

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.



Contents

Chapter 1 Administration	1403- 4	6.4 Safety	1403-13
1.1 Scope	1403- 4	6.5 Instructors	1403-14
1.2 Purpose	1403- 4		
1.3 Application	1403- 4	Chapter 7 Exterior Props	1403-14
Chapter 2 Referenced Publications	1403- 4	7.1 Student Prerequisites	1403-14
2.1 General	1403- 4	7.2 Structures and Facilities	1403-15
2.2 NFPA Publications	1403- 4	7.3 Fuel Materials	1403-16
2.3 Other Publications	1403- 4	7.4 Safety	1403-16
2.4 References for Extracts in Mandatory Sections	1403- 4	7.5 Instructors	1403-17
Chapter 3 Definitions	1403- 4	Chapter 8 Exterior Class B Fires	1403-18
3.1 General	1403- 4	8.1 Student Prerequisites	1403-18
3.2 NFPA Official Definitions	1403- 4	8.2 Facilities	1403-18
3.3 General Definitions	1403- 4	8.3 Fuel Materials	1403-19
Chapter 4 Acquired Structures	1403- 5	8.4 Safety	1403-19
4.1 Student Prerequisites	1403- 5	8.5 Instructors	1403-20
4.2 Structures and Facilities	1403- 5	Chapter 9 Reports and Records	1403-20
4.3 Fuel Materials	1403- 7	9.1 General	1403-20
4.4 Safety	1403- 7		
4.5 Instructors	1403- 8	Annex A Explanatory Material	1403-21
Chapter 5 Gas-Fired Live Fire Training Structures	1403- 8	Annex B Live Fire Evolution Sample Checklist	1403-27
5.1 Student Prerequisites	1403- 8	Annex C Responsibilities of Personnel	1403-30
5.2 Structures and Facilities	1403- 8	Annex D Heat Exhaustion and Heat Stroke in Training	1403-30
5.3 Fuel Materials	1403-10	Annex E Informational References	1403-30
5.4 Safety	1403-10	Index	1403-32
5.5 Instructors	1403-11		
Chapter 6 Non-Gas-Fired Live Fire Training Structures	1403-11		
6.1 Student Prerequisites	1403-11		
6.2 Structures and Facilities	1403-11		
6.3 Fuel Materials	1403-13		

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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

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.

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

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

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:



- (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.

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*.