting*.

4.2.23.2 A minimum reserve of additional water in the amount of 50 percent of the fire flow demand determined in 4.2.23.1 shall be available to handle exposure protection or unforeseen situations.

4.2.23.3* Separate sources shall be utilized for the supply of attack lines and backup lines in order to preclude the loss of both water supply sources at the same time.

4.2.24 Areas for the staging, operating, and parking of fire apparatus that are used in the live fire training evolution shall be designated.

4.2.24.1 An area for parking fire apparatus and vehicles that are not a part of the evolution shall be designated so as not to interfere with fireground operations.

4.2.24.2 If any of the apparatus described in 4.2.24.1 is in service to respond to an emergency, it shall be located in an area to facilitate a prompt response.

4.2.24.3 Where required or necessary, parking areas for police vehicles or for the press shall be designated.

4.2.24.4 A parking area for an ambulance or an emergency medical services vehicle shall be designated and located where it will facilitate a prompt response in the event of personal injury to participants in the evolution.

4.2.24.5 Ingress and egress routes shall be designated, identified, and monitored during the training evolutions to ensure their availability in the event of an emergency.

4.2.25 Prior to the conduct of actual live fire training evolutions, a preburn briefing session shall be conducted for all participants, in which all facets of each evolution to be conducted are discussed and assignments for all crews participating in the training session are given.

4.2.25.1 The location of simulated victims shall not be required to be disclosed, provided that the possibility of victims is discussed during the preburn briefing.

4.2.25.2 A preburn plan shall be prepared and shall be utilized during the preburn briefing sessions.

4.2.25.3 All features of the training areas and structure shall be indicated on the preburn plan.

4.2.25.4 Prior to the conduct of any live fire training, all participants shall be required to conduct a walk-through of the acquired structure in order to have a knowledge of and familiarity with the layout of the acquired structure and to facilitate any necessary evacuation of the acquired structure.

4.2.26 All spectators shall be restricted to an area outside the operations area perimeter established by the safety officer.

4.2.26.1 Control measures such as ropes, signs, and fire line markings shall be posted to indicate the perimeter of the operations area.

4.2.26.2 Visitors who are allowed within the operations area perimeter shall be escorted at all times.

4.2.26.3 Visitors who are allowed within the operations area perimeter shall be equipped with and shall wear complete protective clothing in accordance with manufacturer's instructions and in accordance with 6.4.17.1 through 6.4.17.7.

4.2.27 All possible sources of ignition, other than those that are under the direct supervision of the person responsible for

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the start of the training fire, shall be removed from the operations area.

4.3 Fuel Materials.

4.3.1 The fuels that are utilized in live fire training evolutions shall have known burning characteristics that are as controllable as possible.

4.3.2 Unidentified materials, such as debris found in or around the structure that could burn in unanticipated ways, react violently, or create environmental or health hazards, shall not be used.

4.3.3* Pressure-treated wood, rubber, and plastic, and straw or hay treated with pesticides or harmful chemicals shall not be used.

4.3.4* Fuel materials shall be used only in the amounts necessary to create the desired fire size.

4.3.5 The fuel load shall be limited to avoid conditions that could cause an uncontrolled flashover or backdraft.

4.3.6 Flammable or combustible liquids, as defined in NFPA 30, *Flammable and Combustible Liquids Code*, shall not be used in live fire training evolutions in acquired structures.

4.3.7* The instructor-in-charge shall assess the selected fire room environment for factors that can affect the growth, development, and spread of fire.

4.3.8* The instructor-in-charge shall document fuel loading, including all of the following:

(1) Furnishings
(2) Wall and floor coverings and ceiling materials
(3) Type of construction of the structure, including type of roof and combustible void spaces
(4) Dimensions of the room

4.3.9* The training exercise shall be stopped immediately when the instructor-in-charge determines through ongoing assessment that the combustible nature of the environment represents a potential hazard.

4.3.10 An exercise stopped as a result of an assessed hazard according to 4.3.9 shall continue only when actions have been taken to reduce the hazard.

4.4 Safety.

4.4.1 A safety officer shall be appointed for all live fire training evolutions.

4.4.2* The safety officer shall have the authority, regardless of rank, to intervene and control any aspect of the operations when, in his or her judgment, a potential or actual danger, accident, or unsafe condition exists.

4.4.3 The responsibilities of the safety officer shall include, but shall not be limited to, the following:

(1) Prevention of unsafe acts
(2) Elimination of unsafe conditions

4.4.4 The safety officer shall provide for the safety of all persons on the scene including students, instructors, visitors, and spectators.

4.4.5 The safety officer shall not be assigned other duties that interfere with safety responsibilities.

4.4.6* The instructor-in-charge of the live fire training evolutions shall determine, prior to each specific evolution, the number of training attack lines and backup lines that are necessary.

4.4.6.1 Each hose line shall be capable of delivering a minimum of 360 L/min (95 gpm).

4.4.6.2 Backup lines shall be provided to ensure protection for personnel on training attack lines.

4.4.7 The instructor-in-charge shall assign the following personnel:

(1) One instructor to each functional crew, which shall not exceed five students
(2) One instructor to each backup line
(3) Additional personnel to backup lines to provide mobility
(4) One additional instructor for each additional functional assignment

4.4.8* Additional safety personnel, as deemed necessary by the safety officer, shall be located strategically within the structure to react to any unplanned or threatening situation or condition.

4.4.9 A method of fireground communications shall be established to enable coordination among the incident commander, the interior and exterior sectors, the safety officer, and external requests for assistance.

4.4.10* A building evacuation plan shall be established, including an evacuation signal to be demonstrated to all participants in an interior live fire training evolution.

4.4.11 Emergency medical services shall be available on site to handle injuries.

4.4.12 Written reports shall be filled out and submitted on all injuries and on all medical aid rendered.

4.4.13 A search of the acquired structure shall be conducted to ensure that no unauthorized persons, animals, or objects are in the acquired structure immediately prior to ignition.

4.4.14 No person(s) shall play the role of a victim inside the acquired structure.

4.4.15 Only one fire at a time shall be permitted within an acquired structure.

4.4.16 Fires shall not be located in any designated exit paths.

4.4.17 The training session shall be curtailed, postponed, or canceled, as necessary, to reduce the risk of injury or illness caused by extreme weather conditions.

4.4.18 Each participant shall be equipped with full protective clothing and self-contained breathing apparatus (SCBA).

4.4.18.1 All participants shall be inspected by the safety officer prior to entry into a live fire training evolution to ensure that the protective clothing and SCBA are being worn correctly and are in serviceable condition.

4.4.18.2 Protective coats, trousers, hoods, footwear, helmets, and gloves shall have been manufactured to meet the requirements of NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*.

4.4.18.3 SCBA shall have been manufactured to meet the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*.

4.4.18.4* Where station or work uniforms are worn by any participant, the station or work uniform shall have been

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manufactured to meet the requirements of NFPA 1975, *Standard on Station/Work Uniforms for Fire and Emergency Services.*

4.4.18.5 Personal alarm devices shall have been manufactured to meet the requirements of NFPA 1982, *Standard on Personal Alert Safety Systems (PASS).*

4.4.18.6 All students, instructors, safety personnel, and other personnel shall wear according to manufacturer's instructions all protective clothing and equipment specified in this chapter whenever they are involved in any evolution or fire suppression operation during the live fire training evolution.

4.4.18.7* All students, instructors, safety personnel, and other personnel participating in any evolution or operation of fire suppression during the live fire training evolution shall breathe from an SCBA air supply whenever they operate under one or more of the following conditions:

(1) In an atmosphere that is oxygen deficient or contaminated by products of combustion, or both
(2) In an atmosphere that is suspected of being oxygen deficient or contaminated by products of combustion, or both
(3) In any atmosphere that can become oxygen deficient, contaminated, or both
(4) Below ground level

4.4.19 One person who is not a student shall be designated as the "ignition officer" to control the materials being burned.

4.4.19.1 The ignition officer shall wear full protective clothing, including SCBA, as required in 6.4.17.1 through 6.4.17.7, when performing this control function.

4.4.19.2 A charged hose line shall accompany the ignition officer when he or she is igniting any fire.

4.4.19.3 The decision to ignite the training fire shall be made by the instructor-in-charge in coordination with the safety officer.

4.4.19.4 The fire shall be ignited by the ignition officer in the presence of and under the direct supervision of the safety officer.

4.5 Instructors.

4.5.1 All instructors shall be qualified to deliver fire fighter training by the AHJ.

4.5.2* The participating student-to-instructor ratio shall not be greater than 5 to 1.

4.5.3 Additional instructors shall be designated when factors such as extreme temperatures or large groups are present, and classes of long duration are planned.

4.5.4 The instructor-in-charge shall be responsible for full compliance with this standard.

4.5.5 Prior to the ignition of any fire, instructors shall ensure that all protective clothing and equipment specified in this chapter are being worn according to manufacturer's instructions.

4.5.6 Instructors shall take a head count when entering and exiting the acquired structure during an actual attack evolution conducted in accordance with this standard.

4.5.7 Instructors shall monitor and supervise all assigned students during the live fire training evolution.

4.5.8 The instructor-in-charge shall provide for rest and rehabilitation of members operating at the scene, including any necessary medical evaluation and treatment, food and fluid replenishment, and relief from climatic conditions. *(See Annex D.)*

4.5.9 It shall be the responsibility of the instructor-in-charge to coordinate overall acquired structure fireground activities to ensure correct levels of safety.

Chapter 5 Gas-Fired Live Fire Training Structures

5.1 Student Prerequisites.

5.1.1* Prior to being permitted to participate in live fire training evolutions, the student shall have received training to meet the job performance requirements for Fire Fighter I in NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, related to the following subjects:

(1) Safety
(2) Fire behavior
(3) Portable extinguishers
(4) Personal protective equipment
(5) Ladders
(6) Fire hose, appliances, and streams
(7) Overhaul
(8) Water supply
(9) Ventilation
(10) Forcible entry

5.1.2* Students participating in a live fire training evolution who have received the required minimum basic training from other than the AHJ shall not be permitted to participate in any live fire training evolution without first presenting prior written evidence of having successfully completed the prescribed minimum training to the levels specified in 5.1.1.

5.2 Structures and Facilities.

5.2.1* Strict safety practices shall be applied to all structures selected for live fire training evolutions.

5.2.2* Live fire training structures shall be inspected visually for damage prior to live fire training evolutions.

5.2.2.1 Damage shall be documented.

5.2.2.2* The structural integrity of the live fire training structure shall be evaluated and documented periodically by a licensed professional engineer with live fire training structure experience and expertise.

5.2.2.3 The frequency of the structural evaluation shall be as follows:

(1) Once per year for live fire training structures that support more than 60 days of live fire training per year (a day of live fire training is any day during which at least one live fire training evolution has been conducted)
(2) Once every two years for live fire training structures that support 31 to 60 days of live fire training per year
(3) Once every three years for live fire training structures that support 30 or fewer days of live fire training per year
(4) Immediately if visible structural defects have formed, such as cracks, spalls, or warps in structural floors, columns, beams, walls, metal panels, and so on

5.2.2.4* Part of the live fire training structure evaluation shall include, once every 5 years, the removal and reinstallation of a representative area of thermal linings (if any) to inspect the hidden conditions behind the linings.

5.2.2.4.1 This requirement shall be permitted to be waived under both of the following conditions:

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(1) The thermal lining has never had a break in any part of its thermal barrier (no cracks, holes, breaks, or insulation sags that could allow heat to pass through the lining system).
(2) Thermocouples between the thermal lining and the structural element indicate that temperatures have never exceeded 149°C (300°F) behind the lining.

5.2.2.4.2 If the requirement of 5.2.2.4 cannot be waived for a concrete structure, and if removal and reinstallation of thermal linings would be difficult or expensive due to the permanent nature of the lining system, then it shall be permitted to take concrete cores through the protected ceiling slab from the top surface of the slab in order to spot check conditions hidden by the thermal lining.

5.2.2.5 The engineer shall core solid structural concrete slabs and walls that have been exposed to temperatures in excess of 149°C (300°F) to check for hidden delamination and to test comprehensive strength once every 10 years for conventional (Portland) concrete and once every 3 years for refractory (calcium aluminate) concrete.

5.2.2.6 Where the live fire training structure damage is severe enough to affect the safety of the students, training shall not be permitted.

5.2.3 All doors, windows and window shutters, roof scuttles and automatic ventilators, mechanical equipment, lighting, manual or automatic sprinklers, and standpipes necessary for the live fire training evolution shall be checked and operated prior to any live fire training evolution to ensure they operate correctly.

5.2.4 All safety devices, such as thermometers, oxygen and toxic and combustible gas monitors, evacuation alarms, and emergency shutdown switches, shall be checked prior to any live fire training evolutions to ensure they operate correctly.

5.2.5 For live fire training structures that contain gas-fueled training systems, the instructors shall run the system prior to exposing students to live flames in order to ensure the correct operation of devices such as the gas valves, flame safeguard units, agent sensors, combustion fans, and ventilation fans.

5.2.6 Live fire training structures shall be left in a safe condition upon completion of live fire training evolutions.

5.2.7 Debris hindering the access or egress of fire fighters shall be removed prior to the beginning of the next training exercises.

5.2.8 Fire lines shall be established to keep pedestrian traffic in the vicinity of the training site clear of the operations area of the live burn.

5.2.9 Awareness of weather conditions, wind velocity, and wind direction shall be maintained, including a final check for possible changes in weather conditions immediately before actual ignition.

5.2.10 The instructor-in-charge shall determine the rate and duration of waterflow necessary for each individual live fire training evolution, including the water necessary for control and extinguishment of the training fire, the supply necessary for backup lines to protect personnel, and any water needed to protect exposed property.

5.2.10.1 The minimum water supply and delivery for the live fire training evolutions shall meet the criteria identified in NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting*.

5.2.10.2 A minimum reserve of additional water in the amount of 50 percent of the fire flow demand determined in accordance with 5.2.10.1 shall be available to handle exposure protection or unforeseen situations.

5.2.10.3* Except under the conditions of 5.2.10.4, separate water sources shall be utilized for the supply of attack lines and backup lines in order to preclude the loss of both water supply sources at the same time.

5.2.10.4* A single water source shall be sufficient at a training center facility where the water system has been engineered to provide adequate volume for the evolutions conducted and a backup power source or backup pumps, or both, are in place to ensure an uninterrupted supply in the event of a power failure or malfunction.

5.2.11 Areas for the staging, operating, and parking of fire apparatus that are used in the live fire training evolution shall be designated.

5.2.11.1 An area for parking fire apparatus and vehicles that are not a part of the evolution shall be designated so as not to interfere with fireground operations.

5.2.11.2 If any of the apparatus described in 5.2.11.1 is in service to respond to an emergency, it shall be located in an area to facilitate a prompt response.

5.2.11.3 Where required or necessary, parking areas for police or press vehicles shall be designated.

5.2.11.4 A parking area for an ambulance or an emergency medical services vehicle shall be designated and located where it will facilitate a prompt response in the event of personal injury to participants in the evolution.

5.2.11.5 The parking area shall be located to facilitate prompt response in the event of personal injury to participants in the evolution.

5.2.11.6 Ingress and egress routes shall be designated, identified, and monitored during the training evolutions to ensure their availability in the event of an emergency.

5.2.12 Prior to the conduct of actual live fire training evolutions, a preburn briefing session shall be conducted for all participants.

5.2.12.1 All facets of each evolution to be conducted shall be discussed in the preburn briefing, and assignments shall be made for all crews participating in the training session.

5.2.12.2 The location of simulated victims shall not be required to be disclosed, provided that the possibility of victims is discussed during the preburn briefing.

5.2.12.3 A preburn plan shall be prepared and utilized during the preburn briefing sessions.

5.2.12.4 All features of the training areas and structure shall be indicated on the preburn plan.

5.2.13 Prior to the conduct of any live fire training, all participants shall be required to conduct a walk-through of the structure in order to have knowledge of and familiarity with the layout of the live fire training structure and to be able to facilitate any necessary evacuation of the live fire training structure.

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5.2.14 All spectators shall be restricted to an area outside the operations area perimeter established by the safety officer.

5.2.14.1 Control measures such as ropes, signs, and fire line markings shall be used to indicate the perimeter of the operations area.

5.2.14.2 Visitors who are allowed within the operations area perimeter shall be escorted at all times.

5.2.14.3 Visitors who are allowed within the operations area perimeter shall be equipped with and shall wear complete protective clothing in accordance with manufacturer's instructions and in accordance with 5.4.17.1 through 5.4.17.7.

5.2.15 All possible sources of ignition, other than those that are under the direct supervision of the person responsible for the start of the training fire, shall be removed from the operations area.

5.2.16 There shall be ample room provided around all props such that there is space for all attack lines as well as backup lines to operate freely.

5.3 Fuel Materials.

5.3.1 The fuels that are utilized in live fire training evolutions shall have known burning characteristics that are as controllable as possible.

5.3.2 Unidentified materials, such as debris found in or around the structure that could burn in unanticipated ways, react violently, or create environmental or health hazards, shall not be used.

5.3.3* The use of flammable gas, such as propane and natural gas, shall be permitted only in live fire training structures specifically designed for their use.

5.3.4 Liquefied versions of the gases specified in 5.3.3 shall not be permitted inside the live fire training structure.

5.3.5* The instructor-in-charge shall assess the selected fire room environment for factors that can affect the growth, development, and spread of fire.

5.3.6* The training exercise shall be stopped immediately when the instructor-in-charge determines through ongoing assessment that the combustible nature of the environment represents a potential hazard.

5.3.7 An exercise stopped as a result of an assessed hazard according to 5.3.6 shall continue only when actions have been taken to reduce the hazard.

5.4 Safety.

5.4.1 A safety officer shall be appointed for all live fire training evolutions.

5.4.2* The safety officer shall have the authority, regardless of rank, to intervene and control any aspect of the operations when, in his or her judgment, a potential or actual danger, accident, or unsafe condition exists.

5.4.3 The responsibilities of the safety officer shall include, but shall not be limited to, the following:

(1) Prevention of unsafe acts
(2) Elimination of unsafe conditions

5.4.4 The safety officer shall provide for the safety of all persons on the scene including students, instructors, visitors, and spectators.

5.4.5 The safety officer shall not be assigned other duties that interfere with safety responsibilities.

5.4.6 The safety officer shall be knowledgeable in the operation and location of safety features available within the live fire training structure, such as emergency shutoff switches, gas shutoff valves, and evacuation alarms.

5.4.7* The instructor-in-charge of the live fire training evolutions shall determine, prior to each specific evolution, the number of training attack lines and backup lines that are necessary.

5.4.7.1 Each hose line shall be capable of delivering a minimum of 360 L/min (95 gpm).

5.4.7.2 Backup lines shall be provided to ensure protection for personnel on training attack lines.

5.4.7.3 The instructor-in-charge shall assign the following personnel:

(1) One instructor to each functional crew, which shall not exceed five students
(2) One instructor to each backup line
(3) Additional personnel to backup lines to provide mobility
(4) One additional instructor for each additional functional assignment

5.4.8* Additional safety personnel, as deemed necessary by the safety officer, shall be located strategically within the structure to react to any unplanned or threatening situation or condition.

5.4.9 A method of fireground communications shall be established to enable coordination among the incident commander, the interior and exterior sectors, the safety officer, and external requests for assistance.

5.4.10* A building evacuation plan shall be established, including an evacuation signal to be demonstrated to all participants in an interior live fire training evolution.

5.4.11 Emergency medical services shall be available on site to handle injuries.

5.4.12 Written reports shall be filled out and submitted on all injuries and on all medical aid rendered.

5.4.13 A search of the structure shall be conducted to ensure that no unauthorized persons, animals, or objects are in the live fire training structure immediately prior to ignition.

5.4.14 No person(s) shall play the role of a victim inside the live fire training structure.

5.4.15 Fires shall not be located in any designated exit paths.

5.4.16 The training session shall be curtailed, postponed, or canceled, as necessary, to reduce the risk of injury or illness caused by extreme weather conditions.

5.4.17 Each participant shall be equipped with full protective clothing and SCBA.

5.4.17.1 All participants shall be inspected by the safety officer prior to entry into a live fire training evolution to ensure that the protective clothing and SCBA are being worn according to manufacturer's instructions and are in serviceable condition.

5.4.17.2 Protective coats, trousers, hoods, footwear, helmets, and gloves shall have been manufactured to meet the requirements of NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting.*

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5.4.17.3 SCBA shall have been manufactured to meet the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services.*

5.4.17.4* Where station or work uniforms are worn by any participant, the station or work uniform shall have been manufactured to meet the requirements of NFPA 1975, *Standard on Station/Work Uniforms for Fire and Emergency Services.*

5.4.17.5 Personal alarm devices shall have been manufactured to meet the requirements of NFPA 1982, *Standard on Personal Alert Safety Systems (PASS).*

5.4.17.6 All students, instructors, safety personnel, and other personnel shall wear all protective clothing and equipment specified in this chapter according to manufacturer's instructions whenever they are involved in any evolution or fire suppression operation during the live fire training evolution.

5.4.17.7* All students, instructors, safety personnel, and other personnel participating in any evolution or operation of fire suppression during the live fire training evolution shall breathe from an SCBA air supply whenever operating under one or more of the following conditions:

(1) In an atmosphere that is oxygen deficient or contaminated by products of combustion, or both
(2) In an atmosphere that is suspected of being oxygen deficient or contaminated by products of combustion, or both
(3) In any atmosphere that can become oxygen deficient or contaminated, or both
(4) Below ground level

5.4.18* The decision to ignite a training fire shall be made by the instructor-in-charge in coordination with the safety officer.

5.4.19 Fires shall not be ignited without an instructor visually confirming that the flame area is clear of personnel.

5.4.20 Flammable gas fires shall not be ignited manually.

5.5 Instructors.

5.5.1 All instructors shall be qualified by the AHJ to deliver fire fighter training.

5.5.2* The participating student-to-instructor ratio shall not be greater than 5 to 1.

5.5.3 Additional instructors shall be designated when factors such as extreme temperatures or large groups are present, and classes of long duration are planned.

5.5.4 The instructor-in-charge shall be responsible for full compliance with this standard.

5.5.5 Prior to the ignition of any fire, instructors shall ensure that all protective clothing and equipment specified in this chapter are being worn according to manufacturer's instructions.

5.5.6 Instructors shall take a head count when participants are entering and exiting the live fire training structure during an actual attack evolution conducted in accordance with this standard.

5.5.7 Instructors shall monitor and supervise all assigned students during the live fire training evolution.

5.5.8 The instructor-in-charge shall provide for rest and rehabilitation of members operating at the scene, including any necessary medical evaluation and treatment, food and fluid replenishment, and relief from climatic conditions. *(See Annex D.)*

5.5.9 Instructors responsible for conducting live fire training evolutions with a gas-fueled training system shall be trained in the complete operation of the system.

5.5.10 The training of instructors shall be performed by an individual authorized by the gas-fueled training system manufacturer or others qualified to perform this type of training.

5.5.11 Where concurrent, multiple, live fire training evolutions are being conducted in a specifically designed live fire training structure, the identity of the instructor-in-charge of the evolutions shall be clear to all participants.

5.5.12 It shall be the responsibility of the instructor-in-charge to coordinate overall live fire training structure fireground activities to ensure correct levels of safety.

Chapter 6 Non-Gas-Fired Live Fire Training Structures

6.1 Student Prerequisites.

6.1.1* Prior to being permitted to participate in live fire training evolutions, the student shall have received training to meet the job performance requirements for Fire Fighter I in NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, related to the following subjects:

(1) Safety
(2) Fire behavior
(3) Portable extinguishers
(4) Personal protective equipment
(5) Ladders
(6) Fire hose, appliances, and streams
(7) Overhaul
(8) Water supply
(9) Ventilation
(10) Forcible entry

6.1.2* Students participating in a live fire training evolution who have received the required minimum basic training from other than the AHJ shall not be permitted to participate in any live fire training evolution without first presenting prior written evidence of having successfully completed the prescribed minimum training to the levels specified in 6.1.1.

6.2 Structures and Facilities.

6.2.1* Strict safety practices shall be applied to all structures selected for live fire training evolutions.

6.2.2* Live fire training structures shall be inspected visually for damage prior to live fire training evolutions.

6.2.2.1 Damage shall be documented.

6.2.2.2* The structural integrity of the live fire training structure shall be evaluated and documented periodically by a licensed professional engineer with live fire training structure experience and expertise.

6.2.2.3 The structural evaluation shall be conducted with the following frequency:

(1) Once per year for live fire training structures that support more than 60 days of live fire training per year (a day of live fire training is any day during which at least one live fire training evolution has been conducted)
(2) Once every two years for live fire training structures that support 31 days to 60 days of live fire training per year

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(3) Once every three years for live fire training structures that support 30 or fewer days of live fire training per year
(4) Immediately if visible structural defects have formed, such as cracks, spalls, or warps in structural floors, columns, beams, walls, metal panels, and so on

6.2.2.4* Part of the live fire training structure evaluation shall include, once every five years, the removal and reinstallation of a representative area of thermal linings (if any) to inspect the hidden conditions behind the linings.

6.2.2.4.1 The requirement of 6.2.2.4 shall be permitted to be waived under the following conditions:

(1) The thermal lining has never had a break in any part of its thermal barrier (no cracks, holes, breaks, or insulation sags that could allow heat to pass through the lining system).
(2) Thermocouples between the thermal lining and the structural element indicate that temperatures have never exceeded 149°C (300°F) behind the lining.

6.2.2.4.2 If the requirement of 6.2.2.4 cannot be waived for a concrete structure, and if removal and reinstallation of thermal linings would be difficult or expensive due to the permanent nature of the lining system, then it shall be permitted to take concrete cores through the protected ceiling slab from the top surface of the slab in order to spot check conditions hidden by the thermal lining.

6.2.2.5 The engineer shall core solid structural concrete slabs and walls that have been exposed to temperatures in excess of 149°C (300°F) to check for hidden delaminations and to test compressive strength once every 10 years for conventional (Portland) concrete and once every 3 years for refractory (calcium aluminate) concrete.

6.2.2.6 Where the live fire training structure damage is severe enough to affect the safety of the students, training shall not be permitted.

6.2.3 All doors, windows and window shutters, roof scuttles and automatic ventilators, mechanical equipment, lighting, manual or automatic sprinklers, and standpipes necessary for the live fire training evolution shall be checked and operated prior to any live fire training evolution to ensure they operate correctly.

6.2.4 All safety devices, such as thermometers, oxygen and toxic and combustible gas monitors, evacuation alarms, and emergency shutdown switches, shall be checked prior to any live fire training evolutions to ensure they operate correctly.

6.2.5 Live fire training structures shall be left in a safe condition upon completion of live fire training evolutions.

6.2.6 Debris hindering the access or egress of fire fighters shall be removed prior to the beginning of the next training exercises.

6.2.7 In preparation for live fire training, an inspection of the structure shall be made to determine that the floors, walls, stairs, and other structural components are capable of withstanding the weight of contents, participants, and accumulated water.

6.2.8 Property adjacent to the training site that could be affected by the smoke from the live fire training evolution, such as railroads, airports or heliports, and nursing homes, hospitals, or other similar facilities, shall be identified.

6.2.9 The persons in charge of the properties described in 6.2.8 shall be informed of the date and time of the evolution.

6.2.10* Streets or highways in the vicinity of the training site shall be surveyed for potential effects from live fire training evolutions, and safeguards shall be taken to eliminate any possible hazard to motorists.

6.2.11 Fire lines shall be established to keep pedestrian traffic in the vicinity of the training site clear of the operations area of the live burn.

6.2.12 Awareness of weather conditions, wind velocity, and wind direction shall be maintained, including a final check for possible changes in weather conditions immediately before actual ignition.

6.2.13 The instructor-in-charge shall determine the rate and duration of waterflow necessary for each individual live fire training evolution, including the water necessary for control and extinguishment of the training fire, the supply necessary for backup lines to protect personnel, and any water needed to protect exposed property.

6.2.13.1 The minimum water supply and delivery for live fire training evolutions shall meet the criteria identified in NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting*.

6.2.13.2 A minimum reserve of additional water in the amount of 50 percent of the fire flow demand determined in accordance with 6.2.13.1 shall be available to handle exposure protection or unforeseen situations.

6.2.13.3* Except under the conditions of 6.2.13.4, separate sources shall be utilized for the supply of attack lines and backup lines in order to preclude the loss of both water supply sources at the same time.

6.2.13.4* A single water source shall be sufficient at a training center facility where the water system has been engineered to provide adequate volume for the evolutions conducted and a backup power source or backup pumps, or both, are in place to ensure an uninterrupted supply in the event of a power failure or malfunction.

6.2.14 Areas for the staging, operating, and parking of fire apparatus that are used in the live fire training evolution shall be designated.

6.2.14.1 An area for parking fire apparatus and vehicles that are not a part of the evolution shall be designated so as not to interfere with fireground operations.

6.2.14.2 If any of the apparatus described in 6.2.14.1 is in service to respond to an emergency, it shall be located in an area to facilitate a prompt response.

6.2.14.3 Where required or necessary, parking areas for police vehicles or for the press shall be designated.

6.2.14.4 A parking area for an ambulance or an emergency medical services vehicle shall be designated and located where it will facilitate a prompt response in the event of personal injury to participants in the evolution.

6.2.14.5 The parking area shall be located to facilitate prompt response in the event of a personal injury to participants in the evolution.

6.2.14.6 Ingress and egress routes shall be designated, identified, and monitored during the training evolutions to ensure their availability in the event of an emergency.

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6.2.15 Prior to the conduct of actual live fire training evolutions, a preburn briefing session shall be conducted for all participants.

6.2.15.1 All facets of each evolution to be conducted shall be discussed in the preburn briefing, and assignments shall be made for all crews participating in the training session.

6.2.15.2 The location of simulated victims shall not be required to be disclosed, provided that the possibility of victims is discussed during the preburn briefing.

6.2.15.3 A preburn plan shall be prepared and shall be utilized during the preburn briefing sessions.

6.2.15.4 All features of the training areas and structure shall be indicated on the preburn plan.

6.2.16 Prior to the conduct of any live fire training, all participants shall be required to conduct a walk-through of the structure in order to have knowledge of and familiarity with the layout of the live fire training structure and to facilitate any necessary evacuation of the live fire training structure.

6.2.17 All spectators shall be restricted to an area outside the operations area perimeter established by the safety officer.

6.2.17.1 Control measures such as ropes, signs, and fire line markings shall be posted to indicate the perimeter of the operations area.

6.2.17.2 Visitors who are allowed within the operations area perimeter shall be escorted at all times.

6.2.17.3 Visitors who are allowed within the operations area perimeter shall be equipped with and shall wear complete protective clothing in accordance with manufacturer's instructions and in accordance with 6.4.17.1 through 6.4.17.7.

6.2.18 All possible sources of ignition, other than those that are under the direct supervision of the person responsible for the start of the training fire, shall be removed from the operations area.

6.3 Fuel Materials.

6.3.1 The fuels that are utilized in live fire training evolutions shall have known burning characteristics that are as controllable as possible.

6.3.2 Unidentified materials, such as debris found in or around the structure that could burn in unanticipated ways, react violently, or create environmental or health hazards, shall not be used.

6.3.3 Fuel materials shall be used only in the amounts necessary to create the desired fire size.

6.3.4* Pressure-treated wood, rubber, and plastic, and straw or hay treated with pesticides or harmful chemicals shall not be used.

6.3.5 The fuel load shall be limited to avoid conditions that could cause an uncontrolled flashover or backdraft.

6.3.6* Except under the conditions of 6.3.7, the use of flammable or combustible liquids, as defined in NFPA 30, *Flammable and Combustible Liquids Code*, shall not be used in live fire training evolutions in structures.

6.3.7 Limited quantities of combustible liquid with a flash point above 38°C (100°F) shall be permitted to be used in a live fire training structure that has been specifically engineered to accommodate this fuel.

6.3.8* The instructor-in-charge shall assess the selected fire room environment for factors that can affect the growth, development, and spread of the fire.

6.3.9* The instructor-in-charge shall document fuel loading, including all of the following:

(1) Furnishings
(2) Wall and floor coverings and ceiling materials
(3) Type of construction of the structure, including type of roof and combustible void spaces
(4) Dimensions of room

6.3.10* The training exercise shall be stopped immediately when the instructor-in-charge determines through ongoing assessment that the combustible nature of the environment represents a potential hazard.

6.3.11 An exercise stopped as a result of an assessed hazard according to 6.3.10 shall continue only when actions have been taken to reduce the hazard.

6.4 Safety.

6.4.1 A safety officer shall be appointed for all live fire training evolutions.

6.4.2* The safety officer shall have the authority, regardless of rank, to intervene and control any aspect of the operations when, in his or her judgment, a potential or actual danger, accident, or unsafe condition exists.

6.4.3 The responsibilities of the safety officer shall include, but shall not be limited to, the following:

(1) Prevention of unsafe acts
(2) Elimination of unsafe conditions

6.4.4 The safety officer shall provide for the safety of all persons on the scene including students, instructors, visitors, and spectators.

6.4.5 The safety officer shall not be assigned other duties that interfere with safety responsibilities.

6.4.6 The safety officer shall be knowledgeable in the operation and location of safety features available within the live fire training structure, such as emergency shutoff switches, gas shutoff valves, and evacuation alarms.

6.4.7* The instructor-in-charge of the live fire training evolutions shall determine, prior to each specific evolution, the number of training attack lines and backup lines that are necessary.

6.4.7.1 Backup lines shall be provided to ensure protection for personnel on training attack lines.

6.4.7.2 Each hose line shall be capable of delivering a minimum of 360 L/min (95 gpm).

6.4.7.3 The instructor-in-charge shall assign the following personnel:

(1) One instructor to each functional crew, which shall not exceed five students
(2) One instructor to each backup line
(3) Additional personnel to backup lines to provide mobility
(4) One additional instructor for each additional functional assignment

6.4.8* Additional safety personnel, as deemed necessary by the safety officer, shall be located strategically within the structure to react to any unplanned or threatening situation or condition.

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6.4.9 A method of fireground communications shall be established to enable coordination among the incident commander, the interior and exterior sectors, the safety officer, and external requests for assistance.

6.4.10* A building evacuation plan shall be established, including an evacuation signal to be demonstrated to all participants in an interior live fire training evolution.

6.4.11 Emergency medical services shall be available on site to handle injuries.

6.4.12 Written reports shall be filled out and submitted on all injuries and on all medical aid rendered.

6.4.13 A search of the structure shall be conducted to ensure that no unauthorized persons, animals, or objects are in the live fire training structure immediately prior to ignition.

6.4.14 No person(s) shall play the role of a victim inside the live fire training structure.

6.4.15 Fires shall not be located in any designated exit paths.

6.4.16 The training session shall be curtailed, postponed, or canceled, as necessary, to reduce the risk of injury or illness caused by extreme weather conditions.

6.4.17 Each participant shall be equipped with full protective clothing and SCBA.

6.4.17.1 All participants shall be inspected by the safety officer prior to entry into a live fire training evolution to ensure that the protective clothing and SCBA are being worn according to manufacturer's instruction and are in serviceable condition.

6.4.17.2 Protective coats, trousers, hoods, footwear, helmets, and gloves shall have been manufactured to meet the requirements of NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*.

6.4.17.3 SCBA shall have been manufactured to meet the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*.

6.4.17.4* Where station or work uniforms are worn by any participant, the station or work uniform shall have been manufactured to meet the requirements of NFPA 1975, *Standard on Station/Work Uniforms for Fire and Emergency Services*.

6.4.17.5 Personal alarm devices shall have been manufactured to meet the requirements of NFPA 1982, *Standard on Personal Alert Safety Systems (PASS)*.

6.4.17.6 All students, instructors, safety personnel, and other personnel shall wear all protective clothing and equipment specified in this chapter according to manufacturer's instructions whenever they are involved in any evolution or fire suppression operation during the live fire training evolution.

6.4.17.7* All students, instructors, safety personnel, and other personnel participating in any evolution or operation of fire suppression during the live fire training evolution shall breathe from an SCBA air supply whenever operating under one or more of the following conditions:

(1) In an atmosphere that is oxygen deficient or contaminated by products of combustion, or both
(2) In an atmosphere that is suspected of being oxygen deficient or contaminated by products of combustion, or both
(3) In any atmosphere that can become oxygen deficient or contaminated, or both
(4) Below ground level

6.4.18 One person who is not a student shall be designated as the "ignition officer" to control the materials being burned.

6.4.18.1 The ignition officer shall wear full protective clothing, including SCBA, as required in 6.4.17.1 through 6.4.17.7, when performing this control function.

6.4.18.2 A charged hose line shall accompany the ignition officer when he or she is igniting any fire.

6.4.18.3 The decision to ignite the training fire shall be made by the instructor-in-charge in coordination with the safety officer.

6.4.18.4 The fire shall be ignited by the ignition officer in the presence of and under the direct supervision of the safety officer.

6.5 Instructors.

6.5.1 All instructors shall be qualified by the AHJ to deliver fire fighter training.

6.5.2* The participating student-to-instructor ratio shall not be greater than 5 to 1.

6.5.3 Additional instructors shall be designated when factors such as extreme temperatures or large groups are present, and classes of long duration are planned.

6.5.4 The instructor-in-charge shall be responsible for full compliance with this standard.

6.5.5 Prior to the ignition of any fire, instructors shall ensure that all protective clothing and equipment specified in this chapter are being worn according to manufacturer's instructions.

6.5.6 Instructors shall take a head count when participants are entering and exiting the live fire training structure during an actual attack evolution conducted in accordance with this standard.

6.5.7 Instructors shall monitor and supervise all assigned students during the live fire training evolution.

6.5.8 The instructor-in-charge shall provide for the rest and rehabilitation of members operating at the scene, including medical evaluation and treatment, food and fluid replenishment, and relief from climate conditions, in accordance with the circumstances of the training session. *(See Annex D.)*

6.5.9 Where concurrent, multiple, live fire training evolutions are being conducted in a specifically designed live fire training structure, the identity of the instructor-in-charge shall be clear to all participants.

6.5.10 It shall be the responsibility of the instructor-in-charge to coordinate overall live fire training structure fireground activities to ensure proper levels of safety.

Chapter 7 Exterior Props

7.1 Student Prerequisites.

7.1.1* Prior to being permitted to participate in live fire training evolutions, the student shall have received training to meet the job performance requirements for Fire Fighter I in NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, related to the following subjects:

(1) Safety
(2) Fire behavior
(3) Portable extinguishers
(4) Personal protective equipment

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(5) Ladders
(6) Fire hose, appliances, and streams
(7) Overhaul
(8) Water supply
(9) Ventilation
(10) Forcible entry

7.1.2* Students participating in a live fire training evolution who have received the required minimum basic training from other than the AHJ shall not be permitted to participate in any live fire training evolution without first presenting prior written evidence of having successfully completed the prescribed minimum training to the levels specified in 7.1.1.

7.2 Structures and Facilities.

7.2.1 Props used for outside live fire training shall have been designed specifically for the evolution to be performed.

7.2.2* Strict safety practices shall be applied to all exterior props selected for live fire training evolutions.

7.2.3 For outside training, care shall be taken to select areas that limit the hazards to both personal safety and the environment.

7.2.4 The training site shall be flat and open without obstructions that can interfere with fire-fighting operations.

7.2.5 Where live training fires are used outside, the ground cover shall be such that it does not contribute to the fire.

7.2.6 The ground cover shall be impervious and of such topography that the runoff from live fire does not enter municipal, private, or public waters or other sensitive areas.

7.2.7 Exterior props shall be inspected visually for damage prior to live fire training evolutions.

7.2.7.1 Damage to exterior props shall be documented.

7.2.7.2 The structural integrity of the props shall be evaluated and documented annually.

7.2.8 All safety devices, such as thermometers, oxygen and toxic and combustible gas monitors, evacuation alarms, and emergency shutdown switches, plus doors, shutters, vents, and other operable devices, shall be checked prior to any live fire training evolutions to ensure they operate correctly.

7.2.9 Exterior props shall be left in a safe condition upon completion of live fire training evolutions.

7.2.10 Debris hindering the access of fire fighters shall be removed prior to the beginning of the next training exercise.

7.2.11 All required permits to conduct live fire training evolutions shall be obtained.

7.2.12 The permits specified in this chapter shall be provided to outside, contract, or other separate training agencies by the AHJ upon the request of those agencies.

7.2.13 Adjacent buildings or property that might become ignited and involved in fire shall be protected or removed.

7.2.14 Utility services adjacent to the live burn site shall be removed or protected.

7.2.15 Trees, brush, and surrounding vegetation that create a hazard to participants shall be removed.

7.2.16 Combustible materials, other than those intended for the live fire training evolution, shall be removed or stored in a protected area to preclude accidental ignition.

7.2.17 Property adjacent to the training site that could be affected by the smoke from the live fire training evolution, such as railroads, airports or heliports, and nursing homes, hospitals, or other similar facilities, shall be identified.

7.2.18 The persons in charge of the properties described in 7.2.17 shall be informed of the date and time of the evolution.

7.2.19* Streets or highways in the vicinity of the training site shall be surveyed for potential effects from live fire training evolutions, and safeguards shall be taken to eliminate possible hazards to motorists.

7.2.20 Fire lines shall be established to keep pedestrian traffic in the vicinity of the training site clear of the operations area of the live burn.

7.2.21 Awareness of weather conditions, wind velocity, and wind direction shall be maintained, including a final check for possible changes in weather conditions immediately before actual ignition.

7.2.22 The instructor-in-charge shall determine the rate and duration of waterflow necessary for each individual live fire training evolution, including the water necessary for control and extinguishment of the training fire, the supply necessary for backup lines to protect personnel, and any water needed to protect exposed property.

7.2.22.1 Additional reserve water shall be available to handle exposure protection or unforeseen situations.

7.2.22.2* Except under the conditions of 7.2.22.3, separate sources shall be utilized for the supply of attack lines and backup lines in order to preclude the loss of both water supply sources at the same time.

7.2.22.3* A single water source shall be sufficient at a training center facility where the water system has been engineered to provide adequate volume for the evolutions conducted and a backup power source or backup pumps, or both, are in place to ensure an uninterrupted supply in the event of a power failure or malfunction.

7.2.23 Areas for the staging, operating, and parking of fire apparatus that are used in the live fire training evolution shall be designated.

7.2.23.1 An area for parking fire apparatus and vehicles that are not a part of the evolution shall be designated so as not to interfere with fireground operations.

7.2.23.2 If any of the apparatus described in 7.2.23.1 is in service to respond to an emergency, it shall be located in an area to facilitate a prompt response.

7.2.23.3 Where required or necessary, parking areas for police or press vehicles shall be designated.

7.2.23.4 A parking area for an ambulance or an emergency medical services vehicle shall be designated and located where it will facilitate a prompt response in the event of personal injury to participants in the evolution.

7.2.23.5 Ingress and egress routes shall be designated, identified, and monitored during the training evolutions to ensure their availability in the event of an emergency.

7.2.24 Prior to the conduct of actual live fire training evolutions, a preburn briefing session shall be conducted for all participants.

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7.2.24.1 All facets of each evolution to be conducted shall be discussed and assignments shall be made for all crews participating in the training session.

7.2.24.2 The location of simulated victims shall not be required to be disclosed, provided that the possibility of victims is discussed in the preburn briefing.

7.2.24.3 A preburn plan shall be prepared and utilized during the preburn briefing sessions.

7.2.24.4 All features of the training areas and structures/props shall be indicated on the preburn plan.

7.2.25 Prior to the conduct of any live fire training, all participants shall have a knowledge of and familiarity with the prop or props being used for the evolution.

7.2.26 All spectators shall be restricted to an area outside the operations area perimeter established by the safety officer.

7.2.26.1 Control measures such as ropes, signs, and fire line markings shall be used to indicate the perimeter of the operations area.

7.2.26.2 Visitors who are allowed within the operations area perimeter shall be escorted at all times.

7.2.26.3 Visitors who are allowed within the operations area perimeter shall be equipped with and shall wear complete protective clothing according to manufacturer's instructions and in accordance with 7.4.17.1 through 7.4.17.7.

7.2.27 All possible sources of ignition, other than those that are under the direct supervision of the person responsible for the start of the training fire, shall be removed from the operations area.

7.2.28 There shall be room provided around all props so that there is space for all attack lines as well as backup lines to operate freely.

7.3 Fuel Materials.

7.3.1 The fuels that are utilized in live fire training evolutions shall have known burning characteristics that are as controllable as possible.

7.3.2 Unidentified materials, such as debris found in or around the site that could burn in unanticipated ways, react violently, or create environmental or health hazards, shall not be used.

7.3.3* Fuel materials shall be used only in the amounts necessary to create the desired fire size.

7.3.4 Pressure-treated wood, rubber, plastic, and straw or hay treated with pesticides or harmful chemicals shall not be used.

7.3.5* The instructor-in-charge shall assess the selected fire environment for factors that can affect the growth, development, and spread of the fire.

7.3.6* The training exercise shall be stopped immediately when the instructor-in-charge determines through ongoing assessment that the combustible nature of the environment represents a potential hazard.

7.3.7 An exercise stopped as a result of an assessed hazard according to 7.3.6 shall continue only when actions have been taken to reduce the hazard.

7.3.8* All props that use pressure to move fuel to the fire shall be equipped with remote fuel shutoffs outside of the safety perimeter but within sight of the prop and the entire field of attack for the prop.

7.3.9 During the entire time the prop is in use, the remote shutoff shall be continuously attended by safety personnel trained in its operation.

7.3.10 Liquefied petroleum gas props shall be equipped with all safety features as described in NFPA 58, *Liquefied Petroleum Gas Code*, and NFPA 59, *Utility LP-Gas Plant Code*.

7.3.11 Where the evolution involves the failure of a safety feature, the failed part shall be located downstream from the correctly functioning safety feature.

7.3.12 Where flammable or combustible liquids are used, measures shall be taken to prevent runoff from contaminating the surrounding area.

7.3.13 There shall be oil separators for cleaning the runoff water.

7.3.14* Vehicles used as props for live fire training shall have all fluid reservoirs, tanks, shock absorbers, drive shafts, and other gas-filled closed containers removed, vented, or drained prior to any ignition.

7.3.15 For flammable metal fires, there shall be a sufficient quantity of the proper extinguishing agent available so that all attack crews have the required supply as well as a 150 percent reserve for the use of the backup crews.

7.4 Safety.

7.4.1 A safety officer shall be appointed for all live fire training evolutions.

7.4.2* The safety officer shall have the authority, regardless of rank, to intervene and control any aspect of the operations when, in his or her judgment, a potential or actual danger, accident, or unsafe condition exists.

7.4.3 The responsibilities of the safety officer shall include, but shall not be limited to, the following:

(1) Prevention of unsafe acts
(2) Elimination of unsafe conditions

7.4.4 The safety officer shall provide for the safety of all persons on the scene including students, instructors, visitors, and spectators.

7.4.5 The safety officer shall not be assigned other duties that interfere with safety responsibilities.

7.4.6 The safety officer shall be knowledgeable in the operation and location of safety features available, such as emergency shutoff switches, gas shutoff valves, and evacuation alarms.

7.4.7 Backup lines shall be provided to ensure protection for personnel on training attack lines.

7.4.8* The instructor-in-charge of the live fire training evolutions shall determine, prior to each specific evolution, the number of training attack lines and backup lines that are necessary.

7.4.8.1 Each hose line shall be capable of delivering a minimum of 360 L/min (95 gpm).

7.4.8.2 The instructor-in-charge shall assign the following personnel:

(1) One instructor to each functional crew, which shall not exceed five students

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(2) One instructor to each backup line
(3) Additional personnel to backup lines to provide mobility
(4) One additional instructor for each additional functional assignment
(5) One safety person to each manually activated safety station

7.4.9* Additional safety personnel, as deemed necessary by the safety officer, shall be located strategically within the area to react to any unplanned or threatening situation or condition.

7.4.10 A method of fireground communications shall be established to enable coordination among the incident commander, the interior and exterior sectors, the safety officer, and external requests for assistance.

7.4.11 Emergency medical services shall be available on site to handle injuries.

7.4.12 Written reports shall be filled out and submitted on all injuries and on all medical aid rendered.

7.4.13 One person who is not a student shall be designated to control the materials being burned and to ignite the training fire in the presence of and under the direct supervision of a safety officer.

7.4.13.1 The person designated to control the materials being burned and to ignite the training fire shall wear full protective clothing, including SCBA, as required in 7.4.17.1 through 7.4.17.7.

7.4.13.2 The decision to ignite the training fire shall be made by the instructor-in-charge, in coordination with the safety officer.

7.4.14 No person(s) shall play the role of a victim inside a prop.

7.4.15 Fires shall not be located in any designated exit paths.

7.4.16 The training session shall be curtailed, postponed, or canceled, as necessary, to reduce the risk of injury or illness caused by extreme weather conditions.

7.4.17 Each participant shall be equipped with full protective clothing and SCBA.

7.4.17.1 All participants shall be inspected by the safety officer prior to entry into a live fire training evolution to ensure that the protective clothing and SCBA are being worn according to manufacturer's instructions and are in serviceable condition.

7.4.17.2 Protective coats, trousers, hoods, footwear, helmets, and gloves shall have been manufactured to meet the following requirements:

(1) They shall meet the requirements of NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting.*
(2) For outside fires, those persons who do not engage in or are not exposed to the hazards of structural fire fighting shall be permitted to use helmets that meet federal OSHA requirements.

7.4.17.3 SCBA shall have been manufactured to meet the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services.*

7.4.17.4* Where station or work uniforms are worn by any participant, the station or work uniform shall have been manufactured to meet the requirements of NFPA 1975, *Standard on Station/Work Uniforms for Fire and Emergency Services.*

7.4.17.5 Personal alarm devices shall have been manufactured to meet the requirements of NFPA 1982, *Standard on Personal Alert Safety Systems (PASS).*

7.4.17.6 All students, instructors, safety personnel, and other personnel shall wear all protective clothing and equipment specified in this chapter according to manufacturer's instructions whenever they are involved in any evolution or fire suppression operation during the live fire training evolution.

7.4.17.7* All students, instructors, safety personnel, and other personnel participating in any evolution or operation of fire suppression during the live fire training evolution shall breathe from an SCBA air supply whenever operating under one or more of the following conditions:

(1) In an atmosphere that is oxygen deficient or contaminated by products of combustion, or both
(2) In an atmosphere that is suspected of being oxygen deficient or contaminated by products of combustion, or both
(3) In any atmosphere that can become oxygen deficient or contaminated, or both
(4) Below ground level

7.5 Instructors.

7.5.1 All instructors shall be qualified by the AHJ to deliver fire fighter training.

7.5.2* The participating student-to-instructor ratio shall not be greater than 5 to 1.

7.5.3 Additional instructors shall be designated when factors such as extreme temperatures or large groups are present, and classes of long duration are planned.

7.5.4 The instructor-in-charge shall be responsible for full compliance with this standard.

7.5.5 Prior to the ignition of any fire, instructors shall ensure that all protective clothing and equipment specified in this chapter are being worn according to manufacturer's instructions.

7.5.6 Instructors shall take a head count when participants are entering and exiting the area during an actual attack evolution conducted in accordance with this standard.

7.5.7 Instructors shall monitor and supervise all assigned students during the live fire training evolution.

7.5.8 The instructor-in-charge shall provide for the rest and rehabilitation of members operating at the scene, including medical evaluation and treatment, food and fluid replenishment, and relief from climate conditions, in accordance with the circumstances of the training session. *(See Annex D.)*

7.5.9 Training Instructors on How to Use Specialty Props.

7.5.9.1 Instructors responsible for conducting live fire training evolutions with a gas-fueled training system or with other specialty props (such as fire behavior labs) shall be trained in the complete operation of the system and the props.

7.5.9.2 The training of instructors shall be performed by an individual authorized by the gas-fueled training system and specialty prop manufacturer or others qualified to perform this type of training.

7.5.10 It shall be the responsibility of the instructor-in-charge to coordinate overall live fire training area fireground activities to ensure proper levels of safety.

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Chapter 8 Exterior Class B Fires

8.1 Student Prerequisites.

8.1.1* Prior to being permitted to participate in live fire training evolutions, the student shall have received training to meet the job performance requirements for Fire Fighter I in NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, related to the following subjects:

(1) Safety
(2) Fire behavior
(3) Portable extinguishers
(4) Personal protective equipment
(5) Ladders
(6) Fire hose, appliances, and streams
(7) Overhaul
(8) Water supply
(9) Ventilation
(10) Forcible entry

8.1.2* Students participating in a live fire training evolution who have received the required minimum basic training from other than the AHJ shall not be permitted to participate in any live fire training evolution without first presenting prior written evidence of having successfully completed the prescribed minimum training to the levels specified in 8.1.1.

8.2 Facilities.

8.2.1 Props used for outside live fire training shall have been designed specifically for the evolution to be performed.

8.2.2* Strict safety practices shall be applied to all props and areas selected for live fire training evolutions.

8.2.3 For outside training, care shall be taken to select areas that limit the hazards to both personal safety and the environment.

8.2.4 The training site shall be flat and open without obstructions that can interfere with fire-fighting operations.

8.2.5 Where live training fires are used outside, the ground cover shall be such that it does not contribute to the fire.

8.2.6 The ground cover shall be impervious and of such topography that the runoff from live fire does not enter municipal, private, or public waters or other sensitive areas.

8.2.7 The burn area shall be inspected visually for damage prior to live fire training evolutions.

8.2.8 Damage in the burn area shall be documented.

8.2.9 All safety devices, such as thermometers, oxygen and toxic and combustible gas monitors, evacuation alarms, and emergency shutdown switches, plus doors, shutters, vents, and other operable devices, shall be checked prior to any live fire training evolutions to ensure they operate correctly.

8.2.10 Props shall be left in a safe condition upon completion of live fire training evolutions.

8.2.11 Debris hindering the access of fire fighters shall be removed prior to the beginning of the next training exercise.

8.2.12 All required permits to conduct live fire training evolutions shall be obtained.

8.2.13 The permits specified in this chapter shall be provided to outside, contract, or other separate training agencies by the AHJ upon the request of those agencies.

8.2.14 Adjacent buildings or property that might become ignited shall be protected or removed.

8.2.15 Utility services adjacent to the live burn site shall be removed or protected.

8.2.16 Trees, brush, and surrounding vegetation that create a hazard to participants shall be removed.

8.2.17 Combustible materials, other than those intended for the live fire training evolution, shall be removed or stored in a protected area to preclude accidental ignition.

8.2.18 Property adjacent to the training site that could be affected by the smoke from the live fire training evolution, such as railroads, airports or heliports, and nursing homes, hospitals, or other similar facilities, shall be identified.

8.2.19 The persons in charge of the properties described in 8.2.18 shall be informed of the date and time of the evolution.

8.2.20* Streets or highways in the vicinity of the training site shall be surveyed for potential effects from live fire training evolutions, and safeguards shall be taken to eliminate possible hazards to motorists.

8.2.21 Fire lines shall be established to keep pedestrian traffic in the vicinity of the training site clear of the operations area of the live burn.

8.2.22 Awareness of weather conditions, wind velocity, and wind direction shall be maintained, including a final check for possible changes in weather conditions immediately before actual ignition.

8.2.23 The instructor-in-charge shall determine the rate and duration of waterflow necessary for each individual live fire training evolution, including the water necessary for control and extinguishment of the training fire, the supply necessary for backup lines to protect personnel, and any water needed to protect exposed property.

8.2.23.1 Additional reserve water shall be available to handle exposure protection or unforeseen situations.

8.2.23.2* Except under the conditions of 8.2.23.3, separate sources shall be utilized for the supply of attack lines and backup lines in order to preclude the loss of both water supply sources at the same time.

8.2.23.3* A single water source shall be sufficient at a training center facility where the water system has been engineered to provide adequate volume for the evolutions conducted and a backup power source or backup pumps, or both, are in place to ensure an uninterrupted supply in the event of a power failure or malfunction.

8.2.24 Areas for the staging, operating, and parking of fire apparatus that are used in the live fire training evolution shall be designated.

8.2.24.1 An area for parking fire apparatus and vehicles that are not a part of the evolution shall be designated so as not to interfere with fireground operations.

8.2.24.2 If any of the apparatus described in 8.2.24.1 is in service to respond to an emergency, it shall be located in an area to facilitate a prompt response.

8.2.24.3 Where required, parking areas for police or press vehicles shall be designated.

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8.2.24.4 A parking area for an ambulance or an emergency medical services vehicle shall be designated in an area to facilitate prompt response in the event of personal injury to participants in the evolution.

8.2.24.5 Ingress and egress routes shall be designated, identified, and monitored during the training evolutions to ensure their availability in the event of an emergency.

8.2.25 Prior to conducting actual live fire training evolutions, a preburn briefing session shall be conducted for all participants.

8.2.25.1 All facets of each evolution to be conducted shall be discussed, and assignments shall be made for all crews participating in the training session.

8.2.25.2 The location of simulated victims shall not be required to be disclosed, provided that the possibility of victims is discussed in the preburn briefing.

8.2.25.3 A preburn plan shall be prepared and shall be utilized during the preburn briefing sessions.

8.2.25.4 All features of the training areas shall be indicated on the preburn plan.

8.2.26 Prior to conducting any live fire training, all participants shall have a knowledge of and familiarity with the prop or props being used for the evolution.

8.2.27 All spectators shall be restricted to an area outside the operations area perimeter established by the safety officer.

8.2.27.1 Control measures such as ropes, signs, and fire line markings shall be used to indicate the perimeter of the operations area.

8.2.27.2 Visitors who are allowed within the operations area perimeter shall be escorted at all times.

8.2.27.3 Visitors who are allowed within the operations area perimeter shall wear complete protective clothing according to manufacturer's instructions in accordance with 8.4.16.1 through 8.4.16.7.

8.2.28 All possible sources of ignition, other than those that are under the direct supervision of the person responsible for the start of the training fire, shall be removed from the operations area.

8.2.29 There shall be room provided around all props so that there is space for all attack lines as well as backup lines to operate freely.

8.3 Fuel Materials.

8.3.1 The fuels that are utilized in live exterior Class B fire training evolutions shall have known burning characteristics that are as controllable as possible.

8.3.2 Unidentified materials found in or around the site that could burn in unanticipated ways, react violently, or create environmental or health hazards shall not be used.

8.3.3* Fuel materials shall be used only in the amounts necessary to create the desired fire size.

8.3.4* The instructor-in-charge shall assess the selected fire environment for factors that can affect the growth, development, and spread of the fire.

8.3.5* The instructor-in-charge shall document fuel loading.

8.3.6* The training exercise shall be stopped immediately when the instructor-in-charge determines through ongoing assessment that the combustible nature of the environment represents a potential hazard.

8.3.7 An exercise stopped as a result of an assessed hazard according to 8.3.6 shall continue only when actions have been taken to reduce the hazard.

8.3.8* All props that use pressure to move fuel to the fire shall be equipped with remote fuel shutoffs outside of the safety perimeter but within sight of the prop and the entire field of attack for the prop.

8.3.9 During the entire time the prop is in use, the remote shutoff shall be continuously attended by safety personnel trained in its operation.

8.3.10 Liquefied petroleum gas props shall be equipped with all safety features as described in NFPA 58, *Liquefied Petroleum Gas Code*, and NFPA 59, *Utility LP-Gas Plant Code*.

8.3.11 Where the evolution involves the failure of a safety feature, the failed part shall be located downstream from the properly functioning safety feature.

8.3.12 Where flammable or combustible liquids are used, measures shall be taken to prevent runoff from contaminating the surrounding area.

8.3.13 There shall be oil separators for cleaning the runoff water.

8.4 Safety.

8.4.1 A safety officer shall be appointed for all live fire training evolutions.

8.4.2* The safety officer shall have the authority, regardless of rank, to intervene and control any aspect of the operations when, in his or her judgment, a potential or actual danger, accident, or unsafe condition exists.

8.4.3 The responsibilities of the safety officer shall include, but shall not be limited to, the following:

(1) Prevention of unsafe acts
(2) Elimination of unsafe conditions

8.4.4 The safety officer shall provide for the safety of all persons on the scene including students, instructors, visitors, and spectators.

8.4.5 The safety officer shall not be assigned other duties that interfere with safety responsibilities.

8.4.6 The safety officer shall be knowledgeable in the operation and location of safety features available, such as emergency shutoff switches, gas shutoff valves, and evacuation alarms.

8.4.7* The instructor-in-charge of the live fire training evolutions shall determine, prior to each specific evolution, the number of training attack lines and backup lines that are necessary.

8.4.7.1 Each hose line shall be capable of delivering a minimum of 360 L/min (95 gpm).

8.4.7.2 Backup lines shall be provided to ensure adequate protection for personnel on training attack lines.

8.4.8 The instructor-in-charge shall assign the following personnel:

(1) One instructor to each functional crew, which shall not exceed five students
(2) One instructor to each backup line

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(3) Additional personnel to backup lines to provide mobility
(4) One additional instructor for each additional functional assignment
(5) One safety person to each manually activated safety station

8.4.9 A method of fireground communications shall be established to enable coordination among the incident commander, the interior and exterior sectors, the safety officer, and external requests for assistance.

8.4.10 Emergency medical services shall be available on site to handle injuries.

8.4.11 Written reports shall be filled out and submitted on all injuries and on all medical aid rendered.

8.4.12 One person who is not a student shall be designated to control the materials being burned and to ignite the training fire in the presence of and under the direct supervision of a safety officer.

8.4.12.1 The person designated to control the materials being burned and to ignite the training fire shall wear full protective clothing, including SCBA, as required in 8.4.16.1 through 8.4.16.7.

8.4.12.2 The decision to ignite the training fire shall be made by the instructor-in-charge, in coordination with the safety officer.

8.4.13 No person(s) shall play the role of a victim inside a live fire prop.

8.4.14 Fires shall not be located in any designated exit paths.

8.4.15 The training session shall be curtailed, postponed, or canceled, as necessary, to reduce the risk of injury or illness caused by extreme weather conditions.

8.4.16 Each participant shall be equipped with full protective clothing and SCBA.

8.4.16.1 All participants shall be inspected by the safety officer prior to entry into a live fire training evolution to ensure that the protective clothing and SCBA are being worn according to manufacturer's instructions and are in serviceable condition.

8.4.16.2* Except under the conditions of 8.4.16.3, protective coats, trousers, hoods, footwear, helmets, and gloves shall have been manufactured to meet the requirements of NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*.

8.4.16.3 For outside fires, those persons who do not engage in or are not exposed to the hazards of structural fire fighting shall be permitted to use helmets that meet federal OSHA requirements.

8.4.16.4 SCBA shall have been manufactured to meet the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*.

8.4.16.5* Where station or work uniforms are worn by any participant, the station or work uniform shall have been manufactured to meet the requirements of NFPA 1975, *Standard on Station/Work Uniforms for Fire and Emergency Services*.

8.4.16.6 Personal alarm devices shall have been manufactured to meet the requirements of NFPA 1982, *Standard on Personal Alert Safety Systems (PASS)*.

8.4.16.7 All students, instructors, safety personnel, and other personnel shall wear all protective clothing and equipment specified in this chapter according to manufacturer's instructions whenever they are involved in any evolution or fire suppression operation during the live fire training evolution.

8.4.16.8* All students, instructors, safety personnel, and other personnel participating in any evolution or operation of fire suppression during the live fire training evolution shall breathe from an SCBA air supply whenever operating under one or more of the following conditions:

(1) In an atmosphere that is oxygen deficient or contaminated by products of combustion, or both
(2) In an atmosphere that is suspected of being oxygen deficient or contaminated by products of combustion, or both
(3) In any atmosphere that can become oxygen deficient or contaminated, or both
(4) Below ground level

8.5 Instructors.

8.5.1 All instructors shall be qualified by the AHJ to deliver fire fighter training.

8.5.2* The participating student-to-instructor ratio shall not be greater than 5 to 1.

8.5.3 Additional instructors shall be designated when factors such as extreme temperatures or large groups are present, and classes of long duration are planned.

8.5.4 The instructor-in-charge shall be responsible for full compliance with this standard.

8.5.5 Prior to the ignition of any fire, instructors shall ensure that all protective clothing and equipment specified in this chapter are being worn according to manufacturer's instructions.

8.5.6 Instructors shall take a head count when entering and exiting the area during an actual attack evolution conducted in accordance with this standard.

8.5.7 Instructors shall monitor and supervise all assigned students during the live fire training evolution.

8.5.8 The instructor-in-charge shall provide for the rest and rehabilitation of members operating at the scene, including medical evaluation and treatment, food and fluid replenishment, and relief from climate conditions, in accordance with the circumstances of the training session. *(See Annex D.)*

8.5.9 Training Instructors on How to Use Gas-Fueled Training Systems.

8.5.9.1 Instructors responsible for conducting live fire training evolutions with a gas-fueled training system shall be trained in the complete operation of the system.

8.5.9.2 The training of instructors shall be performed by an individual authorized by the gas-fueled training system manufacturer or others qualified to perform this type of training.

8.5.10 It shall be the responsibility of the instructor-in-charge to coordinate overall live fire training area fireground activities to ensure proper levels of safety.

Chapter 9 Reports and Records

9.1 General.

9.1.1 The following records and reports shall be maintained on all live fire training evolutions in accordance with the requirements of this standard:

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(1) An accounting of the activities conducted
(2) A listing of instructors present and their assignments
(3) A listing of all other participants
(4) Documentation of unusual conditions encountered
(5) Any injuries incurred and treatment rendered
(6) Any changes or deterioration of the structure
(7) Documentation of the condition of the premises and adjacent area at the conclusion of the training exercise

9.1.2* For acquired structures, records pertaining to the structure shall be completed.

9.1.3 Upon completion of the training session, an acquired structure shall be formally turned over to the control of the property owner; the process shall include the completion of a standard form indicating the transfer of authority for the acquired structure.

9.1.4 A post-training critique session, complete with documentation, shall be conducted to evaluate student performance and to reinforce the training that was covered.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1 Live fire training activities of entry level and experienced fire suppression personnel are high-risk activities. This risk can be effectively managed through compliance with this standard.

A.1.2 Drills conducted to familiarize fire fighters with the proper use of self-contained breathing apparatus (SCBA) in a smoke environment should not be conducted under live fire conditions.

A.1.3.2 While this standard does not deal with the suppression of fires set to train individuals on fire cause and origin, this standard does contain procedures that can be adapted to ensure maximum safety during those types of operations. For fire scenarios set with flammable or combustible liquids, fire suppression should be achieved by fixed fire suppression systems or by exterior application of hose streams. Interior fire suppression operations in scenarios that do not involve the use of flammable or combustible liquids should be conducted in compliance with the requirements of this standard.

A.3.2.1 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.3.11.2 Live Fire Training Structure. It does not include a structure that is used primarily for training in the use of SCBA where only smoke conditions are created, without a live fire, and the trainee is not subjected to risk of the effects of fire other than the smoke produced.

A.4.1.1 The following job performance requirements from NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, should be used as guidance related to the list of subjects in 4.1.1:

(1) 5.2.3 Radio use
(2) 5.3.1 SCBA
(3) 5.3.4 Forcible entry
(4) 5.3.2 Vehicle safety
(5) 5.3.6 Ground ladders
(6) 5.3.7, 5.3.8 Fire extinguishment
(7) 5.3.9 Search and rescue
(8) 5.3.10 Structural fire fighting
(9) 5.3.11 Horizontal ventilation
(10) 5.3.12 Vertical ventilation
(11) 5.3.13 Overhaul
(12) 5.3.15 Water supply
(13) 5.3.16 Fire extinguishers
(14) 5.3.17 Scene illumination
(15) 5.5.3 Tool maintenance
(16) 5.5.4 Fire hose care and maintenance

Industrial fire brigade members should meet the requirements of NFPA 1081, *Standard for Industrial Fire Brigade Member Professional Qualifications*.

A.4.1.2 The type of written documentation required can vary, depending upon the instructor's familiarity with the student participants' level of training from outside agencies. All student participants from outside agencies should be allowed to participate only as official representatives of an established organization. Prior documentation should be required in order to facilitate planning of the training session.

A.4.2.1 Where live fire training structures are available, they should be used instead of acquired structures.

A.4.2.2 The permits required for the exercise could include the following:

(1) Air quality
(2) Water runoff
(3) Water usage
(4) Burning
(5) Traffic

Other permits could be required and thorough research of required permits should be completed prior to acceptance of the building for use for training.

A.4.2.3 Information pertaining to building ownership should be reviewed by the legal counsel of the AHJ prior to acceptance of the structure.

A.4.2.5 Information regarding the written permission of the building owner should be reviewed by the legal counsel of the AHJ prior to acceptance of the structure.

A.4.2.7 Information regarding cancellation of insurance by the building owner should be reviewed by the legal counsel of the AHJ prior to acceptance of the structure.

A.4.2.9 Care should be exercised in the neutralization of hazards posed by closed tanks and vessels. The vessel or its contents can pose a hazard that should be eliminated. Appropriate

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references should be consulted or assistance should be obtained based on the specific circumstances encountered. The area within the tank should be filled with dry sand as a preferred means of rendering the internal atmosphere inert. Under no circumstances should water or other liquids be utilized as a means of inerting a tank or other closed vessel.

A.4.2.10.5 Low-density combustible fiberboard has been implicated as a major factor in the following rapidly spreading fires that resulted in fatalities:

(1) Our Lady of the Angels School (Chicago, IL, 1958)
(2) Hartford Hospital (Hartford, CT, 1961)
(3) Opemiska Social Club (Chapais, Quebec, 1980)
(4) Boulder Fire Department training fire (Boulder, CO, 1982)

Unconventional interior finishes include burlap, carpeting, and artificial turf.

A.4.2.10.6 The collapse of overhead structural members can result from the combined effect of the weight of both live and dead overhead loads as well as the loss of structural integrity caused by fire. Linoleum is a potential fuel source, particularly after being preheated by repeated fire exposure, and thus can contribute to an unanticipated increase in fire intensity.

A.4.2.11.2 Roof ventilation openings can consist of precut panels or hinged covers.

A.4.2.20 Such safeguards can include street closings, traffic rerouting, signs, and police traffic control.

A.4.2.22 Severe weather could require the participants to respond to other incidents, or could expose trainees to danger if training takes place during severe weather. Wind velocity can contribute to spreading the fire within the training structure or throughout a neighborhood, or wind direction could cause smoke problems in the neighborhood.

A.4.2.23.3 Reliability should be considered when determining what constitutes valid separate sources. The intent of this paragraph is to prevent the simultaneous loss of both attack lines and backup lines in the event of a pump or water supply failure. Where a public water supply system is used, two pumpers on two different hydrants should be used. Two pumpers drafting from the same pond or river also are appropriate, provided the source contains sufficient usable water. Where tankers or folding tanks, or both, are used, two separate pumpers should be used to supply the attack and backup lines.

A.4.3.3 Acceptable Class A materials include pine excelsior, wooden pallets, straw, hay, and other ordinary combustibles.

A.4.3.4 An excessive fuel load can contribute to conditions that create unusually dangerous fire behavior. This can jeopardize structural stability, egress, and the safety of participants.

A.4.3.7 The instructor-in-charge is concerned with the safety of participants and the assessment of conditions that can lead to rapid, uncontrolled burning, commonly referred to as *flashover*. Flashover can trap, injure, and kill fire fighters. Conditions known to be variables affecting the attainment of flashover are as follows:

(1) The heat release characteristics of materials used as primary fuels
(2) The preheating of combustibles
(3) The combustibility of wall and ceiling materials
(4) The room geometry (e.g., ceiling height, openings to rooms)

In addition, the arrangement of the initial materials to be ignited, particularly the proximity to walls and ceilings, and the ventilation openings are important factors to be considered when assessing the potential fire growth.

A.4.3.8 Plotting the expected avenues of firespread and the time factors for expected buildup of the fire provides an extra degree of safety for the participants of the exercise. Voids can result in sudden and unexpected vertical spread of the fire and trap participants by cutting off exit routes, or can result in unexpected weakening of the structural members, leading to collapse. To compensate for this potential hazard, the instructor-in-charge should prescribe primary and secondary exit paths for participants in the exercises.

A.4.3.9 Incidents of injuries and deaths during live fire training exercises indicate that fire growth dynamics were not considered or were inaccurately assessed prior to the beginning of the exercises. Fire growth is typically linear until the flame height reaches the ceiling; thereafter, rapid acceleration can be expected. It might be necessary to remove combustible wall and ceiling materials, reduce the amount of furnishings, or take other similar measures to reduce rapid fire growth. Careful consideration should be given to the presence of combustible void spaces, and steps should be taken to ensure that the fire is not able to gain unexpected growth in such areas.

A.4.4.2 Severe weather presents the potential for health and safety hazards to all persons attending and participating in an exercise. Extreme heat can cause heat exhaustion or heat stroke, and extreme cold can cause frostbite, hypothermia, or slippery surfaces. An impending severe storm can bring lightning or high winds. Such situations warrant the careful consideration of limiting activity, waiting for a storm to pass, or postponing the exercise.

A.4.4.6 A minimum flow rate of 360 L/min (95 gpm) is necessary in order to provide adequate quantities of water to cover the planned evolution plus a reserve for unanticipated emergencies. The appropriate quantity and exact flow rates that are needed for fire control and extinguishment should be calculated in advance, and certain factors such as equipment, manpower, fire area, and topography should be taken into consideration. Knowledge of the hose line sizes, types of nozzles, type of fire stream to be utilized, and principles of fire attack and deployment aid in determining the exact flow rates that are necessary.

A.4.4.8 The additional safety personnel can be necessary to watch for signs of fire in voids, concealed spaces, and exit paths, or combinations thereof, at acquired structures. Where fire is discovered in any of these areas, the operation should cease as a training exercise and should be treated as a working structure fire.

A.4.4.10 Participants involved in the live fire training evolutions should be instructed to report to a predetermined location for a roll call if evacuation of the acquired structure is signaled. Instructors should immediately report any personnel not accounted for to the instructor-in-charge. Examples of an evacuation signal that could be used include a whistle, apparatus air horn, or high–low electronic siren.

A.4.4.18.4 Clothing worn under protective clothing can degrade and cause injury to the wearer, even without damaging the protective clothing. All wearers of protective clothing should be aware of the dangers of clothing made from certain all-synthetic materials that can melt and adhere to and burn

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the wearer even while wearing protective clothing that meets NFPA standards. Any clothing, such as shirts, pants, underwear, and sweatshirts, worn under protective clothing should meet the requirements of NFPA 1975, *Standard on Station/Work Uniforms for Fire and Emergency Services*, whenever possible, or clothing should be selected, at a minimum, for the fabric's ability to resist ignition. Fire-retardant fabrics and all-natural fibers should be considered.

A.4.4.18.7 No person should be allowed to breathe smoke, toxic vapors or fumes, products of combustion, or other contaminated atmospheres or be exposed to an oxygen-deficient atmosphere.

A.4.5.2 It is important that the participating student-to-instructor ratio be monitored so that it does not exceed the span of control necessary to provide proper supervision of trainees.

A.5.1.1 The following job performance requirements from NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, should be used as guidance related to the list of subjects in 5.1.1:

(1) 5.2.3 Radio use
(2) 5.3.1 SCBA
(3) 5.3.4 Forcible entry
(4) 5.3.2 Vehicle safety
(5) 5.3.6 Ground ladders
(6) 5.3.7, 5.3.8 Fire extinguishment
(7) 5.3.9 Search and rescue
(8) 5.3.10 Structural fire fighting
(9) 5.3.11 Horizontal ventilation
(10) 5.3.12 Vertical ventilation
(11) 5.3.13 Overhaul
(12) 5.3.15 Water supply
(13) 5.3.16 Fire extinguishers
(14) 5.3.17 Scene illumination
(15) 5.5.3 Tool maintenance
(16) 5.5.4 Fire hose care and maintenance

A.5.1.2 See A.4.1.2.

A.5.2.1 These practices vary greatly in the degree of application where comparing live fire training structures to acquired structures. By nature, live fire training structures have been designed specifically for the purpose of repeated live fire training evolutions and include safeguards that become unacceptably hazardous only through misuse or improper maintenance.

A.5.2.2 There should be ongoing concern for the progressive damage to live fire training structures associated with fire intensity during live fire training evolutions. Excessive fire intensity can result in accelerated destruction of the live fire training structure and can increase the risk to personnel to an unacceptable level.

A.5.2.2.2 Routine maintenance is important to providing a safe, durable live fire training structure for live fire training. Periodic engineering evaluations are one step in that process. Live fire training structures present unique engineering problems that are not taught to engineers in college or in their daily practice of engineering office buildings, schools, and fire stations. Before a registered (licensed) Professional Engineer (P.E.) understands "live fire training structure engineering," it takes significant efforts on the part of the P.E. to learn how live fire training structures are used, how repetitive live fire training affects structural and nonstructural elements within the live fire training structure, and what materials have been proven to work (or not work) within such a harsh environment. This effort typically requires research and educational efforts and experience with live fire training structure projects.

Because the required evaluation is for structural integrity, the P.E. performing the evaluation should be a structural engineer or teamed with a structural engineer to perform the evaluation. Many states do not license P.E.s by discipline, meaning that "P.E." could mean structural engineer or some other engineering discipline, such as electrical, mechanical, fire protection, or aeronautical. State laws require P.E.s to offer engineering services for only those branches of engineering for which they are qualified. Therefore, a P.E. who is an electrical engineer or fire protection engineer with no structural qualifications would not be allowed, under law, to evaluate the structural integrity of a live fire training structure.

Note that a P.E. with refractive materials experience and expertise, but not live fire training structure experience and expertise, might not have sufficient understanding of how refractory concrete performs in a live fire training structure environment. Many P.E.s with refractive materials experience have gained that experience working with industrial applications, where furnaces are heated and cooled slowly. Certain applications of refractory concrete work well under those furnace conditions. However, the same applications of refractory concrete at times work poorly in the live fire training structure environment, where rapid heating, cooling, and thermal shock deteriorate refractory concrete differently than a furnace application would. Many P.E.s with only refractive materials experience, but no live fire training structure experience, do not know this. As a result, the requirement for live fire training structure experience and expertise has been added to the standard. In many cases, the P.E. retained to evaluate the integrity can also, under the same contract, be required to make recommendations for how to repair, maintain, or improve the live fire training structure.

The phrase "with live fire training structure experience and expertise" must be interpreted by each entity following its own local and state laws and guidelines. The intent is for the P.E. to have performed at least one live fire training structure project previously, so that the entity hiring the P.E. will benefit from the educational and research efforts performed, and experience gained, by the P.E. for the previous live fire training structure project(s). This experience could include a previous live fire training structure evaluation, the repair or renovation to an existing live fire training structure, or the design of a new live fire training structure. In many cases, it would be acceptable for a P.E. without live fire training structure experience or expertise to perform the evaluation as long as he or she has teamed with a P.E. with live fire training structure experience or expertise.

Although the standard requires only the "structural integrity" to be evaluated annually, it is advisable to have the nonstructural elements evaluated at the same time. Illustrative examples include the following:

(1) A spray-on refractory concrete thermal lining is not a structural element. It is a concrete material on the ceiling intended to protect the structural concrete. Exposure to live fire training can cause it to wear out over time. Portions of it can loosen and fall out, creating a safety concern for occupants. Even though it is not structural, it is good to have the P.E. evaluate the condition of the lining concrete and advise on its repairs and maintenance in order to enhance training safety.
(2) Doors in live fire training structures at times do not operate properly, sticking shut during training and creating safety

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problems relating to emergency egress. The P.E. could evaluate this and make recommendations for repairs.
(3) A rusted hinge at a second floor window shutter could cause the shutter to fall to the ground below. The P.E. could evaluate the live fire training structure shutters and make recommendations for necessary repairs to enhance safety and durability.

A.5.2.2.4 Heat can soak through thermal linings and reach the protected structure, especially if the linings are cracked or otherwise require maintenance when live fire training occurs. This heat could damage the structure, a hidden condition that would otherwise go undetected if the panels are not occasionally removed to expose the hidden conditions.

A.5.2.10.3 See A.4.2.23.3.

A.5.2.10.4 See A.4.2.23.3 for additional information.

A.5.3.3 Propane and liquefied natural gas remain in the liquid state only when they are stored and distributed under pressure. When either of these gases is released, the difference in the storage and atmospheric pressures can cause the liquid to convert quickly to a gas. During this conversion, liquid propane, for example, can expand to 270 times its volume. With such a high expansion rate, a leaking liquid propane pipe has the potential to cause the space to reach an explosive level.

A.5.3.5 See A.4.3.7.

A.5.3.6 See A.4.3.9.

A.5.4.2 See A.4.4.2.

A.5.4.7 See A.4.4.6.

A.5.4.8 See A.4.4.8.

A.5.4.10 See A.4.4.10.

A.5.4.17.4 See A.4.4.18.4.

A.5.4.17.7 See A.4.4.18.7.

A.5.4.18 The gas-fueled training systems that are available can provide the instructors with the ability to ignite the fires from a remote control room. Igniting a fire in this manner can present a safety risk to unsuspecting personnel within the live fire training structure. It is important for the instructor located in the control room to keep in constant communication with the instructor present within the live fire training structure. This communication is critical when a fire is initiated and throughout the training exercise.

A.5.5.2 See A.4.5.2.

A.6.1.1 The following job performance requirements from NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, should be used as guidance related to the list of subjects in 6.1.1:

(1) 5.2.3 Radio use
(2) 5.3.1 SCBA
(3) 5.3.4 Forcible entry
(4) 5.3.2 Vehicle safety
(5) 5.3.6 Ground ladders
(6) 5.3.7, 5.3.8 Fire extinguishment
(7) 5.3.9 Search and rescue
(8) 5.3.10 Structural fire fighting
(9) 5.3.11 Horizontal ventilation
(10) 5.3.12 Vertical ventilation
(11) 5.3.13 Overhaul
(12) 5.3.15 Water supply
(13) 5.3.16 Fire extinguishers
(14) 5.3.17 Scene illumination
(15) 5.5.3 Tool maintenance
(16) 5.5.4 Fire hose care and maintenance

A.6.1.2 See A.4.1.2.

A.6.2.1 These practices vary greatly in the degree of application where live fire training structures are compared to acquired structures. By nature, live fire training structures have been designed specifically for the purpose of repeated live fire training evolutions and include safeguards that become unacceptably hazardous only through misuse or improper maintenance.

A.6.2.2 See A.5.2.2.

A.6.2.2.2 See A.5.2.2.2.

A.6.2.2.4 See A.5.2.2.4.

A.6.2.10 Such safeguards can include street closings, traffic rerouting, signs, and police traffic control.

A.6.2.13.3 See A.4.2.23.3.

A.6.2.13.4 See A.4.2.23.3 for additional information.

A.6.3.4 See A.4.3.3.

A.6.3.6 Where combustible liquids are used in a live fire training structure, safety precautions should include, but should not be limited to, the following:

(1) Fuel is contained in a noncombustible container.
(2) A qualified person verifies that the rate of heat release does not result in unsafe conditions for the students, instructors, or structure.
(3) A system is in place to prevent overflow of the container when fire-fighting water is applied.
(4) A system is in place to prevent splashing of the fuel.
(5) A method is in place to control unburned vapors.

A.6.3.8 See A.4.3.7.

A.6.3.9 See A.4.3.8.

A.6.3.10 See A.4.3.9.

A.6.4.2 See A.4.4.2.

A.6.4.7 See A.4.4.6.

A.6.4.8 See A.4.4.8.

A.6.4.10 See A.4.4.10.

A.6.4.17.4 See A.4.4.18.4.

A.6.4.17.7 See A.4.4.18.7.

A.6.5.2 See A.4.5.2.

A.7.1.1 The following job performance requirements from NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, should be used as guidance related to the list of subjects in 7.1.1:

(1) 5.2.3 Radio use
(2) 5.3.1 SCBA
(3) 5.3.4 Forcible entry
(4) 5.3.2 Vehicle safety
(5) 5.3.6 Ground ladders
(6) 5.3.7, 5.3.8 Fire extinguishment
(7) 5.3.9 Search and rescue
(8) 5.3.10 Structural fire fighting
(9) 5.3.11 Horizontal ventilation

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(10) 5.3.12 Vertical ventilation
(11) 5.3.13 Overhaul
(12) 5.3.15 Water supply
(13) 5.3.16 Fire extinguishers
(14) 5.3.17 Scene illumination
(15) 5.5.3 Tool maintenance
(16) 5.5.4 Fire hose care and maintenance

A.7.1.2 See A.4.1.2.

A.7.2.2 These practices vary greatly, depending on the evolutions performed and the location where performed. Props that are specifically designed for live fire training represent different challenges than props that are acquired for training. Acquired props were never designed to withstand repeated burning and might present unexpected reactions when exposed to fire.

A.7.2.19 Such safeguards can include street closings, traffic rerouting, signs, and police traffic control.

A.7.2.22.2 See A.4.2.23.3.

A.7.2.22.3 See A.4.2.23.3 for additional information.

A.7.3.3 A fire should not be larger than is necessary for the evolution. It should be understood that it is not necessary to have large fires to teach many of the basic evolutions and tactics. Where the objective of the training session is to train in the use of master streams or multiple attack lines, larger fires might be necessary. The key element is to maintain a fire that is controllable using the available resources.

A.7.3.5 See A.4.3.7.

A.7.3.6 See A.4.3.9.

A.7.3.8 The safety person at the remote shutoff should have the authority to shut off the fuel supply to the prop when, in the safety person's judgment, the prop has malfunctioned, the fire has gone dangerously out of control, or the extinguishment team is in jeopardy.

A.7.3.14 The list of the items to be removed prior to a vehicle burn evolution should consist of, but should not be limited to, bumper compression cylinders, shock absorbers, fuel tanks, drive shafts, batteries, and brake shoes (asbestos). The oil pan, transmission, and differential drain plugs should be removed, and the fluids should be drained and disposed of properly.

A.7.4.2 See A.4.4.2.

A.7.4.8 See A.4.4.6.

A.7.4.9 See A.4.4.8.

A.7.4.17.4 See A.4.4.18.4.

A.7.4.17.7 See A.4.4.18.7.

A.7.5.2 See A.4.5.2.

A.8.1.1 See A.4.1.1.

A.8.1.2 See A.4.1.2.

A.8.2.2 See A.7.2.2.

A.8.2.20 Such safeguards can include street closings, traffic rerouting, signs, and police traffic control.

A.8.2.23.2 See A.4.2.23.3.

A.8.2.23.3 See A.4.2.23.3 for additional information.

A.8.3.3 See A.4.3.4.

A.8.3.4 See A.4.3.7.

A.8.3.5 See A.4.3.8.

A.8.3.6 See A.4.3.9.

A.8.3.8 See A.7.3.8.

A.8.4.2 See A.4.4.2.

A.8.4.7 See A.4.4.6.

A.8.4.16.2 Protective trousers might be susceptible to wicking where they are used with flammable and combustible liquids. Precautions should be taken to prevent protective trouser contact with flammable or combustible liquids. Leather boots might be susceptible to degradation when contact is made with flammable or combustible liquids. Precautions should be taken to prevent leather boots from coming in contact with flammable or combustible liquids.

A.8.4.16.5 See A.4.4.18.4.

A.8.4.16.8 See A.4.4.18.7.

A.8.5.2 See A.4.5.2.

A.9.1.2 Figure A.9.1.2(a) shows a standard notice of cancellation or nonrenewal of insurance. Figure A.9.1.2(b) shows a sample release form that can be used with acquired structures. The exact form should be approved by local officials.

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NOTICE OF CANCELLATION OR NONRENEWAL

of _____
KIND OF POLICY

POLICY NO.	ISSUED THROUGH AGENCY OR OFFICE AT:	CANCELLATION OR TERMINATION WILL TAKE EFFECT AT: (DATE) (HOUR–STANDARD TIME)	DATE OF NOTICE

INSURANCE COMPANY:

NAME AND ADDRESS OF INSURED:

(Applicable item is marked ☒)

CANCELLATION	❑ You are hereby notified in accordance with the terms and conditions of the above-mentioned policy that your insurance will cease at and from the hour and date mentioned above. If the premium has been paid, premium adjustment will be made as soon as practicable after cancellation becomes effective. If the premium has not been paid, a bill for the premium earned to the time of cancellation will be forwarded in due course.
	❑ You are hereby notified in accordance with the terms and conditions of the above-mentioned policy that your insurance will cease at and from the hour and date mentioned above due to nonpayment of premium. A bill for the premium earned to the time of cancellation will be forwarded in due course.
NONRENEWAL	❑ You are hereby notified in accordance with the terms and conditions of the above-mentioned policy that the above-mentioned policy will expire effective at and from the hour and date mentioned above and the policy will NOT be renewed.
IMPORTANT NOTICE	❑ In compliance with the Fair Credit Reporting Act (Public Law 91-508), you are hereby informed that the action taken above is being taken wholly or partly because of information contained in a consumer report from the following consumer reporting agency:

_____
NAME

_____
ADDRESS

GU 8811b (Ed. 3-73) Uniform Printing & Supply Div.

INSURED'S COPY

. . . . . .
Authorized Representative

FIGURE A.9.1.2(a) Standard Notice of Cancellation or Nonrenewal of Insurance Form.

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Release Form

_____ Fire Department

Address _____

City _____ State _____

Date _____

Having agreed with the Building Official, City of

_____ ,

that a structure owned by me and located at _____

_____ is unfit for human habitation

and is beyond rehabilitation, I further agree that the structure should be demolished. In order that demolition may be accomplished, I give my consent to the

City of _____

to demolish, by burning or other means, the said structure.

I further release the City of _____

_____ from any claim for loss resulting from

such demolition.

_____
Owner/Agent

_____
Owner/Agent

_____
Witness

FIGURE A.9.1.2(b) Sample Release Form.

Annex B Live Fire Evolution Sample Checklist

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Figure B.1 provides a checklist for a live fire evolution.

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LIVE FIRE EVOLUTION SAMPLE CHECKLIST

PERMITS, DOCUMENTS, NOTIFICATIONS, INSURANCE.

____ 1. Written documentation received from owner:
- ❑ Permission to burn structure
- ❑ Proof of clear title
- ❑ Certificate of insurance cancellation
- ❑ Acknowledgment of post-burn property condition

____ 2. Local burn permit received

____ 3. Permission obtained to utilize fire hydrants

____ 4. Notification made to appropriate dispatch office of date, time, and location of burn

____ 5. Notification made to all affected police agencies:
- ❑ Received authority to block off roads
- ❑ Received assistance in traffic control

____ 6. Notification made to owners and users of adjacent property of date, time, and location of burn

____ 7. Liability insurance obtained covering damage to other property

____ 8. Written evidence of prerequisite training obtained from participating students from outside agencies

PREBURN PLANNING.

____ 1. Preburn plans made, showing the following:
- ❑ Site plan drawing, including all exposures
- ❑ Floor plan detailing all rooms, hallways, and exterior openings
- ❑ Location of command post
- ❑ Position of all apparatus
- ❑ Position of all hoses, including backup lines
- ❑ Location of emergency escape routes
- ❑ Location of emergency evacuation assembly area
- ❑ Location of ingress and egress routes for emergency vehicles

____ 2. Available water supply determined

____ 3. Required fire flow determined for the acquired structure/live fire training structure/burn prop and exposure buildings

____ 4. Required reserve flow determined (50 percent of fire flow)

____ 5. Apparatus pumps obtained that meet or exceed the required fire flow for the building and exposures

____ 6. Separate water sources established for attack and backup hose lines

____ 7. Periodic weather reports obtained

____ 8. Parking areas designated and marked:
- ❑ Apparatus staging
- ❑ Ambulances
- ❑ Police vehicles
- ❑ Press vehicles
- ❑ Private vehicles

____ 9. Operations area established and perimeter marked

____ 10. Communications frequencies established, equipment obtained

TRAINING STRUCTURE PREPARATION.

____ 1. Training structure inspected to determine structural integrity

____ 2. All utilities disconnected (acquired structures only)

____ 3. Highly combustible interior wall and ceiling coverings removed

____ 4. All holes in walls and ceilings patched

____ 5. Materials of exceptional weight removed from above training area (or area sealed from activity)

____ 6. Ventilation openings of adequate size precut for each separate roof area

____ 7. Windows checked and operated, openings closed

____ 8. Doors checked and operated, opened or closed, as needed

____ 9. Training structure components checked and operated:
- ❑ Roof scuttles
- ❑ Automatic ventilators
- ❑ Mechanical equipment
- ❑ Lighting equipment
- ❑ Manual or automatic sprinklers
- ❑ Standpipes

____ 10. Stairways made safe with railings in place

____ 11. Chimney checked for stability

____ 12. Fuel tanks and closed vessels removed or adequately vented

____ 13. Unnecessary inside and outside debris removed

____ 14. Porches and outside steps made safe

____ 15. Cisterns, wells, cesspools, and other ground openings fenced or filled

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FIGURE B.1 Sample Checklist for Procedures for a Live Fire Evolution.

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LIVE FIRE EVOLUTION SAMPLE CHECKLIST *(continued)*

____ 16. Hazards from toxic weeds, hives, and vermin eliminated

____ 17. Hazardous trees, brush, and surrounding vegetation removed

____ 18. Exposures such as buildings, trees, and utilities removed or protected

____ 19. All extraordinary exterior and interior hazards remedied

____ 20. Fire "sets" prepared:
- ❏ Class A materials only
- ❏ No flammable or combustible liquids
- ❏ No contaminated materials

PREBURN PROCEDURES.

____ 1. All participants briefed:
- ❏ Training structure layout
- ❏ Crew and instructor assignments
- ❏ Safety rules
- ❏ Training structure evacuation procedure
- ❏ Evacuation signal (demonstrate)

____ 2. All hose lines checked:
- ❏ Sufficient size for the area of fire involvement
- ❏ Charged and test flowed
- ❏ Supervised by qualified instructors
- ❏ Adequate number of personnel

____ 3. Necessary tools and equipment positioned

____ 4. Participants checked:
- ❏ Approved full protective clothing
- ❏ Self-contained breathing apparatus (SCBA)
- ❏ Adequate SCBA air volume
- ❏ All equipment properly donned

POSTBURN PROCEDURES.

____ 1. All personnel accounted for

____ 2. Remaining fires overhauled, as needed

____ 3. Training structure inspected for stability and hazards where more training is to follow *(see Training Structure Preparation)*

____ 4. Training critique conducted

____ 5. Records and reports prepared, as required:
- ❏ Account of activities conducted
- ❏ List of instructors and assignments
- ❏ List of other participants
- ❏ Documentation of unusual conditions or events
- ❏ Documentation of injuries incurred and treatment rendered
- ❏ Documentation of changes or deterioration of live fire training structure
- ❏ Acquired structure release
- ❏ Student training records
- ❏ Certificates of completion

____ 6. Building and property released to owner, release document signed

---

RELEASE FORM

Having agreed with the Building Official, City of _____ , that a structure owned by me and located at _____ is unfit for human habitation and is beyond rehabilitation, I further agree that the structure should be demolished. In order that demolition may be accomplished, I give my consent to the City of _____ to demolish, by burning or other means, the said structure.

I further release the City of _____ from any claim for loss resulting from such demolition.

Fire Department _____

Address _____

City, State _____

Date _____

Owner/Agent _____

Owner/Agent _____

Witness _____

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FIGURE B.1 *Continued*

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Annex C Responsibilities of Personnel

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

C.1 The lists in Figure C.1 outline the responsibilities of participants in a live fire training evolution.

Annex D Heat Exhaustion and Heat Stroke in Training

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

D.1 The two most serious heat-related illnesses are heat exhaustion and heat stroke. The following material is excerpted from the NIOSH document *Occupational Exposure to Hot Environments, Revised Criteria.*

Symptoms of heat exhaustion include fatigue, nausea, headache, dizziness, pallor, weakness, and thirst. Factors that predispose a person to heat exhaustion include sustained exertion in the heat, failure to replace the water lost in sweat, and lack of acclimatization. Heat exhaustion responds readily to prompt treatments such as moving to a cooler environment, resting in a recumbent position, and taking fluids by mouth.

Heat stroke is the more serious of the heat-related illnesses and is considered a medical emergency. Symptoms of heat stroke include hot, red, dry skin, a rectal temperature of 40°C (104°F) or above, confusion, possible convulsions or loss of consciousness, or any combination of these symptoms. Factors that predispose a person to heat stroke include sustained exertion in the heat by unacclimatized workers, lack of physical fitness, obesity, recent alcohol intake, dehydration, individual susceptibility, and chronic cardiovascular disease. Heat stroke should be treated immediately. Treatments to reduce body temperature rapidly include immersing in chilled water, rinsing with alcohol, wrapping in a wet sheet, or fanning with cool, dry air, or any combination of these treatments. A physician's care is necessary to treat possible secondary disorders such as shock or kidney failure. While heat exhaustion cases greatly outnumber heat stroke cases, every case of heat exhaustion should be treated as having the potential to develop into heat stroke.

Acclimatization is a physiological adaptation to heat stress that occurs over a short period of time. After acclimatization has occurred, the body sweats more while losing less salt and can maintain a lower core temperature and lower cardiovascular demands. A person becomes acclimatized to a certain work intensity and temperature with repeated exposures to that work load and temperature. Formal acclimatization procedures might not be necessary for all fire fighters; however, training drills should be held outdoors regularly so that seasonal acclimatization can occur. For additional protection against heat stress, fire fighters might want to perform their regular aerobic training activities outdoors, especially during the spring and summer.

The metabolic demands of fire fighting range from 60 percent to 100 percent of maximum aerobic capacity. Tasks such as stair climbing, roof venting, and rescue operations, when performed in full gear, have an energy cost of 85 percent to 100 percent of maximum capacity and lead to near maximum heart rates.

It is clear from these estimates that a high level of cardiovascular fitness is an advantage in performing fire-fighting tasks. The higher level of fitness allows a longer work period and provides a greater reserve in case of an unexpected increase in work demands or in extreme environmental conditions.

There are fire incidents during which even the fittest, most acclimatized fire fighter is exposed to significant heat stress. For this reason, many fire departments have adopted formal procedures for on-scene rehabilitation and have incorporated them into their manuals for standard operating procedures. The general goals of rehabilitation are as follows:

(1) To provide physical and mental rest, allowing the fire fighter to recuperate from demands of emergency operations and adverse environmental conditions
(2) To revitalize fire fighters by providing fluid replacement and food as needed
(3) To provide medical monitoring, including treatment of injuries, to determine if and when fire fighters are able to return to action

Annex E Informational References

E.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

E.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, 2002 edition.

NFPA 1081, *Standard for Industrial Fire Brigade Member Professional Qualifications*, 2007 edition.

NFPA 1975, *Standard on Station/Work Uniforms for Fire and Emergency Services*, 2004 edition.

E.1.2 Other Publications.

E.1.2.1 NIOSH Publications. National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, 1600 Clifton Road, Atlanta, GA 30333.

NIOSH Publication No. 86-113, *Occupational Exposure to Hot Environments, Revised Criteria*, 1986.

E.2 Informational References. The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

NFPA 1041, *Standard for Fire Service Instructor Professional Qualifications*, 2007 edition.

NFPA 1402, *Guide to Building Fire Service Training Centers*, 2007 edition.

E.3 References for Extracts in Informational Sections. (Reserved)

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RESPONSIBILITIES OF PERSONNEL

INSTRUCTOR-IN-CHARGE.

____ 1. Plan and coordinate all training activities

____ 2. Monitor activities to ensure safe practices

____ 3. Inspect training structure integrity prior to each fire

____ 4. Assign instructors:
- ❑ Attack hose lines
- ❑ Backup hose lines
- ❑ Functional assignments
- ❑ Teaching assignments

____ 5. Brief instructors on responsibilities:
- ❑ Accounting for assigned students
- ❑ Assessing student performance
- ❑ Clothing and equipment inspection
- ❑ Monitoring safety
- ❑ Achieving tactical and training objectives

____ 6. Assign coordinating personnel, as needed:
- ❑ Emergency Medical Services
- ❑ Communications
- ❑ Water supply
- ❑ Apparatus staging
- ❑ Equipment staging
- ❑ Breathing apparatus
- ❑ Personnel welfare
- ❑ Public relations

____ 7. Ensure adherence to this standard by all persons within the training area

INSTRUCTOR.

____ 1. Monitor and supervise assigned students (no more than five per instructor)

____ 2. Inspect students' protective clothing and equipment

____ 3. Account for assigned students, both before and after evolutions

SAFETY OFFICER.

____ 1. Prevent unsafe acts

____ 2. Eliminate unsafe conditions

____ 3. Intervene and terminate unsafe acts

____ 4. Supervise additional safety personnel, as needed

____ 5. Coordinate lighting of fires with instructor-in-charge

____ 6. Ensure compliance of participants' personal equipment with applicable standards:
- ❑ Protective clothing
- ❑ Self-contained breathing apparatus (SCBA)
- ❑ Personal alarm devices, where used

____ 7. Ensure that all participants are accounted for, both before and after each evolution

STUDENT.

____ 1. Acquire prerequisite training

____ 2. Become familiar with building layout

____ 3. Wear approved full protective clothing

____ 4. Wear approved SCBA

____ 5. Obey all instructions and safety rules

____ 6. Provide documentation of prerequisite training, where from an outside agency

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FIGURE C.1 Checklist for Responsibilities of Personnel.

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Index

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- Report on Proposals (ROP) is published for public review and comment.

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3.3.78 Effective Ground-Fault Current Path. An intentionally constructed, permanent, low impedance electrically conductive path designed and intended to carry ~~underground~~ electric fault current ~~conditions~~ from the point of a ground fault on a wiring system to the electrical supply source.

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