

Date: 10/15/13

**FIRE SERVICES BOARD AND BOARD OF HOUSING AND COMMUNITY DEVELOPMENT
STATEWIDE FIRE PREVENTION CODE DEVELOPMENT COMMITTEE
2012 CODE CHANGE CYCLE – BOOK 6
October 28, 2013**

Opening Statement

TAB 1 – 2012 Proposed SFPC

TAB 2 - SFPC Consensus SFPC Code Changes

Recommended action: vote as block to approve as submitted/amended or to deny from the stakeholder meeting results (listed below); or, vote to approve, amend or deny individually.

From the October 11th Stakeholder's Code Change Meeting

Summary of 10/11/13 Stakeholders Meeting

<u>Proposal</u>	<u>Description of Change</u>	<u>Page No.</u>
SFPC 107.5.1, 107.6, and 107.13	Clarify permits issuance for explosives - AS	1
SFPC 107.16	SFMO permit refunds - AS	3
SFPC 5601.4.3.1	SFMO replacement of certificate - AS	4
SFPC 202 and 308.1.6.3	Sky lanterns - AS	5
SFPC 307.1	Approved outdoor live fire training exception – AS	6
SFPC Chapter 4	Rewrite of Chapter 4 – AS	7
SFPC 404.2	Evacuation plans – bed and breakfast facilities -AS	28
SFPC IFC 3406.1	Fire apparatus access roads for tire storage yards – AS	30
SFPC 5601.5 (new section)	Denial, suspension or revocation of certificate for blasters and pryotechnicians – AS	31
SFPC 5603.4	Accident reports - explosives - to SFMO – AS	33
SFPC 5607.16	Blast records – AS	34
USBC/SFPC 2306.7.1	E85 Standard – AS	40
SFPC 202	Definition of Responsible Management – AS	42
SFPC 5001.3	Laboratory buildings (SFMO change and DHCD staff revised language)– AM	43

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TAB 3 - Non-Consensus SFPC Code Changes.

Recommended action: vote to approve, amend or deny individually.

From the October 11th Stakeholder's Code Change Meeting

<u>Proposal</u>	<u>Description of Change</u>	<u>Page No.</u>
SFPC 103.2	Administrative inspections, permits, construction documents	1
SFPC 107.13 (items 5 and 6)	SFMO new fee for permissible fireworks on state property	34
SFPC 107.6 and 107.14	Compliance fees – complaints, storage/retail display permissible fireworks, bon fires on state owned property	36
SFPC 107.13	Fees – state explosives, blasting agents, theatrical flame effects and firework permit fees	39
SFPC 107.14	State compliance inspection permits fees.	41
SFPC – R5	R-5 Definition	44
SFPC 108.3	Conditions of a permit	46
SFPC 403.3.1 and 403.2	Crowd managers for training	48
SFPC 403.3	Crowd managers thresholds	49
SFPC IFC 503.1	Fire apparatus access roads for new and existing buildings	50
SFPC IFC 607.1 (and other sections)	Changes to existing Building references	51
SFPC IFC 609.3.3.3	Tags – kitchen hood systems	53
SFPC 703.1	Delete annual visual inspection	55
SFPC 902.3 and 906.4	New certification program for fire extinguisher technicians	56
SFPC 5706.6.2.1	Fuel and propane truck parking in residential areas	60
SFPC/VCC IBC/IFC 906.1	Delete USBC amendments for 2012 IBC/IFC	61
SFPC/VCC IBC/IFC 906	Delete from IBC and retain in SFPC/IFC	64
IWUIC	Urban interface code	65

TAB 4 – Public Comments Submitted.

TAB 1

Regulations

Proposed Regulation

REGISTRAR'S NOTICE: The Board of Housing and Community Development is claiming an exemption from the Administrative Process Act pursuant to § 2.2-4006 A 12 of the Code of Virginia, which excludes regulations adopted by the board pursuant to the Statewide Fire Prevention Code (§ 27-94 et seq. of the Code of Virginia).

Title of Regulation: 13VAC5-51. Virginia Statewide Fire Prevention Code (amending 13VAC5-51-21, 13VAC5-51-31, 13VAC5-51-41, 13VAC5-51-61, 13VAC5-51-81, 13VAC5-51-85, 13VAC5-51-91, 13VAC5-51-111, 13VAC5-51-121, 13VAC5-51-130, 13VAC5-51-131, 13VAC5-51-132, 13VAC5-51-133, 13VAC5-51-133.5, 13VAC5-51-135, 13VAC5-51-140, 13VAC5-51-145, 13VAC5-51-150, 13VAC5-51-154, 13VAC5-51-155; adding 13VAC5-51-138; repealing 13VAC5-51-154.5).

Statutory Authority: § 27-97 of the Code of Virginia.

Public Hearing Information:

September 23, 2013 - 10 am - Virginia Housing Center, 4224 Cox Road, Glen Allen, VA

Public Comment Deadline: September 29, 2013.

Agency Contact: Stephen W. Calhoun, Regulatory Coordinator, Department of Housing and Community Development, Main Street Centre, 600 East Main Street, Suite 300, Richmond, VA 23219, telephone (804) 371-7000, FAX (804) 371-7090, TTY (804) 371-7089, or email steve.calhoun@dhcd.virginia.gov.

Background: The Virginia Statewide Fire Prevention Code (SFPC) governs the maintenance of fire-safety features in existing buildings and structures and fire-safety related operations on property. The SFPC incorporates by reference the International Fire Code (IFC), a nationally recognized model code produced by the International Code Council as a companion code to that used under the Virginia Uniform Statewide Building Code (13VAC5-63). Every three years, a new edition of the model code becomes available. At that time, the Board of Housing and Community Development initiates a regulatory action to incorporate the newer edition of the model code into the regulation through the publishing of a proposed regulation.

Summary:

Specific changes in the proposed regulation are outlined below:

1. 13VAC5-51-21 H: Deletes the reference to section 3413 to correlate with changes to the Uniform Statewide Building Code (USBC). Section 3413 of the USBC is for the retrofitting of existing buildings in accordance with state law and those provisions have been moved to a new rehabilitation code portion of the USBC.
2. 13VAC5-51-31 A: Updates the reference to the IFC from the 2009 to the 2012 edition, which is the new nationally recognized model code used in the SFPC.

3. 13VAC5-51-61 C: Clarifies the existing requirement for accepting reports from private or third-party inspectors and references a written policy established by the fire official.

4. 13VAC5-51-81 N: Permits an increase in the fees charged by the State Fire Marshal's Office when there are firework events and the operator fails to notify the office within the appropriate lead time to facilitate inspections.

5. 13VAC5-51-85 Q: Adds an option for the electronic submittal of information necessary to obtain operational permits.

6. 13VAC5-51-111 B: Adds language to alert those affected by enforcement actions of a right to appeal, with limited exceptions.

7. 13VAC5-51-121 M: Adds language to match a statutory requirement that actions under local fire prevention regulations may be appealed to the State Building Code Technical Review Board if the locality does not have a local appeals board designated to hear such appeals.

8. 13VAC5-51-131 C: Adds language to clarify that the unauthorized removal of a placard constitutes a violation of the code.

9. 13VAC5-51-135 E: Adds language to correlate with the fire extinguisher requirements in both the IFC and the USBC.

10. 13VAC5-51-150 V: Adds new requirements for the use of fireworks known as comets and mines. The requirements are based on the fireworks standard of the National Fire Protection Association.

Other changes are for clarification or correlation or to avoid duplication.

13VAC5-51-21. Section 102.0. Applicability.

A. 102.1. General: The provisions of the SFPC shall apply to all matters affecting or relating to structures, processes and premises as set forth in Section 101.0. The SFPC shall supersede any fire prevention regulations previously adopted by a local government or other political subdivision.

B. 102.1.1. Changes: No change shall be made in the use or occupancy of any structure that would place the structure in a different division of the same group of occupancies, unless such structure is made to comply with the requirements of this code and the USBC.

C. 102.2. Application to pre-1973 buildings and structures: Buildings and structures constructed prior to the USBC (1973) shall comply with the maintenance requirements of the SFPC to the extent that equipment, systems, devices, and safeguards which were provided and approved when constructed shall be maintained. Such buildings and structures, if subject to the state fire and public building regulations (Virginia Public Building Safety Regulations, VR

394-01-05) in effect prior to March 31, 1986, shall also be maintained in accordance with those regulations.

D. 102.3. Application to post-1973 buildings and structures: Buildings and structures constructed under any edition of the USBC shall comply with the maintenance requirements of the SFPC to the extent that equipment, systems, devices, and safeguards which were provided and approved when constructed shall be maintained.

E. 102.4. Referenced codes and standards: The codes and standards referenced in the IFC shall be those listed in Chapter 47 ~~80~~ and considered part of the requirements of the SFPC to the prescribed extent of each such reference. Where differences occur between the provisions of this code and the referenced standards, the provisions of this code shall apply.

F. 102.5. State-owned buildings and structures: The SFPC shall be applicable to all state-owned buildings and structures in the manner and extent described in § 27-99 of the Code of Virginia and the State Fire Marshal shall have the authority to enforce this code in state-owned buildings and structures as is prescribed in §§ 27-98 and 27-99 of the Code of Virginia.

G. 102.6. Relationship to USBC: In accordance with §§ 27-34.4, 36-105.1 and 36-119.1 of the Code of Virginia, the USBC does not supersede the provisions of this code that prescribe standards to be complied with in existing buildings and structures, provided that this code shall not impose requirements that are more restrictive than those of the USBC under which the buildings or structures were constructed. Subsequent alteration, enlargement, rehabilitation, repair or conversion of the occupancy classification of such buildings and structures shall be subject to the construction and rehabilitation provisions of the USBC. Inspection of buildings other than state-owned buildings under construction and the review and approval of building plans for these structures for enforcement of the USBC shall be the sole responsibility of the appropriate local building inspectors.

Upon completion of such structures, responsibility for fire safety protection shall pass to the local fire marshal or official designated by the locality to enforce this code in those localities that enforce the SFPC or to the State Fire Marshal in those localities that do not enforce this code.

H. 102.7. Inspections for USBC requirements: The fire official shall require that existing structures subject to the requirements of the applicable retrofitting provisions relating to the fire protection equipment and system requirements of the USBC, Part I, Construction, ~~Sections Section~~ Section 103.7 and ~~3413~~, comply with the provisions located therein.

13VAC5-51-31. Section 103.0. Incorporation by reference.

A. 103.1. General: The following document is adopted and incorporated by reference to be an enforceable part of the SFPC:

The International Fire Code -- ~~2009~~ 2012 Edition, hereinafter referred to as "IFC," published by the International Code Council, Inc., 500 New Jersey Avenue,

NW, 6th Floor, Washington, DC 20001-2070, 1-888 422-7233.

B. 103.1.1. Deletion: Delete IFC Chapter 1.

C. 103.1.2. Appendices: The appendices in the IFC are not considered part of the IFC for the purposes of Section 103.1.

Note: Section 101.5 references authority contained in the Code of Virginia for local fire prevention regulations that may be evaluated by localities to determine whether provisions in the IFC appendices may be considered for local fire prevention regulations.

D. 103.2. Amendments: All requirements of the referenced codes and standards that relate to fees, permits, unsafe notices, disputes, condemnation, inspections, scope of enforcement and all other procedural, and administrative matters are deleted and replaced by the provisions of Chapter 1 of the SFPC.

E. 103.2.1. Other amendments: The SFPC contains provisions adopted by the Virginia Board of Housing and Community Development (BHCD), some of which delete, change or amend provisions of the IFC and referenced standards. Where conflicts occur between such changed provisions and the unchanged provisions of the IFC and referenced standards, the provisions changed by the BHCD shall govern.

Note: The IFC and its referenced standards contain some areas of regulation outside of the scope of the SFPC, as established by the BHCD and under state law. Where conflicts have been readily noted, changes have been made to the IFC and its referenced standards to bring it within the scope of authority; however, in some areas, judgment will have to be made as to whether the provisions of the IFC and its referenced standards are fully applicable.

F. 103.3. International Fire Code. Retroactive fire protection system requirements contained in the IFC shall not be enforced unless specified by the USBC.

13VAC5-51-41. Section 104.0. Enforcement.

A. 104.1. Local enforcement: Any local government may enforce the SFPC following official action by such body. The official action shall (i) require compliance with the provisions of the SFPC in its entirety or with respect only to those provisions of the SFPC relating to open burning, fire lanes, fireworks, and hazardous materials and (ii) assign enforcement responsibility to the local agency or agencies of its choice. Any local governing body may establish such procedures or requirements as may be necessary for the administration and enforcement of this code. If a local governing body elects to enforce only those provisions of the SFPC relating to open burning, it may do so in all or in any designated geographic areas of its jurisdiction. The terms "enforcing agency" and "fire official" are intended to apply to the agency or agencies to which responsibility for enforcement of the SFPC has been assigned. The terms "building official" or "building department" are intended to

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apply only to the local building official or local building department.

B. 104.1.1. Enforcement of fireworks provisions by law-enforcement officers: In accordance with § 27-100.1 of the Code of Virginia, law-enforcement officers who are otherwise authorized to enforce certain provisions of this code shall not be subject to the certification requirements of Sections 105.2 or 105.3.2.

C. 104.2. State enforcement:

In accordance with § 27-98 of the Code of Virginia, the State Fire Marshal shall also have the authority, in cooperation with any local governing body, to enforce the SFPC. The State Fire Marshal shall also have authority to enforce the SFPC in those jurisdictions in which the local governments do not enforce the SFPC and may establish such procedures or requirements as may be necessary for the administration and enforcement of the SFPC in such jurisdictions.

D. 104.3. State structures: Every agency, commission or institution of this Commonwealth, including all institutions of higher education, shall permit, at all reasonable hours, the fire official reasonable access to existing structures or a structure under construction or renovation, for the purpose of performing an informational and advisory fire safety inspection. The fire official is permitted to submit, subsequent to performing such inspection, his findings and recommendations, including a list of corrective actions necessary to ensure that such structure is reasonably safe from the hazards of fire, to the appropriate official of such agency, commission, or institution and the State Fire Marshal. Such agency, commission or institution shall notify, within 60 days of receipt of such findings and recommendations, the State Fire Marshal and the fire official of the corrective measures taken to eliminate the hazards reported by the fire official. The State Fire Marshal shall have the same power in the enforcement of this section as is provided for in § 27-98 of the Code of Virginia. The State Fire Marshal may enter into an agreement as is provided for in § ~~36-139.4~~ 9.1-208 of the Code of Virginia with any local enforcement agency that enforces the SFPC to enforce this section and to take immediate enforcement action upon verification of a complaint of an imminent hazard such as a chained or blocked exit door, improper storage of flammable liquids, use of decorative materials, and overcrowding.

13VAC5-51-61. Section 106.0. Duties and powers of the fire official.

A. 106.1. General: The fire official shall enforce the provisions of the SFPC as provided herein and as interpreted by the State Building Code Technical Review Board (TRB) in accordance with § 36-118 of the Code of Virginia.

B. 106.2. Delegation of duties and powers: The fire official may delegate duties and powers subject to any limitations imposed by the local governing body. The fire official shall

be responsible that any powers and duties delegated are carried out in accordance with this code.

C. 106.3. Inspections: The fire official is authorized to conduct such inspections as are deemed necessary to determine the extent of compliance with the provisions of this code and to approve reports of inspection by approved agencies or individuals in accordance with the fire official's written policy. All reports of such inspections by approved agencies or individuals shall be prepared and submitted in writing for review and approval. Inspection reports shall be certified by a responsible officer of such approved agency or by the responsible individual. The fire official is authorized to engage such expert opinion as deemed necessary to report upon unusual, detailed or complex technical issues in accordance with local policies.

D. 106.3.1. Observations: When, during an inspection, the fire official or an authorized representative observes an apparent or actual violation of another law, ordinance or code not within the official's authority to enforce, such official shall report the findings to the official having jurisdiction in order that such official may institute the necessary measures.

E. 106.4. Alternatives: The SFPC provisions are not intended to prevent the use of any safeguards used to protect life and property from the hazards of fire or explosion that are not specifically prescribed by the SFPC, provided that such alternative safeguards comply with the intent of the SFPC. The alternative safeguard offered shall be, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

F. 106.5. Modifications: The fire official may grant modifications to any provision of the SFPC upon application by the owner or the owner's agent provided the spirit and intent of the SFPC are observed and public health, welfare, and safety are assured.

Note: The current editions of many nationally recognized model codes and standards are referenced by the SFPC. Future amendments to such codes and standards do not automatically become part of the SFPC; however, the fire official should consider such amendments in deciding whether a modification request should be granted.

G. 106.5.1. Supporting data: The fire official shall require that sufficient technical data be submitted to substantiate the proposed use of any alternative. If it is determined that the evidence presented is satisfactory proof of performance for the use intended, the fire official shall approve the use of such alternative subject to the requirements of this code. The fire official may require and consider a statement from a professional engineer, architect or other competent person as to the equivalency of the proposed modification.

H. 106.5.2. Decision: The application for modification and the final decision of the fire official shall be in writing and shall be recorded in the permanent records of the local enforcing agency.

I. 106.6. Notices and orders: The fire official shall issue all necessary notices or orders to ensure compliance with the SFPC.

J. 106.7. Department records: The fire official shall keep official records of applications received, permits and certificates issued, fees collected, reports of inspections, and notices and orders issued. Such records shall be retained in the official records or disposed of in accordance with General Schedule Number Ten available from The Library of Virginia.

13VAC5-51-81. Section 107.0. Permits and fees.

A. 107.1. Prior notification: The fire official may require notification prior to (i) activities involving the handling, storage or use of substances, materials or devices regulated by the SFPC; (ii) conducting processes which produce

conditions hazardous to life or property; or (iii) establishing a place of assembly.

B. 107.2. Permits required: Permits may be required by the fire official as permitted under the SFPC in accordance with Table 107.2, except that the fire official shall require permits for the manufacturing, storage, handling, use, and sale of explosives. In accordance with Section ~~3301.2.3.1~~ 5601.2.3.1, an application for a permit to manufacture, store, handle, use, or sell explosives shall only be made by a designated individual.

Exception: Such permits shall not be required for the storage of explosives or blasting agents by the Virginia Department of State Police provided notification to the fire official is made annually by the Chief Arson Investigator listing all storage locations.

C. Add Table 107.2 as follows:

Table 107.2. OPERATIONAL PERMIT REQUIREMENTS (to be filled in by local jurisdiction).			
Description	Permit Required (yes or no)	Permit Fee	Inspection Fee
Aerosol products. An operational permit is required to manufacture, store or handle an aggregate quantity of Level 2 or Level 3 aerosol products in excess of 500 pounds (227 kg) net weight.			
Amusement buildings. An operational permit is required to operate a special amusement building.			
Aviation facilities. An operational permit is required to use a Group H or Group S occupancy for aircraft servicing or repair and aircraft fuel-servicing vehicles. Additional permits required by other sections of this code include, but are not limited to, hot work, hazardous materials and flammable or combustible finishes			
Carnivals and fairs. An operational permit is required to conduct a carnival or fair.			
Battery systems. An operational permit is required to install stationary lead-acid battery systems having a liquid capacity of more than 50 gallons (189 L).			
Cellulose nitrate film. An operational permit is required to store, handle or use cellulose nitrate film in a Group A occupancy.			
Combustible dust-producing operations. An operational permit is required to operate a grain elevator, flour starch mill, feed mill, or a plant pulverizing aluminum, coal, cocoa, magnesium, spices or sugar, or other operations producing combustible dusts as defined in Chapter 2.			
Combustible fibers. An operational permit is required for the storage and handling of combustible fibers in quantities greater than 100 cubic feet (2.8 m ³). Exception: An operational permit is not required for agricultural storage.			

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<p>Compressed gas. An operational permit is required for the storage, use or handling at normal temperature and pressure (NTP) of compressed gases in excess of the amounts listed below.</p> <p>Exception: Vehicles equipped for and using compressed gas as a fuel for propelling the vehicle.</p> <p style="text-align: center;">Permit Amounts for Compressed Gases</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Type of Gas</th> <th style="text-align: left;">Amount (cubic feet at NTP)</th> </tr> </thead> <tbody> <tr> <td>Corrosive</td> <td>200</td> </tr> <tr> <td>Flammable (except cryogenic fluids and liquefied petroleum gases)</td> <td>200</td> </tr> <tr> <td>Highly toxic</td> <td>Any Amount</td> </tr> <tr> <td>Inert and simple asphyxiant</td> <td>6,000</td> </tr> <tr> <td>Oxidizing (including oxygen)</td> <td>504</td> </tr> <tr> <td>Toxic</td> <td>Any Amount</td> </tr> </tbody> </table> <p>For SI: 1 cubic foot = 0.02832 m³.</p>	Type of Gas	Amount (cubic feet at NTP)	Corrosive	200	Flammable (except cryogenic fluids and liquefied petroleum gases)	200	Highly toxic	Any Amount	Inert and simple asphyxiant	6,000	Oxidizing (including oxygen)	504	Toxic	Any Amount				
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Toxic	Any Amount																	
<p>Covered mall buildings. An operational permit is required for:</p> <ol style="list-style-type: none"> 1. The placement of retail fixtures and displays, concession equipment, displays of highly combustible goods and similar items in the mall. 2. The display of liquid-fired or gas-fired equipment in the mall. 3. The use of open-flame or flame-producing equipment in the mall. 																		
<p>Cryogenic fluids. An operational permit is required to produce, store, transport on site, use, handle or dispense cryogenic fluids in excess of the amounts listed below.</p> <p>Exception: Operational permits are not required for vehicles equipped for and using cryogenic fluids as a fuel for propelling the vehicle or for refrigerating the lading.</p> <p style="text-align: center;">Permit Amounts for Cryogenic Fluids</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Type of Cryogenic Fluid</th> <th style="text-align: left;">Inside Building (gallons)</th> <th style="text-align: left;">Outside Building (gallons)</th> </tr> </thead> <tbody> <tr> <td>Flammable</td> <td>More than 1</td> <td>60</td> </tr> <tr> <td>Inert</td> <td>60</td> <td>500</td> </tr> <tr> <td>Oxidizing (includes oxygen)</td> <td>10</td> <td>50</td> </tr> <tr> <td>Physical or health hazard not indicated above</td> <td>Any Amount</td> <td>Any Amount</td> </tr> </tbody> </table> <p>For SI: 1 gallon = 3.785 L.</p>	Type of Cryogenic Fluid	Inside Building (gallons)	Outside Building (gallons)	Flammable	More than 1	60	Inert	60	500	Oxidizing (includes oxygen)	10	50	Physical or health hazard not indicated above	Any Amount	Any Amount			
Type of Cryogenic Fluid	Inside Building (gallons)	Outside Building (gallons)																
Flammable	More than 1	60																
Inert	60	500																
Oxidizing (includes oxygen)	10	50																
Physical or health hazard not indicated above	Any Amount	Any Amount																
<p>Cutting and welding. An operational permit is required to conduct cutting or welding operations within the jurisdiction.</p>																		

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<p>Dry cleaning plants. An operational permit is required to engage in the business of dry cleaning or to change to a more hazardous cleaning solvent used in existing dry cleaning equipment.</p>			
<p>Exhibits and trade shows. An operational permit is required to operate exhibits and trade shows.</p>			
<p>Explosives. An operational permit is required for the manufacture, storage, handling, sale or use of any quantity of explosive, explosive material, fireworks, or pyrotechnic special effects within the scope of Chapter 33 56.</p>			
<p>Fire hydrants and valves. An operational permit is required to use or operate fire hydrants or valves intended for fire suppression purposes that are installed on water systems and accessible to a fire apparatus access road that is open to or generally used by the public.</p> <p>Exception: An operational permit is not required for authorized employees of the water company that supplies the system or the fire department to use or operate fire hydrants or valves.</p>			
<p>Flammable and combustible liquids. An operational permit is required:</p> <ol style="list-style-type: none"> 1. To use or operate a pipeline for the transportation within facilities of flammable or combustible liquids. This requirement shall not apply to the offsite transportation in pipelines regulated by the Department of Transportation (DOTn) (see § 3501.1.2) nor does it apply to piping systems (see § 3503.6). 2. To store, handle or use Class I liquids in excess of 5 gallons (19 L) in a building or in excess of 10 gallons (37.9 L) outside of a building, except that a permit is not required for the following: <ol style="list-style-type: none"> 2.1. The storage or use of Class I liquids in the fuel tank of a motor vehicle, aircraft, motorboat, mobile power plant or mobile heating plant, unless such storage, in the opinion of the fire official, would cause an unsafe condition. 2.2. The storage or use of paints, oils, varnishes or similar flammable mixtures when such liquids are stored for maintenance, painting or similar purposes for a period of not more than 30 days. 3. To store, handle or use Class II or Class IIIA liquids in excess of 25 gallons (95 L) in a building or in excess of 60 gallons (227 L) outside a building, except for fuel oil used in connection with oil-burning equipment. 4. To remove Class I or Class II liquids from an underground storage tank used for fueling motor vehicles by any means other than the approved, stationary on-site pumps normally used for dispensing purposes. 5. To operate tank vehicles, equipment, tanks, plants, terminals, wells, fuel-dispensing stations, refineries, distilleries and similar facilities where flammable and combustible liquids are produced, processed, transported, stored, dispensed or used. 6. To install, alter, remove, abandon, place temporarily out of service (for more than 90 days) or otherwise dispose of an underground, protected above-ground or above-ground flammable or combustible liquid tank. 7. To change the type of contents stored in a flammable or 			

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combustible liquid tank to a material that poses a greater hazard than that for which the tank was designed and constructed.			
8. To manufacture, process, blend or refine flammable or combustible liquids.			
Floor finishing. An operational permit is required for floor finishing or surfacing operations exceeding 350 square feet (33 m ²) using Class I or Class II liquids.			
Fruit and crop ripening. An operational permit is required to operate a fruit- or crop-ripening facility or conduct a fruit-ripening process using ethylene gas.			
Fumigation and thermal insecticidal fogging. An operational permit is required to operate a business of fumigation or thermal insecticidal fogging and to maintain a room, vault or chamber in which a toxic or flammable fumigant is used.			
Hazardous materials. An operational permit is required to store, transport on site, dispense, use or handle hazardous materials in excess of the amounts listed below.			
Permit Amounts for Hazardous Materials			
Type of Material		Amount	
Combustible liquids		See flammable and combustible liquids	
Corrosive materials			
Gases		See compressed gases	
Liquids		55 gallons	
Solids		1000 pounds	
Explosive materials		See explosives	
Flammable materials			
Gases		See compressed gases	
Liquids		See flammable and combustible liquids	
Solids		100 pounds	
Highly toxic materials			
Gases		See compressed gases	
Liquids		Any amount	
Solids		Any amount	
Oxidizing materials			
Gases		See compressed gases	
Liquids			
Class 4		Any amount	
Class 3		1 gallon	
Class 2		10 gallons	

Class 1	55 gallons		
Solids			
Class 4	Any amount		
Class 3	10 pounds		
Class 2	100 pounds		
Class 1	500 pounds		
Organic peroxides			
Liquids			
Class I	Any amount		
Class II	Any amount		
Class III	1 gallon		
Class IV	2 gallons		
Class V	No permit required		
Solids			
Class I	Any amount		
Class II	Any amount		
Class III	10 pounds		
Class IV	20 pounds		
Class V	No permit required		
Pyrophoric materials			
Gases	See compressed gases		
Liquids	Any amount		
Solids	Any amount		
Toxic materials			
Gases	See compressed gases		
Liquids	10 gallons		
Solids	100 pounds		
Unstable (reactive) materials			
Liquids			
Class 4	Any amount		
Class 3	Any amount		
Class 2	5 gallons		
Class 1	10 gallons		
Solids			
Class 4	Any amount		
Class 3	Any amount		

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Class 2	50 pounds		
Class 1	100 pounds		
Water reactive materials			
Liquids			
Class 3	Any amount		
Class 2	5 gallons		
Class 1	55 gallons		
Solids			
Class 3	Any amount		
Class 2	50 pounds		
Class 1	500 pounds		
For SI: 1 gallon = 3.785 L, 1 pound = 0.454 kg.			
HPM facilities. An operational permit is required to store, handle or use hazardous production materials.			
High piled storage. An operational permit is required to use a building or portion thereof as a high-piled storage area exceeding 500 square feet (46 m ²).			
Hot work operations. An operational permit is required for hot work including, but not limited to:			
1. Public exhibitions and demonstrations where hot work is conducted.			
2. Use of portable hot work equipment inside a structure.			
Exception: Work that is conducted under a construction permit.			
3. Fixed-site hot work equipment such as welding booths.			
4. Hot work conducted within a hazardous fire area.			
5. Application of roof coverings with the use of an open-flame device.			
6. When approved, the fire official shall issue a permit to carry out a Hot Work Program. This program allows approved personnel to regulate their facility's hot work operations. The approved personnel shall be trained in the fire safety aspects denoted in this chapter and shall be responsible for issuing permits requiring compliance with the requirements found in this chapter. These permits shall be issued only to their employees or hot work operations under their supervision.			
Industrial ovens. An operational permit is required for operation of industrial ovens regulated by Chapter 24 <u>30</u> .			
Lumber yards and woodworking plants. An operational permit is required for the storage or processing of lumber exceeding 100,000 board feet (8,333 ft ³) (236 m ³).			
Liquid-fueled or gas-fueled vehicles or equipment in assembly buildings. An operational permit is required to display, operate or demonstrate liquid-fueled or gas-fueled vehicles or equipment in assembly buildings.			
LP-gas. An operational permit is required for:			
1. Storage and use of LP-gas.			

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Exception: An operational permit is not required for individual containers with a 500-gallon (1893 L) water capacity or less serving occupancies in Group R-3. 2. Operation of cargo tankers that transport LP-gas.			
Magnesium. An operational permit is required to melt, cast, heat treat or grind more than 10 pounds (4.54 kg) of magnesium.			
Miscellaneous combustible storage. An operational permit is required to store in any building or upon any premises in excess of 2,500 cubic feet (71 m ³) gross volume of combustible empty packing cases, boxes, barrels or similar containers, rubber tires, rubber, cork or similar combustible material.			
Open burning. An operational permit is required for the kindling or maintaining of an open fire or a fire on any public street, alley, road, or other public or private ground. Instructions and stipulations of the permit shall be adhered to. Exception: Recreational fires.			
Open flames and candles. An operational permit is required to remove paint with a torch; use a torch or open-flame device in a hazardous fire area; or to use open flames or candles in connection with assembly areas, dining areas of restaurants or drinking establishments.			
Organic coatings. An operational permit is required for any organic-coating manufacturing operation producing more than 1 gallon (4 L) of an organic coating in one day.			
Assembly/educational. An operational permit is required to operate a place of assembly/educational occupancy.			
Private fire hydrants. An operational permit is required for the removal from service, use or operation of private fire hydrants. Exception: An operational permit is not required for private industry with trained maintenance personnel, private fire brigade or fire departments to maintain, test and use private hydrants.			
Pyrotechnic special effects material. An operational permit is required for use and handling of pyrotechnic special effects material.			
Pyroxylin plastics. An operational permit is required for storage or handling of more than 25 pounds (11 kg) of cellulose nitrate (pyroxylin) plastics and for the assembly or manufacture of articles involving pyroxylin plastics.			
Refrigeration equipment. An operational permit is required to operate a mechanical refrigeration unit or system regulated by Chapter 6.			
Repair garages and service stations. An operational permit is required for operation of repair garages and automotive, marine and fleet service stations.			
Rooftop heliports. An operational permit is required for the operation of a rooftop heliport.			
Spraying or dipping. An operational permit is required to conduct a spraying or dipping operation utilizing flammable or combustible liquids or the application of combustible powders regulated by			

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Chapter 15 24.			
Storage of scrap tires and tire byproducts. An operational permit is required to establish, conduct or maintain storage of scrap tires and tire byproducts that exceeds 2,500 cubic feet (71 m ³) of total volume of scrap tires and for indoor storage of tires and tire byproducts.			
Temporary membrane structures and tents. An operational permit is required to operate an air-supported temporary membrane structure or a tent. Exceptions: 1. Tents used exclusively for recreational camping purposes. 2. Tents and air-supported structures that cover an area of 900 square feet (84 m ²) or less, including all connecting areas or spaces with a common means of egress or entrance and with an occupant load of 50 or less persons.			
Tire-rebuilding plants. An operational permit is required for the operation and maintenance of a tire-rebuilding plant.			
Waste handling. An operational permit is required for the operation of wrecking yards, junk yards and waste material-handling facilities.			
Wood products. An operational permit is required to store chips, hogged material, lumber or plywood in excess of 200 cubic feet (6 m ³).			

D. 107.3. Application for permit: Application for a permit shall be made on forms prescribed by the fire official.

E. 107.4. Issuance of permits: Before a permit is issued, the fire official shall make such inspections or tests as are necessary to assure that the use and activities for which application is made comply with the provisions of this code.

F. 107.5. Conditions of permit: A permit shall constitute permission to store or handle materials or to conduct processes in accordance with the SFPC, and shall not be construed as authority to omit or amend any of the provisions of this code. Permits shall remain in effect until revoked or for such period as specified on the permit. Permits are not transferable.

G. 107.5.1. Special conditions for the State Fire Marshal's office. Permits issued by the State Fire Marshal's office for the use of explosives in special operations or under emergency conditions shall be valid for one week from the date of issuance and shall not be renewable.

H. 107.6. State Fire Marshal: Permits will not be required by the State Fire Marshal except for those permits listed in Sections 107.13 and 107.14 of this code.

Exception: Such permits shall not be required for the storage of explosives or blasting agents by the Virginia Department of State Police provided notification to the State Fire Marshal is made annually by the Chief Arson Investigator listing all storage locations within areas where enforcement is provided by the State Fire Marshal's office.

I. 107.7. Annual: The enforcing agency may issue annual permits for the manufacturing, storage, handling, use, or sales of explosives to any state regulated public utility.

J. 107.8. Approved plans: Plans approved by the fire official are approved with the intent that they comply in all respects to this code. Any omissions or errors on the plans do not relieve the applicant of complying with all applicable requirements of this code.

K. 107.9. Posting: Issued permits shall be kept on the premises designated therein at all times and shall be readily available for inspection by the fire official.

L. 107.10. Suspension of permit: A permit shall become invalid if the authorized activity is not commenced within six months after issuance of the permit, or if the authorized activity is suspended or abandoned for a period of six months after the time of commencement.

~~M. 107.11. Revocation of permit: The fire official may revoke a permit or approval issued under the SFPC if conditions of the permit have been violated, or if the approved application, data or plans contain misrepresentation as to material fact.~~

~~N. M.~~ 107.12. Local fees: In accordance with § 27-97 of the Code of Virginia, fees may be levied by the local governing body in order to defray the cost of enforcement and appeals under the SFPC.

~~O. N.~~ 107.13. State Fire Marshal's office permit fees for explosives, blasting agents, theatrical flame effects, and fireworks: Applications Except as modified herein.

applications for firework or pyrotechnic displays shall be submitted to and received by the State Fire Marshal's office not less than 15 days prior to the planned event. Fees for permits issued by the State Fire Marshal's office for the storage, use, sale or manufacture of explosives or blasting agents, and for the display of fireworks and flame effects on state-owned property shall be as follows:

1. \$125 per year per magazine to store explosives and blasting agents.
2. \$200 per year per city or county to use explosives and blasting agents.
3. \$150 per year to sell explosives and blasting agents.
4. \$200 per year to manufacture explosives, blasting agents and fireworks.
5. \$350 the first day of fireworks, pyrotechnics or proximate audience displays conducted in any state-owned building and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the State Fire Marshal's office less than 15 days prior to the planned event, the permit fee shall be ~~\$450 per \$550~~ the first day and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the State Fire Marshal's office less than seven days prior to the planned event, the permit fee shall be ~~\$550 per \$650~~ the first day and \$150 per day for each consecutive day for identical multi-day events.
6. \$250 the first day of fireworks, pyrotechnics or proximate audience displays conducted out-of-doors on any state-owned property and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the State Fire Marshal's office less than 15 days prior to the planned event, the permit fee shall be ~~\$450 per \$550~~ the first day and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the State Fire Marshal's office less than seven days prior to the planned event, the permit fee shall be ~~\$550 per \$650~~ the first day and \$150 per day for each consecutive day for identical multi-day events.
7. \$100 per event for the use of explosives in special operations or emergency conditions.
8. \$300 the first day for flame effects conducted in accordance with Section 308.3.6 indoors of any state-owned building or outdoors on state-owned property and \$150 per day for each consecutive day for identical multi-day events, or, if conducted as part of a firework (pyrotechnic) display, \$100 the first day and \$75 per day for each consecutive day for identical multi-day events. If an application for flame effects is received by the State Fire Marshal's office less than 15 days prior to the planned event, the permit fee shall be ~~\$450 per \$550~~ the first day and \$150 per day for each consecutive day for identical multi-day events or, if conducted as part of a firework (pyrotechnic) display, \$200 the first day and \$100 per day

for each consecutive day for identical multi-day events. If an application is received by the State Fire Marshal's office less than seven days prior to the planned event, the permit fee shall be ~~\$550 per \$650~~ the first day and \$150 per day for each consecutive day for identical multi-day events or, if conducted as part of a firework (pyrotechnic) display, ~~\$300 the first day and \$125 per day~~ for each consecutive day for identical multi-day events.

P. Q. 107.14 State annual inspection permit fees. Annual fees for inspection permits issued by the State Fire Marshal's office for the inspection of buildings shall be as follows:

1. Nightclubs.
 - 1.1. \$350 for occupant load of 100 or less.
 - 1.2. \$450 for occupant load of 101 to 200.
 - 1.3. \$500 for occupant load of 201 to 300.
 - 1.4. \$500 plus \$50 for each 100 occupants where occupant loads exceed 300.
2. Private college dormitories with or without assembly areas. If containing assembly areas, such assembly areas are not included in the computation of square footage.
 - 2.1. \$150 for 3500 square feet or less.
 - 2.2. \$200 for greater than 3500 square feet up to 7000 square feet.
 - 2.3. \$250 for greater than 7000 square feet up to 10,000 square feet.
 - 2.4. \$250 plus \$50 for each additional 3000 square feet where square footage exceeds 10,000.
3. Assembly areas that are part of private college dormitories.
 - 3.1. \$50 for 10,000 square feet or less provided the assembly area is within or attached to a dormitory building.
 - 3.2. \$100 for greater than 10,000 square feet up to 25,000 square feet provided the assembly area is within or attached to a dormitory building, such as gymnasiums, auditoriums or cafeterias.
 - 3.3. \$100 for up to 25,000 square feet provided the assembly area is in a separate or separate buildings such as gymnasiums, auditoriums or cafeterias.
 - 3.4. \$150 for greater than 25,000 square feet for assembly areas within or attached to a dormitory building or in a separate or separate buildings such as gymnasiums, auditoriums or cafeterias.
4. Hospitals.
 - 4.1. \$300 for 1 to 50 beds.
 - 4.2. \$400 for 51 to 100 beds.
 - 4.3. \$500 for 101 to 150 beds.
 - 4.4. \$600 for 151 to 200 beds.
 - 4.5. \$600 plus \$100 for each additional 100 beds where the number of beds exceeds 200.

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5. Child day centers, assisted living facilities and adult day care centers licensed by the Virginia Department of Social Services based on licensed capacity as follows:

- 5.1. \$50 for 1 to 8.
- 5.2. \$75 for 9 to 20.
- 5.3. \$100 for 21 to 50.
- 5.4. \$200 for 51 to 100.
- 5.5. \$400 for 101 or more.

Exception: Annual inspection permits for any building or groups of buildings on the same site may not exceed \$2500.

~~Q.~~ P. 107.15. Fee schedule: The local governing body may establish a fee schedule. The schedule shall incorporate unit rates, which may be based on square footage, cubic footage, estimated cost of inspection or other appropriate criteria.

~~R.~~ Q. 107.16. Payment of fees: A permit shall not be issued until the designated fees have been paid.

Exception: The fire official may authorize delayed payment of fees.

13VAC5-51-85. Section 108.0. Operational permits.

A. 108.1. General. Operational permits shall be in accordance with Section 108. The fire official may require notification prior to (i) activities involving the handling, storage or use of substances, materials or devices regulated by the SFPC; (ii) conducting processes which produce conditions hazardous to life or property; or (iii) establishing a place of assembly.

B. 108.1.1. Permits required. Operational permits may be required by the fire official in accordance with Table 107.2. The fire official shall require operational permits for the manufacturing, storage, handling, use and sale of explosives. Issued permits shall be kept on the premises designated therein at all times and shall be readily available for inspection by the fire official.

Exceptions:

1. Operational permits will not be required by the State Fire Marshal except for the manufacturing, storage, handling, use and sale of explosives in localities not enforcing the SFPC.
2. Operational permits will not be required for the manufacturing, storage, handling or use of explosives or blasting agents by the Virginia Department of State Police provided notification to the fire official is made annually by the Chief Arson Investigator listing all storage locations.

C. 108.1.2. Duration of operational permits.

An operational permit allows the applicant to conduct an operation or a business for which a permit is required by Section 108.1.1 for either:

1. A prescribed period.
2. Until renewed, suspended, or revoked.

D. 108.1.3. Operational permits for the same location. When more than one operational permit is required for the same location, the fire official is authorized to consolidate such permits into a single permit provided that each provision is listed in the permit.

E. 108.2. Application. Application for an operational permit required by this code shall be made to the fire official in such form and detail as prescribed by the fire official. Applications for permits shall be accompanied by such plans as prescribed by the fire official.

F. 108.2.1. Refusal to issue permit. If the application for an operational permit describes a use that does not conform to the requirements of this code and other pertinent laws and ordinances, the fire official shall not issue a permit, but shall return the application to the applicant with the refusal to issue such permit. Such refusal shall, when requested, be in writing and shall contain the reasons for refusal.

G. 108.2.2. Inspection authorized. Before a new operational permit is approved, the fire official is authorized to inspect the receptacles, vehicles, buildings, devices, premises, storage spaces or areas to be used to determine compliance with this code or any operational constraints required.

H. 108.2.3. Time limitation of application. An application for an operational permit for any proposed work or operation shall be deemed to have been abandoned six months after the date of filing, unless such application has been diligently prosecuted or a permit shall have been issued; except that the fire official is authorized to grant one or more extensions of time for additional periods not exceeding 90 days each if there is reasonable cause.

I. 108.2.4. Action on application. The fire official shall examine or cause to be examined applications for operational permits and amendments thereto within a reasonable time after filing. If the application does not conform to the requirements of pertinent laws, the fire official shall reject such application in writing, stating the reasons. If the fire official is satisfied that the proposed work or operation conforms to the requirements of this code and laws and ordinances applicable thereto, the fire official shall issue a permit as soon as practicable.

J. 108.3. Conditions of a permit. An operational permit shall constitute permission to maintain, store or handle materials; or to conduct processes in accordance with the SFPC, and shall not be construed as authority to omit or amend any of the provisions of this code. ~~The building official shall issue permits to install equipment utilized in connection with such activities; or to install or modify any fire protection system or equipment or any other construction, equipment installation or modification in accordance with the provisions of this code where a permit is required by section 108.5. Such permission shall not be construed as authority to omit or amend any of the provisions of this code.~~

K. 108.3.1. Expiration. An operational permit shall remain in effect until reissued, renewed, or revoked for such a period

of time as specified in the permit. Permits are not transferable and any change in occupancy, operation, tenancy or ownership shall require that a new permit be issued.

L. 108.3.2. Extensions. A permittee holding an unexpired permit shall have the right to apply for an extension of the time within which the permittee will commence work under that permit when work is unable to be commenced within the time required by this section for good and satisfactory reasons. The fire official is authorized to grant, in writing, one or more extensions of the time period of a permit for periods of not more than 90 days each. Such extensions shall be requested by the permit holder in writing and justifiable cause demonstrated.

M. 108.3.3. Annual. The enforcing agency may issue annual operational permits for the manufacturing, storage, handling, use, or sales of explosives to any state regulated public utility.

N. 108.3.4. Suspension of permit. An operational permit shall become invalid if the authorized activity is not commenced within six months after issuance of the permit, or if the authorized activity is suspended or abandoned for a period of six months after the time of commencement.

O. 108.3.5. Posting. Issued operational permits shall be kept on the premises designated therein at all times and shall be readily available for inspection by the fire official.

P. 108.3.6. Compliance with code. The issuance or granting of an operational permit shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or of any other ordinance of the jurisdiction. Operational permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid. The issuance of a permit based on other data shall not prevent the fire official from requiring the correction of errors in the provided documents and other data. Any addition to or alteration of approved provided documents shall be approved in advance by the fire official, as evidenced by the issuance of a new or amended permit.

Q. 108.3.7. Information on the permit. The fire official shall issue all operational permits required by this code on an approved form furnished for that purpose. The operational permit shall contain a general description of the operation or occupancy and its location and any other information required by the fire official. Issued permits shall bear the original or electronic signature of the fire official or other designee approved by the fire official.

R. 108.4. Revocation. The fire official is authorized to revoke an operational permit issued under the provisions of this code when it is found by inspection or otherwise that there has been a false statement or misrepresentation as to the material facts in the application or documents on which the permit or approval was based including, but not limited to, any one of the following:

1. The permit is used for a location or establishment other than that for which it was issued.

2. The permit is used for a condition or activity other than that listed in the permit.

3. Conditions and limitations set forth in the permit have been violated.

4. Inclusion of any false statements or misrepresentations as to a material fact in the application for permit or plans submitted or a condition of the permit.

5. The permit is used by a different person or firm than the person or firm for which it was issued.

6. The permittee failed, refused or neglected to comply with orders or notices duly served in accordance with the provisions of this code within the time provided therein.

7. The permit was issued in error or in violation of an ordinance, regulation or this code.

13VAC5-51-91. Section 109.0. Inspection.

A. 109.1. Inspection: The fire official may inspect all structures and premises for the purposes of ascertaining and causing to be corrected any conditions liable to cause fire, contribute to the spread of fire, interfere with firefighting operations, endanger life, or any violations of the provisions or intent of the SFPC.

Exception: Single family dwellings and dwelling units in two family and multiple family dwellings and farm structures shall be exempt from routine inspections. This exemption shall not preclude the fire official from conducting routine inspections in Group R-3 or Group R-5 occupancies operating as a commercial bed and breakfast as outlined in Section ~~310.1~~ 310.3 of the USBC or inspecting under § 27-98.2 of the Code of Virginia for hazardous conditions relating to explosives, flammable and combustible conditions, and hazardous materials.

B. 109.1.1. Right to entry: The fire official may enter any structure or premises at any reasonable time to inspect subject to constitutional restrictions on unreasonable searches and seizures. If entry is refused or not obtained, the fire official may pursue recourse as provided by law.

Note: Specific authorization and procedures for inspections and issuing warrants are set out in §§ 27-98.1 through 27-98.5 of the Code of Virginia and shall be taken into consideration.

C. 109.1.2. Credentials: The fire official and technical assistants shall carry proper credentials of office when inspecting in the performance of their duties under the SFPC.

D. 109.2. Coordinated inspections: The fire official shall coordinate inspections and administrative orders with any other state and local agencies having related inspection authority, and shall coordinate those inspections required by the USBC for new construction when involving provisions of the amended IFC, so that the owners and occupants will not be subjected to numerous inspections or conflicting orders.

Note: The USBC requires the building official to coordinate such inspections with the fire official.

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E. 109.3. Other inspections: In accordance with ~~§ 36-139.3~~ § 9.1-207 of the Code of Virginia, the State Fire Marshal, upon presenting proper credentials, shall make annual inspections for hazards incident to fire in all (i) residential care facilities operated by any state agency, (ii) assisted living facilities licensed or subject to licensure pursuant to Chapter 18 (§ 63.2-1800 et seq.) of Title 63.2 of the Code of Virginia which are not inspected by a local fire marshal, (iii) student-residence facilities owned or operated by the public institutions of higher education in the Commonwealth, and (iv) public schools in the Commonwealth which are not inspected by a local fire marshal. In the event that any such facility or residence is found to be nonconforming to the SFPC, the State Fire Marshal or local fire marshal may petition any court of competent jurisdiction for the issuance of an injunction.

13VAC5-51-111. Section 111.0. Violations.

A. 111.1. Notice: When the fire official discovers an alleged violation of a provision of the SFPC or other codes or ordinances under the fire official's jurisdiction, the fire official shall prepare a written notice citing the section allegedly violated, describing the condition deemed unsafe and specifying time limitations for the required abatements to be made to render the structure or premises safe and secure.

B. 111.1.1. Right of appeal. Notices of violation issued under Section 111.1 shall indicate the right of appeal by referencing the appeals section of this code.

Exceptions:

1. Summons issued in lieu of a notice of violation in accordance with Section 111.5 of this code.

2. Documents reflecting uncorrected violations in subsequent inspections to verify compliance.

~~B. C.~~ 111.2. Service: The written notice of violation of this code shall be served upon the owner, a duly authorized agent or upon the occupant or other person responsible for the conditions under violation. Such notice shall be served either by delivering a copy of same to such persons by mail to the last known post office address, by delivering in person or by delivering it to and leaving it in the possession of any person in charge of the premises, or, in the case such person is not found upon the premises, by affixing a copy thereof in a conspicuous place at the entrance door or avenue of access. Such procedure shall be deemed the equivalent of personal notice.

~~C. D.~~ 111.3. Failure to correct violations: If the notice of violation is not complied with within the time specified, the fire official shall request the legal counsel of the local governing body to institute the appropriate legal proceedings to restrain, correct, or abate such alleged violation.

~~D. E.~~ 111.4. Penalty: Penalties upon conviction of violating the SFPC shall be as set out in § 27-100 of the Code of Virginia.

~~E. F.~~ 111.5. Summons: When authorized and certified in accordance with § 27-34.2 of the Code of Virginia, the fire official may, subject to any limitations imposed by the local governing body, issue a summons in lieu of a notice of violation. Fire officials not certified in accordance with § 27-34.2 of the Code of Virginia may request the law-enforcement agency of the local governing body to make arrests for any alleged violations of the SFPC or orders affecting the immediate public safety.

13VAC5-51-121. Section 112.0. Appeals.

A. 112.1. Local Board of Fire Prevention Code Appeals (BFPCA): Each local governing body which enforces the SFPC shall have a BFPCA to hear appeals as authorized herein or it shall enter into an agreement with the governing body of another county or municipality, with some other agency, or with a state agency approved by the DHCD to act on appeals. An appeal case decided by some other approved agency shall constitute an appeal in accordance with this section and shall be final unless appealed to the State Building Code Technical Review Board (TRB).

B. 112.2. Membership: The BFPCA shall consist of at least five members appointed by the local governing body and having terms of office established by written policy. Alternate members may be appointed to serve in the absence of any regular members and as such, shall have the full power and authority of the regular members. Regular and alternate members may be reappointed. Written records of current membership, including a record of the current chairman and secretary shall be maintained in the office of the local governing body. In order to provide continuity, the terms of the members may be of different length so that less than half will expire in any one-year period. The BFPCA shall meet at least once annually to assure a duly constituted board, appoint officers as necessary and receive such training on the code as may be appropriate or necessary from staff of the locality.

C. 112.2.1. Chairman: The BFPCA shall annually select one of its regular members to serve as chairman. In case of the absence of the chairman at a hearing, the members present shall select an acting chairman.

D. 112.2.2. Secretary: The local governing body shall appoint a secretary to the BFPCA to maintain a detailed record of all proceedings.

E. 112.3. Qualifications of members: BFPCA members shall be selected by the local governing body on the basis of their ability to render fair and competent decisions regarding application of the SFPC and shall, to the extent possible, represent different occupational or professional fields relating to building construction or fire prevention. At least one member should be an experienced builder and one member a licensed professional engineer or architect. Employees or officials of the local governing body shall not serve as members of the BFPCA.

F. 112.4. Disqualification of member: A member shall not hear an appeal in which that member has conflict of interest

in accordance with the State and Local Government Conflict of Interests Act, Chapter 31 (§ 2.2-3100 et seq.) of Title 2.2 of the Code of Virginia.

G. 112.5. Application for appeal: The owner of a structure, the owner's agent or any other person involved in the design, construction or maintenance of the structure may appeal a decision of the fire official concerning the application of the SFPC or the fire official's refusal to grant modification under Section 106.5 to the provisions of the SFPC. The appeal shall first lie to the local board of fire prevention code appeals (BFPCA) and then to the TRB except that appeals concerning the application of the SFPC or refusal to grant modifications by the State Fire Marshal shall be made directly to the TRB. The appeal shall be submitted to the BFPCA within 14 calendar days of the application of the SFPC. The application shall contain the name and address of the owner of the structure and the person appealing if not the owner. A copy of the written decision of the fire official shall be submitted along with the application for appeal and maintained as part of the record. The application shall be stamped or otherwise marked by the BFPCA to indicate the date received. Failure to submit an application for appeal within the time limit established by this section shall constitute acceptance of the fire official's decision.

Note: In accordance with § 27-98 of the Code of Virginia, any local fire code may provide for an appeal to a local board of appeals. If no local board of appeals exists, the TRB shall hear appeals of any local fire code violation.

H. 112.6. Notice of meeting: The BFPCA shall meet within 30 calendar days after the date of receipt of the application for appeal. Notice indicating the time and place of the hearing shall be sent to the parties in writing to the addresses listed on the application at least 14 calendar days prior to the date of the hearing. Less notice may be given if agreed upon by the applicant.

I. 112.7. Hearing procedures: All hearings before the BFPCA shall be open to the public. The appellant, the appellant's representative, the local governing body's representative and any person whose interests are affected shall be given an opportunity to be heard. The chairman shall have the power and duty to direct the hearing, rule upon the acceptance of evidence and oversee the record of all proceedings.

J. 112.7.1. Postponement: When a quorum of the BFPCA is not present to hear an appeal, either the appellant or the appellant's representative shall have the right to request a postponement of the hearing. The BFPCA shall reschedule the appeal within 30 calendar days of the postponement.

K. 112.8. Decision: The BFPCA shall have the power to uphold, reverse or modify the decision of the fire official by a concurring vote of a majority of those present. Decisions of the BFPCA shall be final if no appeal is made therefrom and the appellant and the fire official shall act accordingly.

L. 112.8.1. Resolution: The ~~BFPCA's~~ BFPCA's decision shall be by resolution signed by the chairman and retained as part of the record by the BFPCA. The following wording shall be part of the resolution: "Any person who was a party to the appeal may appeal to the State Building Code Technical Review Board (TRB) by submitting an application to the TRB within 21 calendar days upon receipt by certified mail of this resolution. Application forms are available from the Office of the TRB, ~~501 North Second~~ 600 East Main Street, Richmond, Virginia 23219, (804) 371-7150." Copies of the resolution shall be furnished to all parties.

M. 112.9. Appeal to the TRB: After final determination by the BFPCA, any person who was a party to the local appeal may appeal to the TRB. Application shall be made to the TRB within 21 calendar days of receipt of the decision to be appealed. Application for appeal to the TRB arising from the SFMO's enforcement of the code or from any local fire code violation if no local board of appeals exists shall be made to the TRB within 14 calendar days of receipt of the decision to be appealed and shall be accompanied by copies of the inspection reports and other relevant information. Failure to submit an application for appeal within the time limit established by this section shall constitute an acceptance of the BFPCA's resolution or fire official's decision.

N. 112.9.1. Information to be submitted: Copies of the fire official's decision and the resolution of the BFPCA shall be submitted with the application for appeal. Upon request by the office of the TRB, the BFPCA shall submit a copy of all inspection reports and all pertinent information from the record of the BFPCA.

O. 112.9.2. Decision of TRB: Procedures of the TRB are in accordance with Article 2 (§ 36-108 et seq.) of Chapter 6 of Title 36 of the Code of Virginia. Decisions of the TRB shall be final if no appeal is made therefrom and the appellant and the code official shall act accordingly.

13VAC5-51-130. IFC Section 202.0. Definitions.

A. Add the following definitions:

~~Background clearance card—See Section 3302.1 or BCC:~~
An identification card issued to an individual who is not a certified blaster or pyrotechnician and is responsible management or an employee of a company, corporation, firm, or other entity, solely for the purpose of submitting an application to the fire official for a permit to manufacture, use, handle, store, or sell explosive materials; or conduct a fireworks display. A person to whom a BCC has been issued can fulfill the role of a designated individual on an application for a permit to manufacture, use, handle, store, or sell explosive materials; or on an application for a permit to design, setup, and conduct a fireworks display.

~~Blaster, restricted: See Section 3302.1~~ Any person engaging in the use of explosives or blasting agents utilizing five pounds (2.25 kg) or less per blasting operation and using instantaneous detonators. A certified

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restricted blaster can fulfill the role of a designated individual on an application for permit to manufacture, use, handle, store, or sell explosive materials.

Blaster, unrestricted: See Section 3302.1 Any person engaging in the use of explosives or blasting agents without the limit to the amount of explosives or blasting agents or type of detonator. A certified unrestricted blaster can fulfill the role of a designated individual on an application for permit to manufacture, use, handle, store, or sell explosive materials.

Design: For the purposes of a fireworks display, either inside a building or structure or outdoors, it shall mean the pyrotechnician who will be in attendance and makes the final artistic determination for the placement of fireworks and ground display pieces suitable for the display site.

Designated individual: See Section 3302.1 A person who is in possession of a BCC issued by the SFMO, certified by the SFMO as a pyrotechnician, or a restricted or unrestricted blaster, any of whom are responsible for ensuring compliance with state law and regulations relating to blasting agents and explosives and applying for explosives or firework permits; is at least 21 years of age; and demonstrates the capability to effectively communicate safety messages verbally and in writing in the English language.

DHCD: The Virginia Department of Housing and Community Development.

Local government, local governing body or locality: The governing body of any county, city, or town, other political subdivision and state agency in this Commonwealth charged with the enforcement of the SFPC under state law.

Night club: Any building or portion thereof in which the main use is a place of public assembly that provides exhibition, performance or other forms or entertainment; serves alcoholic beverages; and provides music and space for dancing.

Permissible fireworks: Any sparklers, fountains, Pharaoh's serpents, caps for pistols, or pinwheels commonly known as whirligigs or spinning jennies.

Pyrotechnician (firework operator): See Section 3302.1 Any person supervising or engaged in the design, setup, or conducting of any fireworks display, either inside a building or outdoors. A certified pyrotechnician can fulfill the role of a designated individual on an application for a permit for a fireworks display.

Pyrotechnician, aerial: A person supervising or engaged in the design, setup, or conducting of an outdoor aerial fireworks display performed in accordance with the regulations as set forth in this code and NFPA 1123, a referenced standard for fireworks displays.

Pyrotechnician, proximate: A person supervising or engaged in the design, setup, or conducting of a fireworks display, either inside a building or outdoors, performed in

accordance with the regulations as set forth in this code and NFPA 1126, a referenced standard for the use of pyrotechnics before a proximate audience.

Responsible management: See Section 3302.1: A person who is any of the following:

1. The sole proprietor of a sole proprietorship.
2. The partners of a general partnership.
3. The managing partners of a limited partnership.
4. The officers of a corporation.
5. The managers of a limited liability company.
6. The officers or directors of an association, or both.
7. Individuals in other business entities recognized under the laws of the Commonwealth as having a fiduciary responsibility to the firm.

Sole proprietor: See Section 3302.1: A person or individual, not a corporation, who is trading under his own name or under an assumed or fictitious name pursuant to the provisions of §§ 59.1-69 through 59.1-76 of the Code of Virginia.

State Fire Marshal: The State Fire Marshal as provided for by § 36-139.2 9.1-206 of the Code of Virginia.

State Regulated Care Facility (SRCF): A building with an occupancy in Group R-2, R-3, R-4, or R-5 occupied by persons in the care of others where program oversight is provided by the Virginia Department of Social Services, the Virginia Department of Behavioral Health and Developmental Services, the Virginia Department of Education or the Virginia Department of Juvenile Justice.

Technical Assistant: Any person employed by or under an extended contract to a local enforcing agency for enforcing the SFPC. For the purposes of this definition, an extended contract shall be a contract with an aggregate term of 18 months or longer.

TRB: The Virginia State Building Code Technical Review Board.

USBC: The Virginia Uniform Statewide Building Code (13VAC5-63).

B. Add the following definition under the term "Occupancy Classification--Residential Group R":

R-5 Detached one and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures. The terms "R-5" and "one and two-family dwelling" where used in this code shall be interchangeable.

C. Change the following definition definitions to read:

Automatic fire-extinguishing system: An approved system of devices and equipment that automatically detects a fire and discharges an approved fire-extinguishing agent onto or in the area of a fire. Such system shall include an

automatic sprinkler system, unless otherwise expressly stated.

Fire code official: The officer or other designated authority charged with administration and enforcement of this code, or a duly authorized representative. For the purpose of this code, the terms "code official" and "fire official" shall have the same meaning as the term "fire code official" and, in addition, such official shall have the powers outlined in § 27-98.1 of the Code of Virginia.

Fireworks: Any firecracker, torpedo, skyrocket, or other substance or object, of whatever form or construction, that contains any explosive or inflammable compound or substance, and is intended, or commonly known, as fireworks and that explodes, rises into the air or travels laterally, or fires projectiles into the air. Fireworks shall not include automobile flares, paper caps containing not more than the average of 0.25 grain (16 mg) of explosive content per cap or toy pistols, toy canes, toy guns, or other devices utilizing such caps and items commonly known as party poppers, pop rocks, and snap-n-pops. Fireworks may be further delineated and referred to as:

Fireworks, 1.4G (formerly known as Class C, Common Fireworks): Small fireworks devices containing restricted amounts of pyrotechnic composition designed primarily to produce visible or audible effects by combustion. Such 1.4G fireworks that comply with the construction, chemical composition, and labeling regulations of the DOTn for Fireworks, UN0336, and the U.S. Consumer Product Safety Commission as set forth in CPSC 16 CFR Parts 1500 and 1507, are not explosive materials for the purpose of this code.

Fireworks, 1.3G (formerly Class B, Special Fireworks): Large fireworks devices, which are explosive materials, intended for the use in fireworks displays and designed to produce audible or visible effects by combustion, deflagration, or detonation. Such 1.3G fireworks include, but are not limited to, firecrackers containing more than 130 milligrams (2 grains) of explosive composition, aerial shells containing more than 40 grams of pyrotechnic composition, and other display pieces that exceed the limits for classification as 1.4G fireworks. Such 1.3G fireworks are also described as Fireworks, UN0335 by the DOTn.

Smokeless propellants. Solid propellants, commonly referred to as smokeless powders or any propellant classified by DOTn as a smokeless propellant in accordance with NA3178, Smokeless Powder for Small Arms, used in small arms ammunition, firearms, cannons, rockets, propellant-actuated devices, and similar articles.

13VAC5-51-131. IFC Chapter 3. Precautions Against Fire General Requirements.

A. Add Section 301.3 to read:

301.3. Occupancy. The occupancy of a structure shall be continued as originally permitted under and in full compliance with the codes in force at the time of construction or alteration. The occupancy of a structure shall not change to another occupancy that will subject the structure to any special provisions of this code or the USBC without the approval of the building official.

B. Change Section 304.3.2 to read:

304.3.2. Capacity exceeding 5.88 cubic feet. Containers with a capacity exceeding 5.88 cubic feet (44 gallons) (0.17 m³) shall be provided with lids. Containers and lids shall be constructed of noncombustible materials or approved combustible materials.

C. Add Section 311.5.6 to read:

311.5.6. Removal. Removal of placards posted in accordance with this section without the approval of the fire official shall be a violation of this code.

D. Change Section 314.1 to read:

314.1. General. Indoor displays constructed within any building or structure shall comply with Sections 314.2 through 314.5.

E. Add Section 314.5 to read:

314.5. Smokeless powder and small arms primers. Venders shall not store, display, or sell smokeless powder or small arms primers during trade shows inside exhibition halls except as follows:

1. The amount of smokeless powder displayed by each vender is limited to the amount established in Section 5506.5.1.1.

2. The amount of smokeless powder each vender may store is limited to the storage arrangements and storage amounts established in Section 5506.5.2.1. Smokeless powder shall remain in the manufacturer's original sealed container, and the container shall remain sealed while inside the building. The repackaging of smokeless powder shall not be performed inside the building. Damaged containers shall not be repackaged inside the building and shall be immediately removed from the building in such manner to avoid spilling any powder.

3. There shall be at least 50 feet separation between venders and 20 feet from any exit.

4. Small arms primers shall be displayed and stored in the manufacturer's original packaging and in accordance with the requirements of Section 5506.5.2.3.

F. Change Section 315.4 to read:

315.4. Outside storage. Outside storage of combustible materials shall not be located within 10 feet (3048 mm) of a property line or other building on the site.

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Exceptions:

1. The separation distance is allowed to be reduced to 3 feet (914 mm) for storage not exceeding 6 feet (1829 mm) in height.
2. The separation distance is allowed to be reduced when the fire official determines that no hazard to the adjoining property exists.

G. Change Section 315.4.1 to read:

315.4.1. Storage beneath overhead projections from buildings. To the extent required by the code the building was constructed under, when buildings are required to be protected by automatic sprinklers, the outdoor storage, display, and handling of combustible materials under eaves, canopies, or other projections or overhangs is prohibited except where automatic sprinklers are installed under such eaves, canopies, or other projections or overhangs.

13VAC5-51-132. IFC Chapter 4. Emergency Planning and Preparedness.

A. Add Section 401.1.1 to read:

401.1.1. State Regulated Care Facilities: ~~when.~~ When a state license is required by the Virginia Department of Social Services; Virginia Department of Behavioral Health and Developmental Services; Virginia Department of Education; or Virginia Department of Juvenile Justice to operate, SRCF shall comply with this section and the provisions of Section 404.0.

B. Add item ~~15~~ 16 to Section 404.2 to read:

~~15.~~ 16. SRCF.

C. Add exception to Section 405.1 to read:

Exception: Emergency evacuation drills shall not be conducted in school buildings during periods of mandatory testing required by the Virginia Board of Education.

D. Add ~~Delete~~ the "High-rise buildings" category, and add the following category to Table 405.2 to read:

Group or occupancy	Frequency	Participation
SRCF	Monthly	All occupants

E. Add Section 405.2.1 to read:

405.2.1. High-rise buildings. Fire exit drills shall be conducted annually by building staff personnel or the owner of the building in accordance with the fire safety plan and shall not affect other current occupants.

F. Add Section 408.1.1 to read:

408.1.1. Maintaining occupant load posting. Occupant load postings required by the building code are required to be maintained.

G. Change Section 408.2 to read:

408.2. Group A occupancies. Group A occupancies shall comply with applicable requirements of Sections 408.2.1 through 408.2.3 and 401 through 406.

H. Add Sections 408.2.3, 408.2.3.1 and 408.2.3.2 to read:

408.2.3. Night clubs. Night clubs shall comply with Sections 408.2.3.1 and 408.2.3.2.

408.2.3.1. Audible announcements. Audible announcements shall be made to the occupants no longer than 10 minutes prior to the start of the entertainment and at each intermission to notify the occupants of the location of the exits to be used in the event of a fire or other emergency.

408.2.3.2. Occupant load count. Upon request of the fire code official, the owner or operator, or both, will be required to keep a running count of the occupant load to provide to the fire code official during performance hours of operation, entertainment hours of operation, or both.

13VAC5-51-133. IFC Chapter 5. Fire Service Features.

A. Delete Section 501.4.

B. Add exceptions to Section 503.1 to read:

Exceptions:

1. Fire apparatus access roads shall be permitted to be provided and maintained in accordance with written policy that establish fire apparatus access road requirements and such requirements shall be identified to the owner or his agent prior to the building official's approval of the building permit.

2. On construction and demolition sites fire apparatus access roads shall be permitted to be provided and maintained in accordance with Section ~~1410.1~~ 3310.1.

C. Add exception to Section 503.2.1 to read:

Exception: Fire apparatus access roads exclusively serving single family dwelling or townhouse developments that are fully sprinklered as provided for in Sections R313.1 or R313.2 of the International Residential Code shall have an unobstructed width of not less than 18 feet (5486 mm), exclusive of shoulders.

D. Add Section 503.7 to read:

503.7. Fire lanes for existing buildings. The fire code official is authorized to designate public and private fire lanes as deemed necessary for the efficient and effective operation of fire apparatus. Fire lanes shall comply with Sections 503.2 through 503.6.

~~E. Change the title of Section 506 to read "Key Boxes and Elevator Fire Service Keys."~~

~~F. Change Section 506.1 to read:~~

~~506.1. Where required. Where access to or within a structure or an area is restricted because of secured openings or where immediate access is necessary for life-saving or firefighting purposes, the fire code official is authorized to require a key box to be installed in an~~

~~approved location. The key box shall be of an approved type listed in accordance with UL 1037 and shall contain keys to gain necessary access as required by the fire code official.~~

~~Exception: Existing key boxes are not required to be listed in accordance with UL 1037 unless replaced.~~

~~G. Add Section 506.3, including all subsections, to read:~~

~~506.3. Standardized fire service elevator keys. All buildings with elevators equipped with Phase I emergency recall or Phase II emergency in-car operation, or buildings equipped with fire service access or occupant evacuation elevators shall be equipped to operate with a standardized fire service key approved by the fire code official.~~

~~Exception: Where providing a standardized key is not possible due to the existing nonstandard elevator equipment, the owner shall be permitted to place the building's nonstandardized fire service elevator keys in a key box installed in accordance with Section 506.1.~~

~~506.3.1. Requirements for standardized fire service keys. Standardized fire service elevator keys shall comply with all of the following:~~

- ~~1. All fire service elevator keys within the jurisdiction shall be uniform and specific for the jurisdiction. Keys shall be cut to a uniform key code.~~
- ~~2. Fire service elevator keys shall be a patent protected design to prevent unauthorized duplication.~~
- ~~3. Fire service elevator keys subject to these rules shall be engraved with the words "DO NOT DUPLICATE."~~

~~506.3.2. Access to standardized fire service keys. Access to standardized fire service elevator keys shall be restricted to the following persons or groups:~~

- ~~1. Elevator owners or their authorized agents.~~
- ~~2. Elevator contractors.~~
- ~~3. Elevator inspectors of the jurisdiction.~~
- ~~4. Fire and building code officials of the jurisdiction.~~
- ~~5. The fire department and other emergency response agencies designated by the fire code official and the code official responsible for the enforcement of Part III, Maintenance, of the USBC.~~

~~506.3.3. Duplication or distribution of keys. No person may duplicate a standardized fire service elevator key or issue, give, or sell a duplicated key unless in accordance with this code.~~

~~506.3.4. Responsibility to provide keys. The building owner shall provide up to three standardized fire service elevator keys, if required by the fire code official, upon installation of a standardized fire service key switch or switches in the building.~~

~~H. E. Add Sections 507.3.1 and 507.3.2 to read:~~

~~507.3.1. Fire flow requirements for fully sprinklered residential developments. Notwithstanding Section~~

103.1.2, the fire flow requirements in Table B105.1 of Appendix B of the IFC, as modified by Section 507.3.2, shall be permitted to be used for determining fire flow in single family dwelling and townhouse developments which are fully sprinklered as provided for in Sections R313.1 or R313.2 of the International Residential Code.

507.3.2. Modifications to Table B105.1. The first six rows of columns five and six of Table B105.1 of Appendix B of the IFC shall be modified as shown below for the use of Table B105.1 in Section 507.3.1.

Type 5-B	Fire-flow (gallons per minute)
0-5000	1000
5001-7200	1250
7201-8200	1500
8201-9500	1750
9501-11300	2000
11301-13000	2250

~~I. E. Change Section 507.5.1 to read:~~

~~507.5.1. Where required. Fire hydrant systems shall be located and installed as directed by the fire department. Fire hydrant systems shall conform to the written standards of the jurisdiction and the fire department.~~

~~J. G. Add Section 507.5.1.1-1 507.5.1.2 to read:~~

~~507.5.1.1 507.5.1.2. Fire hydrant requirements for fully sprinklered residential developments. Notwithstanding Section 103.1.2, the number and distribution of fire hydrants in Table C105.1 of Appendix C of the IFC shall be permitted to be used in single family dwelling and townhouse developments which are fully sprinklered as provided for in Sections R313.1 or R313.2 of the International Residential Code, with the spacing and distances of fire hydrants indicated in Table C105.1 increased by 100%.~~

~~K. H. Change Section 510 to read:~~

~~Section 510.
Maintenance of In-Building Emergency Communication Equipment.~~

~~510.1. General. In-building emergency communication equipment shall be maintained in accordance with USBC and the provisions of this section.~~

~~510.2. Additional in-building emergency communications installations. If it is determined by the locality that increased amplification of their emergency communication system is needed, the building owner shall allow the locality access as well as provide appropriate space within the building to install and maintain necessary additional communication equipment by the locality. If the building owner denies the locality access or appropriate space, or~~

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both, the building owner shall be responsible for the installation and maintenance of these additional systems.

510.3. Field tests. After providing reasonable notice to the owner or their representative, the fire official, police chief, or their agents shall have the right during normal business hours, or other mutually agreed upon time, to enter onto the property to conduct field tests to verify that the required level of radio coverage is present at no cost to the owner.

13VAC5-51-133.5. IFC Chapter 6. Building Services and Systems.

A. Add a note to Section 603.7 to read:

Note: The fire code official may request a copy of the latest certificate of inspection from the Virginia Department of Labor and Industry for boilers and pressure vessels subject to such requirements. When the certificate is not available, the fire code official shall notify the Department of Labor and Industry to ensure that the required maintenance and testing is performed in accordance the Virginia Boiler and Pressure Vessel Regulations (16VAC25-50).

B. Add Section ~~604.6~~ 604.7 to read:

~~604.6~~ 604.7. Testing of Battery Powered Emergency Lights and Exit Signs. Required emergency lighting utilizing battery powered emergency lights or exit signs, or both, shall be tested annually. The emergency lights and exit signs shall be tested for proper operation for the time period established in the building code in effect when the equipment was installed. Written records of tests shall be retained by the owner of the building for a minimum of two years after the test is conducted and shall be made available to the fire code official upon request.

C. Change Section 605.10.1 to read:

605.10.1. Listed and labeled. Only portable electric space heaters listed and labeled in accordance with UL 1278 shall be used.

13VAC5-51-135. IFC Chapter 9. Fire Protection Systems.

A. Change Section 901.4.2 to read:

901.4.2. Nonrequired fire protection systems. Nonrequired fire protection systems shall be maintained to function as originally installed. If any such systems are to be reduced in function or discontinued, approval shall be obtained from the building official in accordance with Section 103.8.1 of Part I of the USBC.

B. Delete Section ~~901.4.3~~ 901.4.4.

C. Change Section 901.6 to read:

901.6. Inspection, testing and maintenance. To the extent that equipment, systems, devices, and safeguards, such as fire detection, alarm and extinguishing systems, which were provided and approved by the building official when constructed, shall be maintained in an operative condition at all times. And where such equipment, systems, devices,

and safeguards are found not to be in an operative condition, the fire official shall order all such equipment to be rendered safe in accordance with the USBC.

D. Add Section ~~901.10~~ 901.11 to read:

~~901.10~~ 901.11. Defective equipment. When the fire official determines through investigation or testing or reports by a nationally recognized testing agency that specific, required water sprinkler or water-spray extinguishing equipment has been identified as failing to perform or operate through not less than 30 randomly selected sprinkler heads at four or more building sites anywhere in the nation, the fire official shall order all such equipment to be rendered safe.

E. ~~Change the following definition in Section 902 to read:~~

~~Automatic fire extinguishing system. An approved system of devices and equipment which automatically detects a fire and discharges an approved fire extinguishing agent onto or in the area of a fire. Such system shall include an automatic sprinkler system, unless otherwise expressly stated.~~

F. ~~E.~~ Change item ~~Item~~ 1 in Section 906.1 to read:

1. In Group A, B, E, F, H, I, M, R-1, R-4 and S occupancies.

~~Exception~~ Exceptions:

1. In Groups A, B, and E occupancies equipped throughout with quick response sprinklers, portable fire extinguishers shall be required only in locations specified in Items 2 through 6.

2. In Group I-3 occupancies, portable fire extinguishers shall be permitted to be located at staff locations and the access to such extinguishers shall be permitted to be locked.

G. Add a note to Section 906.1 to read:

Note: In existing buildings, whether fire extinguishers are needed is determined by the USBC or other code in effect when such buildings were constructed.

H. Change Section ~~907.9.2~~ 907.8.2 to read:

~~907.9.2~~ 907.8.2. Testing. Testing shall be performed in accordance with the schedules in Chapter 10 of NFPA 72 or more frequently where required by the fire code official. Where automatic testing is performed at least weekly by a remotely monitored fire alarm control unit specifically listed for the application, the manual testing frequency shall be permitted to be extended to annual. In Group R-1 occupancies, battery-powered single station smoke detectors shall be tested and inspected at one-month intervals.

Exception: Devices or equipment that are inaccessible for safety considerations shall be tested during scheduled shutdowns where approved by the fire code official, but not less than every 18 months.

I. Change Section ~~907.9.5~~ 907.8.5 to read:

~~907.9.5~~ 907.8.5. Maintenance, inspection and testing. The building owner shall be responsible for maintaining the fire and life safety systems in an operable condition at all times. Service personnel shall meet the qualification requirements of NFPA 72 for maintaining, inspecting and testing such systems. A written record shall be maintained and shall be made available to the fire code official. In addition to all applicable information contained in Figure 10.6.2.3 of NFPA 72, the written record of inspections, testing and maintenance shall contain the following minimum information:

1. Date, name and address of property.
2. Name of person performing inspection, maintenance and tests, or combination thereof, and affiliation, business address and telephone number.
3. Name, address and representative of approving agency or agencies.
4. Test frequency.
5. Designation of the detector or detectors tested (for example, "Test performed in accordance with Section _____").
6. Physical location (for example, "Heat detector in main kitchen; horn-strobe in Room 115.") and a list of all initiating and notification devices and appliances tested.
7. Functional list of detectors and required sequence of operations.
8. Check of all smoke detectors.
9. Loop resistance for all fixed-temperature, line-type detectors.
10. Other tests as required by either the equipment manufacturer's published instructions or the authority having jurisdiction.
11. Signature of tester and approved authority representative.
12. Disposition of problems identified during test (examples, "Owner notified," "Problem corrected or successfully retested, or both," "Device abandoned in place.").

J. Add Change Section 908.7 to read:

908.7. Carbon monoxide alarms. Carbon monoxide alarms shall be maintained as approved.

K. Delete Section 908.7.1.

13VAC5-51-138. IFC Chapter 11. Construction Requirements for Existing Buildings.

Delete Chapter 11 in its entirety.

13VAC5-51-140. IFC Chapter ~~22~~ 23. Service Stations Motor Fuel-Dispensing Facilities and Repair Garages.

A. Change Section ~~2205.4~~ 2305.4 to read:

~~2205.4~~ 2305.4. Sources of ignition. Smoking and open flames shall be prohibited within 20 feet (6096 mm) of a

fuel dispensing device. The engines of vehicles being fueled shall be shut off during fueling. Electrical equipment shall be in accordance with NFPA 70.

B. Change Section ~~2206.2.1.1~~ 2306.2.1.1 to read:

~~2206.2.1.1~~ 2306.2.1.1. Inventory control and leak detection for underground tanks. Accurate inventory records shall be maintained on underground fuel storage tanks for indication of possible leakage from tanks and piping. The records shall be kept at the premises or made available for inspection by the fire official within 24 hours of a written or verbal request and shall include records for each tank. Where there is more than one system consisting of tanks serving separate pumps or dispensers for a product, the inventory record shall be maintained separately for each tank system.

Owners and operators of underground fuel storage tanks shall provide release detection for tanks and piping that routinely contain flammable and combustible liquids in accordance with one of the following methods:

1. Monthly inventory control to detect a release of at least 1.0% of flow-through plus 130 gallons.
2. Manual tank gauging for tanks with 2,000 gallon capacity or less when measurements are taken at the beginning and ending of a 36-hour to 58-hour period during which no liquid is added to or removed from the tank.
3. Tank tightness testing capable of detecting a 0.1 gallon per hour leak rate.
4. Automatic tank gauging that tests for loss of liquid.
5. Vapor monitoring for vapors within the soil of the tank field.
6. Groundwater monitoring when the groundwater is never more than 20 feet from the ground surface.
7. Interstitial monitoring between the underground tank and a secondary barrier immediately around or beneath the tank.
8. Other approved methods that have been demonstrated to be as effective in detecting a leak as the methods listed above.

A consistent or accidental loss of product shall be immediately reported to the fire official.

13VAC5-51-145. IFC Chapter ~~27~~ 50. Hazardous Materials - General Provisions.

A. Add the following language to the end of Section ~~2701.5.1~~ 5001.5.1 to read:

The HMMP shall be maintained onsite for use by emergency responders, and shall be updated not less than annually.

B. Add the following language to the end of Section ~~2701.5.2~~ 5001.5.2 to read:

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The HMIS shall be maintained onsite or readily available through another means where approved by the fire code official for use by temporary responders, and shall be updated not less than annually.

C. Add Sections ~~2701.5.3~~, ~~2701.5.3.1~~ 5001.5.3, 5001.5.3.1, and ~~2701.5.3.2~~ 5001.5.3.2 to read:

~~2701.5.3~~ 5001.5.3. Repository container. When a HMMP or HMIS is required, the owner or operator shall provide a repository container (lock box) or other approved means for the storage of items required in Sections ~~2701.5.1~~ 5001.5.1 and ~~2701.5.2~~ 5001.5.2 so as to be readily available to emergency response personnel.

~~2701.5.3.1~~ 5001.5.3.1. Location and identification. The repository container (lock box) shall be located, installed and identified in an approved manner.

~~2701.5.3.2~~ 5001.5.3.2. Keying. All repository containers (lock boxes) shall be keyed as required by the fire code official.

D. Change Section ~~2703.3.1.4~~ 5003.3.1.4 to read:

~~2703.3.1.4~~ 5003.3.1.4. Responsibility for cleanup. The person, firm or corporation responsible for an unauthorized discharge shall institute and complete all actions necessary to remedy the effects of such unauthorized discharge, whether sudden or gradual, at no cost to the jurisdiction. The fire code official may require records and receipts to verify cleanup and proper disposal of unauthorized discharges. When deemed necessary by the fire code official, cleanup may be initiated by the fire department or by an authorized individual or firm. Costs associated with such cleanup shall be borne by the owner, operator or other person responsible for the unauthorized discharge.

13VAC5-51-150. IFC Chapter ~~33~~ 56. Explosives and Fireworks.

A. Change exception 4 in Section ~~3301.1~~ 5601.1 to read:

4. The possession, storage, and use of not more than 15 pounds (6.81 kg) of commercially manufactured sporting black powder, 20 pounds (9 kg) of smokeless powder and any amount of small arms primers for hand loading of small arms ammunition for personal consumption.

B. Add exceptions 10, 11 and 12 to Section ~~3301.1~~ 5601.1 to read:

10. The storage, handling, or use of explosives or blasting agents pursuant to the provisions of Title 45.1 of the Code of Virginia.

11. The display of small arms primers in Group M when in the original manufacturer's packaging.

12. The possession, storage and use of not more than 50 pounds (23 kg) of commercially manufactured sporting black powder, 100 pounds (45 kg) of smokeless powder, and small arms primers for hand loading of small arms ammunition for personal consumption in Group R-3 or R-5, or 200 pounds (91 kg) of smokeless powder when stored

in the manufacturer's original containers in detached Group U structures at least 10 feet (3048 mm) from inhabited buildings and are accessory to Group R-3 or R-5.

C. Change exception 4 in Section ~~3301.1.3~~ 5601.1.3 to read:

4. The possession, storage, sale, handling and use of permissible fireworks where allowed by applicable local or state laws, ordinances and regulations provided such fireworks comply with CPSC 16 CFR, Parts 1500-1507, and DOTn 49 CFR, Parts 100-178, for consumer fireworks.

D. Add exception 5 to Section ~~3301.1.3~~ 5601.1.3 to read:

5. The sale or use of materials or equipment when such materials or equipment is used or to be used by any person for signaling or other emergency use in the operation of any boat, railroad train or other vehicle for the transportation of persons or property.

E. Change entire Section ~~3301.2~~ 5601.2 to read:

~~3301.2~~ 5601.2. Permit required. Permits shall be required as set forth in Section 107.2 and regulated in accordance with this section. The manufacture, storage, possession, sale and use of fireworks or explosives shall not take place without first applying for and obtaining a permit.

~~3301.2.1~~ 5601.2.1. Residential uses. No person shall keep or store, nor shall any permit be issued to keep, possess or store, any fireworks or explosives at any place of habitation, or within 100 feet (30,480 mm) thereof.

Exception: Storage of smokeless propellant, black powder, and small arms primers for personal use and not for resale in accordance with Section ~~3306~~ 5606.

~~3301.2.2~~ 5601.2.2. Sale and retail display. Except for the Armed Forces of the United States, Coast Guard, National Guard, federal, state and local regulatory, law enforcement and fire agencies acting in their official capacities, explosives shall not be sold, given, delivered or transferred to any person or company not in possession of a valid permit. The holder of a permit to sell explosives shall make a record of all transactions involving explosives in conformance with Section ~~3303.2~~ 5603.2 and include the signature of any receiver of the explosives. No person shall construct a retail display nor offer for sale explosives, explosive materials, or fireworks upon highways, sidewalks, public property, or in assembly or educational occupancies.

~~3301.2.3~~ 5601.2.3. Permit restrictions. The fire official is authorized to limit the quantity of explosives, explosive materials, or fireworks permitted at a given location. No person, possessing a permit for storage of explosives at any place, shall keep or store an amount greater than authorized in such permit. Only the kind of explosive specified in such a permit shall be kept or stored.

~~3301.2.3.1~~ 5601.2.3.1. Permit applicants. As a condition of a permit as provided for in Section 107.5, the fire official shall not issue a permit to manufacture, store, handle, use

or sell explosives or blasting agents to any applicant who has not provided on the permit application the name and signature of a designated individual as representing the applicant. When, as provided for in Section 107.2 or 107.6, a permit is required to conduct a fireworks display, as a condition of permit as provided for in Section 107.5, the fire official shall not issue a permit to design, setup or conduct a fireworks display to any applicant who has not provided on the permit application the name and signature of a designated individual as representing the applicant.

If the applicant's designated individual changes or becomes no longer qualified to represent the applicant as responsible management or designated individual, the applicant shall notify the fire official who issued the permit on the change of status of the designated individual. The notice is to be made prior to the use of any explosives or conducting a fireworks display but in no case shall the notification occur more than seven days after the change of status and shall provide the name of another designated individual. The fire official may revoke or require the reissuance of a permit based on a change of permit conditions or status or inability to provide another designated individual.

~~3301.2.3.1.1~~ 5601.2.3.1.1. BCC: The SFMO shall process all applications for a BCC for compliance with § 27-97.2 of the Code of Virginia and will be the sole provider of a BCC. Using forms provided by the SFMO, a BCC may be applied for and issued to any person who submits to the completion of a background investigation by providing fingerprints and personal descriptive information to the SFMO. The SFMO shall forward the fingerprints and personal descriptive information to the Central Criminal Records Exchange for submission to the Federal Bureau of Investigation for the purpose of obtaining a national criminal history records check regarding such applicant.

~~3301.2.3.1.2~~ 5601.2.3.1.2. Issuance of a ~~background clearance card~~ BCC: The issuance of a ~~background clearance card~~ BCC shall be denied if the applicant or designated person representing an applicant has been convicted of any felony, whether such conviction occurred under the laws of the Commonwealth, or any other state, the District of Columbia, the United States or any territory thereof, unless his civil rights have been restored by the Governor or other appropriate authority.

~~3301.2.3.1.3~~ 5601.2.3.1.3. Fee for ~~background clearance card~~ BCC: The fee for obtaining or renewing a ~~background clearance card~~ BCC from the SFMO shall be \$150 plus any additional fees charged by other agencies for fingerprinting and for obtaining a national criminal history record check through the Central Criminal Records Exchange to the Federal Bureau of Investigation.

~~3301.2.3.1.4~~ 5601.2.3.1.4. Revocation of a ~~background clearance card~~ BCC: After issuance of a ~~background clearance card~~ BCC, subsequent conviction of a felony will be grounds for immediate revocation of a ~~background~~

~~clearance card~~ BCC, whether such conviction occurred under the laws of the Commonwealth, or any other state, the District of Columbia, the United States or any territory thereof. The ~~card~~ BCC shall be returned to the SFMO immediately. An individual may reapply for his ~~background clearance card~~ BCC if his civil rights have been restored by the Governor or other appropriate authority.

~~3301.2.4~~ 5601.2.4. Financial responsibility. Before a permit is issued, as required by Section ~~3301.2~~ 5601.2, the applicant shall file with the jurisdiction a corporate surety bond in the principal sum of \$500,000 or a public liability insurance policy for the same amount, for the purpose of the payment of all damages to persons or property which arise from, or are caused by, the conduct of any act authorized by the permit upon which any judicial judgment results. The legal department of the jurisdiction may specify a greater amount when conditions at the location of use indicate a greater amount is required. Government entities shall be exempt from this bond requirement.

~~3301.2.4.1~~ 5601.2.4.1. Blasting. Before approval to do blasting is issued, the applicant for approval shall file a bond or submit a certificate of insurance in such form, amount, and coverage as determined by the legal department of the jurisdiction to be adequate in each case to indemnify the jurisdiction against any and all damages arising from permitted blasting but in no case shall the value of the coverage be less than ~~\$500,000~~ \$1,000,000.

Exception: Filing a bond or submitting a certificate of liability insurance is not required for blasting on real estate parcels of five or more acres conforming to the definition of "real estate devoted to agricultural use" or "real estate devoted to horticultural use" in § 58.1-3230 of the Code of Virginia and conducted by the owner of such real estate.

~~3301.2.4.2~~ 5601.2.4.2. Fireworks display. The permit holder shall furnish a bond or certificate of insurance in an amount deemed adequate by the legal department of the jurisdiction for the payment of all potential damages to a person or persons or to property by reason of the permitted display, and arising from any acts of the permit holder, the agent, employees or subcontractors, but in no case shall the value of the coverage be less than ~~\$500,000~~ \$1,000,000.

F. Change entire Section ~~3301.4~~ 5601.4 to read:

~~3301.4~~ 5601.4. Qualifications. Persons in charge of magazines, blasting, fireworks display, or pyrotechnic special effect operations shall not be under the influence of alcohol or drugs which impair sensory or motor skills, shall be at least 21 years of age and possess knowledge of all safety precautions related to the storage, handling or use of explosives, explosive materials or fireworks.

~~3301.4.1~~ 5601.4.1. Certification of blasters and pyrotechnicians. Certificates as a restricted blaster, unrestricted blaster or pyrotechnician will be issued upon proof of successful completion of an examination approved

Regulations

by the SFMO commensurate to the certification sought and completion of a background investigation for compliance with § 27-97.2 of the Code of Virginia. The applicant for certification shall submit proof to the SFMO of the following experience:

1. For certification as a restricted blaster, at least one year under direct supervision by a certified unrestricted blaster, certified restricted blaster or other person(s) approved by the SFMO.
2. For certification as an unrestricted blaster, at least one year under direct supervision by a certified unrestricted blaster or other person or persons approved by the SFMO.
3. For certification as a pyrotechnician, aerial, or pyrotechnician, proximate, applicant was in responsible charge of or has assisted in the documented design, setup and conducting of a fireworks display on at least six occasions within the 24 months immediately preceding the application for certification.

The SFMO shall process all certification applicants for compliance with § 27-97.2 of the Code of Virginia and will be the sole provider of blaster and pyrotechnician certifications.

Exception: The use of explosives by the owner of real estate parcels of five or more acres conforming to the definition of "real estate devoted to agricultural use" or "real estate devoted to horticultural use" in § 58.1-3230 of the Code of Virginia when blasting on such real estate.

~~3301.4.2~~ 5601.4.2. Certification issuance. The issuance of a certification as a blaster or pyrotechnician shall be denied if the applicant has (i) been convicted of any felony, whether such conviction occurred under the laws of the Commonwealth, or any other state, the District of Columbia, the United States or any territory thereof, unless his civil rights have been restored by the Governor or other appropriate authority, (ii) has not provided acceptable proof or evidence of the experience required in Section ~~3301.4.1~~ 5601.4.1, or (iii) has not provided acceptable proof or evidence of the continued training or education required in Section ~~3301.4.5~~ 5601.4.5.

~~3301.4.3~~ 5601.4.3. Fee for certification. The fee for obtaining or renewing a blaster or pyrotechnician certificate from the SFMO shall be \$150 plus any additional fees charged by other agencies for fingerprinting and for obtaining a national criminal history record check through the Central Criminal Records Exchange to the Federal Bureau of Investigation.

~~3301.4.4~~ 5601.4.4. Revocation of a blaster or pyrotechnician certification. After issuance of a blaster or pyrotechnician certification, subsequent conviction of a felony will be grounds for immediate revocation of a blaster or pyrotechnician certification, whether such conviction occurred under the laws of the Commonwealth,

or any other state, the District of Columbia, the United States or any territory thereof. The certification shall be returned to the SFMO immediately. An individual may subsequently reapply for his blaster or pyrotechnician certification if his civil rights have been restored by the Governor or other appropriate authority.

~~3301.4.5~~ 5601.4.5. Expiration and renewal of a BCC, or blaster or pyrotechnician certification. A certificate for an unrestricted blaster, restricted blaster or pyrotechnician shall be valid for three years from the date of issuance. A BCC shall be valid for three years from the date of issuance. Renewal of the unrestricted blaster certificate will be issued upon proof of at least 16 accumulated hours of continued training or education in the use of explosives within three consecutive years and a background investigation for compliance with § 27-97.2 of the Code of Virginia. Renewal of the restricted blaster certificate will be issued upon proof of at least eight accumulated hours of continued training or education in the use of explosives within three consecutive years and a background investigation for compliance with § 27-97.2 of the Code of Virginia. Renewal of the pyrotechnician certificate will be issued upon proof of at least 12 accumulated hours of continued training or education in the subject areas of explosives storage; the design, setup or conduct of a fireworks display within three consecutive years; and a background investigation for compliance with § 27-97.2 of the Code of Virginia. The continued training or education required for renewal of a blaster or pyrotechnician certificate shall be obtained during the three years immediately prior to the certificate's published expiration date. Failure to renew a blaster or pyrotechnician certificate in accordance with this section shall cause an individual to obtain another blaster or pyrotechnician certificate upon compliance with Section ~~3301.4.1~~ 5601.4.1 to continue engaging in the unsupervised use of explosives or conducting a fireworks display.

G. Change Section ~~3301.7~~ 5601.7 to read:

~~3301.7~~ 5601.7. Seizure. The fire official is authorized to remove or cause to be removed or disposed of in an approved manner, at the expense of the owner, fireworks offered or exposed for sale, stored, possessed or used in violation of this chapter.

H. Add the following to the list of definitions to in Section ~~3302.1~~ to read 5602.1:

~~Background clearance card (BCC). An identification card issued to an individual who is not a certified blaster or pyrotechnician and is responsible management or an employee of a company, corporation, firm or other entity, solely for the purpose of submitting an application to the fire official for a permit to manufacture, use, handle, store, or sell explosive materials; or conduct a fireworks display. A person to whom a BCC has been issued can fulfill the role of a designated individual on an application for a~~

~~permit to manufacture, use, handle, store, or sell explosive materials; or on an application for a permit to design, setup and conduct a fireworks display.~~

~~Blaster, restricted. Any person engaging in the use of explosives or blasting agents utilizing five pounds (2.25 kg) or less per blasting operation and using instantaneous detonators. A certified restricted blaster can fulfill the role of a designated individual on an application for permit to manufacture, use, handle, store, or sell explosive materials.~~

~~Blaster, unrestricted. Any person engaging in the use of explosives or blasting agents without limit to the amount of explosives or blasting agents or type of detonator. A certified unrestricted blaster can fulfill the role of a designated individual on an application for permit to manufacture, use, handle, store, or sell explosive materials.~~

~~Design. For the purposes of a fireworks display, either inside a building or structure or outdoors, it shall mean the pyrotechnician who will be in attendance and makes the final artistic determination for the placement of fireworks and ground display pieces suitable for the display site.~~

~~Designated individual. A person who is in possession of a BCC issued by the SFMO, certified by the SFMO as a pyrotechnician, or a restricted or unrestricted blaster, any of whom are responsible for ensuring compliance with state law and regulations relating to blasting agents and explosives and applying for explosives or firework permits; is at least 21 years of age; and demonstrates the capability to effectively communicate safety messages verbally and in writing in the English language.~~

Fireworks

Fireworks, 1.4G.

Fireworks, 1.3G.

~~Permissible fireworks. Any sparklers, fountains, Pharaoh's serpents, caps for pistols, or pinwheels commonly known as whirligigs or spinning jennies.~~

~~Pyrotechnician (fireworks operator). Any person supervising or engaged in the design, setup or conducting of any fireworks display, either inside a building or outdoors. A certified pyrotechnician can fulfill the role of a designated individual on an application for a permit for a fireworks display.~~

~~Pyrotechnician, aerial. A person supervising or engaged in the design, setup or conducting of a outdoor aerial fireworks display performed in accordance with the regulations as set forth in this code and NFPA 1123, a referenced standard for fireworks displays.~~

~~Pyrotechnician, proximate. A person supervising or engaged in the design, setup or conducting of a fireworks display, either inside a building or outdoors, performed in accordance with the regulations as set forth in this code and NFPA 1126, a referenced standard for the use of pyrotechnics before a proximate audience.~~

~~Responsible management. A person who is any of the following:~~

- ~~1. The sole proprietor of a sole proprietorship.~~
- ~~2. The partners of a general partnership.~~
- ~~3. The managing partners of a limited partnership.~~
- ~~4. The officers of a corporation.~~
- ~~5. The managers of a limited liability company.~~
- ~~6. The officers or directors of an association, or both.~~
- ~~7. Individuals in other business entities recognized under the laws of the Commonwealth as having a fiduciary responsibility to the firm.~~

Smokeless propellants.

~~Sole proprietor. A person or individual, not a corporation, who is trading under his own name or under an assumed or fictitious name pursuant to the provisions of § 59.1-69 through 59.1-76 of the Code of Virginia.~~

- ~~1. Change the following definitions in Section 3302.1 to read:~~

~~Fireworks. Any firecracker, torpedo, skyrocket, or other substance or object, of whatever form or construction, that contains any explosive or inflammable compound or substance, and is intended, or commonly known, as fireworks and that explodes, rises into the air or travels laterally, or fires projectiles into the air. Fireworks shall not include automobile flares, paper caps containing not more than an average of 0.25 grain (16 mg) of explosive content per cap or toy pistols, toy canes, toy guns or other devices utilizing such caps and items commonly known as party poppers, pop rocks and snap n pops. Fireworks may be further delineated and referred to as:~~

~~Fireworks, 1.4G. (Formerly known as Class C, Common Fireworks.) Small fireworks devices containing restricted amounts of pyrotechnic composition designed primarily to produce visible or audible effects by combustion. Such 1.4G fireworks that comply with the construction, chemical composition, and labeling regulations of the DOTn for Fireworks, UN 0336, and the U.S. Consumer Product Safety Commission as set forth in CPSC 16 CFR: Parts 1500 and 1507, are not explosive materials for the purpose of this code.~~

~~Fireworks, 1.3G. (Formerly Class B, Special Fireworks.) Large fireworks devices, which are explosive materials, intended for use in fireworks displays and designed to produce audible or visible effects by combustion, deflagration, or detonation. Such 1.3G fireworks include, but are not limited to, firecrackers containing more than 130 milligrams (2 grains) of explosive composition, aerial shells containing more than 40 grams of pyrotechnic composition, and other display pieces that exceed the limits for classification as 1.4G fireworks. Such 1.3G fireworks are also described as Fireworks, UN0335 by the DOTn.~~

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~~Smokeless propellants. Solid propellants, commonly referred to as smokeless powders or any propellant classified by DOT as a smokeless propellant in accordance with "NA3178, Smokeless Powder for Small Arms," used in small arms ammunition, firearms, cannons, rockets, propellant-actuated devices, and similar articles.~~

~~J. I.~~ Change Section ~~3305.1~~ 5605.1 to read:

~~3305.1~~ 5605.1. General. The manufacture, assembly and testing of explosives, ammunition, blasting agents and fireworks shall comply with the requirements of this section, Title 59.1, Chapter 11 of the Code of Virginia, and NFPA 495 or NFPA 1124.

Exceptions:

1. The hand loading of small arms ammunition prepared for personal use and not offered for resale.
2. The mixing and loading of blasting agents at blasting sites in accordance with NFPA 495.
3. The use of binary explosives or phosphoric materials in blasting or pyrotechnic special effects applications in accordance with NFPA 495 or NFPA 1126.

~~K. J.~~ Add Section ~~3305.1~~ 5605.1.1 to read:

~~3305.1~~ 5605.1.1. Permits. Permits for the manufacture, assembly and testing of explosives, ammunition, blasting agents and fireworks shall be required as set forth in Section 107.2 and regulated in accordance with this section. A permit to manufacture any explosive material in any quantity shall be prohibited unless such manufacture is authorized by a federal license and conducted in accordance with recognized safety practices.

~~L. K.~~ Change Section ~~3306.4~~ 5606.4 to read:

~~3306.4~~ 5606.4. Storage in residences. Propellants for personal use in quantities not exceeding 50 pounds (23 kg) of black powder or 100 pounds (45 kg) of smokeless powder shall be stored in original containers in occupancies limited to ~~Group~~ Groups R-3 and R-5, or 200 pounds (91 kg) of smokeless powder when stored in the manufacturer's original containers in detached Group U structures that are at least 10 feet from inhabited buildings and are accessory to Group R-3 or R-5. In other than Group R-3 or R-5, smokeless powder in quantities exceeding 20 pounds (9 kg) but not exceeding 50 pounds (23 kg) shall be kept in a wooden box or cabinet having walls of at least one inch (25 mm) nominal thickness or equivalent.

~~M. L.~~ Delete Sections ~~3306.4~~ 5606.4.1, 5606.4.2, and ~~3306.4~~ 5606.4.3.

~~N. M.~~ Change Section ~~3306.5.1~~ 5606.5.1.1 to read:

~~3306.5.1~~ 5606.5.1.1. Smokeless propellant. No more than 100 pounds (45 kg) of smokeless propellants, in containers of 8 pounds (3.6 kg) or less capacity, shall be displayed in Group M occupancies.

~~O. N.~~ Delete Section ~~3306.5.1~~ 5606.5.1.3.

~~P. O.~~ Change Section ~~3306.5.2~~ 5606.5.2.1 to read:

~~3306.5.2~~ 5606.5.2.1 Smokeless propellant. Commercial stocks of smokeless propellants shall be stored as follows:

1. Quantities exceeding 20 pounds (9 kg), but not exceeding 100 pounds (45 kg) shall be stored in portable wooden boxes having walls of at least one inch (25 mm) nominal thickness or equivalent.

2. Quantities exceeding 100 pounds (45 kg), but not exceeding 800 pounds (363 kg), shall be stored in storage cabinets having walls at least one inch (25 mm) nominal thickness or equivalent. Not more than 400 pounds (182 kg) shall be stored in any one cabinet, and cabinets shall be separated by a distance of at least 25 feet (7620 mm) or by a fire partition having a fire-resistance rating of at least one hour.

3. Storage of quantities exceeding 800 pounds (363 kg), but not exceeding 5,000 pounds (2270 kg) in a building shall comply with all of the following:

3.1. The storage is inaccessible to unauthorized personnel.

3.2. Smokeless propellant shall be stored in nonportable storage cabinets having wood walls at least one inch (25 mm) nominal thickness or equivalent and having shelves with no more than three feet (914 mm) of vertical separation between shelves.

3.3. No more than 400 pounds (182 kg) is stored in any one cabinet.

3.4. Cabinets shall be located against walls with at least 40 feet (12 192 mm) between cabinets. The minimum required separation between cabinets may be reduced to 20 feet (6096 mm) provided that barricades twice the height of the cabinets are attached to the wall, midway between each cabinet. The barricades must extend a minimum of 10 feet (3048 mm) outward, be firmly attached to the wall, and be constructed of steel not less than 0.25 inch thick (6.4 mm), two-inch (51 mm) nominal thickness wood, brick, or concrete block.

3.5. Smokeless propellant shall be separated from materials classified as combustible liquids, flammable liquids, flammable solids, or oxidizing materials by a distance of 25 feet (7620 mm) or by a fire partition having a fire-resistance rating of one hour.

3.6. The building shall be equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

4. Smokeless propellants not stored according to Item 1, 2, or 3 above shall be stored in a Type 2 or 4 magazine in accordance with Section 3304 and NFPA 495.

~~Q. P.~~ Change Section ~~3307.1~~ 5607.1 to read:

~~3307.1~~ 5607.1. General. Blasting operations shall be conducted only by persons certified by the SFMO as a restricted or unrestricted blaster or shall be supervised on-

site by a person properly certified by the SFMO as a restricted or unrestricted blaster.

~~R. Q.~~ Add Section ~~3307.16~~ 5607.16 to read:

~~3307.16~~ 5607.16. Blast records. A record of each blast shall be kept and retained for at least five years and shall be available for inspection by the code official. The record shall contain the following minimum data:

1. Name of contractor;
2. Location and time of blast;
3. Name of certified blaster in charge;
4. Type of material blasted;
5. Number of holes bored and spacing;
6. Diameter and depth of holes;
7. Type and amount of explosives;
8. Amount of explosive per delay of 8 milliseconds or greater;
9. Method of firing and type of circuit;
10. Direction and distance in feet to nearest dwelling, public building, school, church, commercial or institutional building;
11. Weather conditions;
12. Whether or not mats or other precautions were used;
13. Type of detonator and delay period;
14. Type and height of stemming; and
15. Seismograph record when utilized.

Exception: Subdivisions 8 and 13 of this section are not applicable to restricted blasters.

~~S. R.~~ Change Section ~~3308.2~~ 5608.2 to read:

~~3308.2~~ 5608.2. Permit application. Prior to issuing permits for a fireworks display, plans for the fireworks display, inspections of the display site and demonstrations of the display operations shall be approved. A plan establishing procedures to follow and actions to be taken in the event that a shell fails to ignite in, or discharge from, a mortar or fails to function over the fallout area or other malfunctions shall be provided to the fire code official.

In addition to the requirements of Section ~~3301.2.3.1~~ 5601.2.3.1, a permit to conduct a fireworks display shall not be issued to any applicant without the applicant identifying on the application the pyrotechnician who will

be in responsible charge of the fireworks display and who is appropriately certified as a pyrotechnician in accordance with Section ~~3301.4.1~~ 5601.4.1.

Exception: Permits are not required for the use or display of permissible fireworks on private property with the consent of the owner of such property.

~~T. S.~~ Change Section ~~3308.3~~ 5608.3 to read:

~~3308.3~~ 5608.3. Approved fireworks displays. Approved fireworks displays shall include only the approved fireworks 1.3G, fireworks 1.4G, fireworks 1.4S and pyrotechnic articles 1.4G. The design, setup, conducting or direct on-site supervision of the design, setup and conducting of any fireworks display, either inside a building or outdoors, shall be performed only by persons certified by the SFMO in accordance with Section ~~3301.4.1~~ 5601.4.1 as a pyrotechnician (firework operator) and at least one person properly certified by the SFMO as a pyrotechnician shall be present at the site where the fireworks display is being conducted. The approved fireworks shall be arranged, located, discharged and fired in a manner that will not pose a hazard to property or endanger any person.

Exception: Certification as a pyrotechnician is not required for the use or display of permissible fireworks when conducted on private property with the consent of the owner of such property.

~~U. T.~~ Change Section ~~3308.4~~ 5608.4 to read:

~~3308.4~~ 5608.4 Clearance. Spectators, spectator parking areas, and dwellings, buildings or structures shall not be located within the display site. The site for the outdoor land or water display shall have at least 100-ft/in. (31-m/2.4mm) radius of internal mortar distance of the largest shell to be fired as shown in Table ~~3308.4~~ 5608.4.

Exceptions:

1. This provision shall not apply to pyrotechnic special effects and fireworks displays using Division 1.4G materials before a proximate audience in accordance with NFPA 1126.
2. This provision shall not apply to unoccupied dwellings, buildings and structures with the approval of the building owner and the fire code official.

~~V. U.~~ Add Table ~~3308.4~~ 5608.4 to read:

Table ~~3308.4~~ 5608.4.

Distances for Outdoor Fireworks Display Sites: Minimum Separation Distances from Mortars to Spectators for Land and Water Displays.									
Mortar Size ^a		Minimum Secured Diameter of Site		Vertical Mortars ^b		Angled Mortars ^c 1/3 offset		Mortars to Special Hazards ^d	
in.	mm	ft	m	ft	m	ft	m	ft	m
<3	<76	300	92	150	46	100	31	300	92

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3	76	600	183	300	92	200	61	600	183
4	102	800	244	400	122	266	81	800	244
5	127	1000	305	500	152	334	102	1000	305
6	152	1200	366	600	183	400	122	1200	366
7	178	1400	427	700	213	467	142	1400	427
8	203	1600	488	800	244	534	163	1600	488
10	254	2000	610	1000	305	667	203	2000	610
12	305	2400	732	1200	366	800	244	2400	732
>12	Requires the approval of the fire official								

^aAerial shells, mines, and comets shall be classified and described only in terms of the inside diameter of the mortar from which they are fired (e.g., 3-in. (76-mm) aerial shells, mines and comets are only for use in 3-in. (76mm) mortars).

^bWhere the mortars are positioned vertically, the mortars shall be placed at the approximate center of the display site.

^cMortars shall be permitted to be angled during a display to allow for wind and to carry shells away from the main spectator viewing areas. For angled mortars, the minimum secured diameter of the display site does not change. Only the location of the mortars within the secured area changes when the mortars are angled.

^dNote that this is only the distance to the special hazards. The minimum secured diameter of the display site does not change.

V. Add Sections 5608.4.1 and 5608.4.2 to read:

5608.4.1. Non-splitting, non-bursting comets and mines. For non-splitting or non-bursting comets and mines containing only stars or non-splitting or non-bursting comets, the minimum required radius of the display site shall be 50 feet per inch (15.24 m per 25.4 mm) of the internal mortar diameter of the largest comet or mine to be fired, one-half that shown in Table 5608.4.

5608.4.2. Special distance requirements. The minimum distance requirements of Table 5608.4 shall be adjusted as follows:

1. For chain-fused aerial shells and comets and mines to be fired from mortars, racks, or other holders that are sufficiently strong to prevent their being repositioned in the event of an explosive malfunction of the aerial shells, comets, or mines, the minimum required radius shall be the same as that required in Sections 5608.4 and 5608.4.1. For chain-fused aerial shells and comets and mines to be fired from mortars, racks, or other holders that are not sufficiently strong to prevent their being repositioned in the event of an explosive malfunction of the aerial shells, comets, or mines, or if there is doubt concerning the strength of racks holding chain-fused mortars, based upon the largest mortar in the sequence, the minimum required radius shall be double that required in Sections 5608.4 and 5608.4.1.

2. Distances from the point of discharge of any firework to a health care or detention and correctional facility, or the bulk storage of materials that have flammability, explosive, or toxic hazard shall be at least twice the distances specified in Table 5608.4.

3. The minimum required spectator separation distance for roman candles and cakes that produce aerial shells, comets, or mine effects shall be the same as the minimum required radius specified in Table 5608.4.

4. Aerial shells, comets and mines, and roman candles and cakes shall be permitted to be angled if the dud shells or components are carried away from the main spectator area and either of the following requirements is satisfied:

4.1. The offset specified in Table 5608.4 is followed.

4.2. The separation distance is correspondingly increased in the direction of the angle.

If the offset provided in Table 5608.4 is followed, the mortars or tubes shall be angled so that any dud shells or components fall at a point approximately equal to the offset of the mortars or tubes from the otherwise required discharge point but in the opposite direction.

13VAC5-51-154. IFC Chapter 38 61. Liquefied Petroleum Gases.

A. Change Section ~~3801.2~~ 6101.2 to read:

~~3801.2~~ 6101.2. Permits. Permits shall be required as set forth in Section 107.2. Distributors shall not fill an LP-gas container for which a permit is required unless a permit for installation has been issued for that location by the fire code official, except when the container is for temporary use on construction sites.

B. Add Section ~~3806.4~~ 6106.4 to read:

~~3806.4~~ 6106.4. ~~DOT~~ DOTn cylinders filled on site. ~~DOT~~ DOTn cylinders in stationary service that are filled on site and therefore are not under the jurisdiction of ~~DOT~~ DOTn either shall be requalified in accordance with ~~DOT~~ DOTn

requirements or shall be visually inspected within 12 years of the date of manufacture or within five years from May 1, 2008, whichever is later, and within every five years thereafter, in accordance with the following:

1. Any cylinder that fails one or more of the criteria in Item 3 shall not be refilled or continued in service until the condition is corrected.
2. Personnel shall be trained and qualified to perform inspections.
3. Visual inspection shall be performed in accordance with the following:
 - 3.1. The cylinder is checked for exposure to fire, dents, cuts, digs, gouges, and corrosion according to CGA C-6, Standards for Visual Inspection of Steel Compressed Gas Cylinders, except that paragraph 4.2.1(1) of that standard (which requires tare weight certification), shall not be part of the required inspection criteria.
 - 3.2. The cylinder protective collar (where utilized) and the foot ring are intact and are firmly attached.
 - 3.3. The cylinder is painted or coated to retard corrosion.
 - 3.4. The cylinder pressure relief valve indicates no visible damage, corrosion of operating components, or obstructions.
 - 3.5. There is no leakage from the cylinder or its appurtenances that is detectable without the use of instruments.
 - 3.6. The cylinder is installed on a firm foundation and is not in contact with the soil.
 - 3.7. A cylinder that passed the visual inspection shall be marked with the month and year of the examination followed by the letter "E" (example: 10-01E, indicating requalification in October 2001 by the external inspection method).
 - 3.8. The results of the visual inspection shall be documented, and a record of the inspection shall be retained for a five-year period.

Exception: Any inspection procedure outlined in Items 3.1 through 3.8 that would require a cylinder be moved in such a manner that disconnection from the piping system would be necessary shall be omitted, provided the other inspection results do not indicate further inspection is warranted.

~~C. Add Sections 3809.15 and 3809.15.1 to read:~~

~~3809.15. LP Gas cylinder exchange for resale. In addition to other applicable requirements of this chapter, facilities operating cylinder exchange stations for LP gas that are accessible to the public shall comply with the following requirements:~~

- ~~1. Cylinders shall be secured in a lockable, ventilated metal cabinet or other approved enclosure.~~

~~2. Cylinders shall be accessible only by authorized personnel or by use of an automated exchange system in accordance with Section 3809.15.1.~~

~~3. A sign shall be posted on the entry door of the business operating the cylinder exchange stating "DO NOT BRING LP GAS CYLINDERS INTO THE BUILDING" or similar approved wording.~~

~~4. An emergency contact information sign shall be posted within 10 feet of the cylinder storage cabinet. The content, lettering, size, color and location of the required sign shall be as required by the fire code official.~~

~~3809.15.1. Automated Cylinder Exchange Stations. Cylinder exchange stations that include an automated vending system for exchanging cylinders shall comply with the following additional requirements:~~

- ~~1. The vending system shall only permit access to a single cylinder per individual transaction.~~
- ~~2. Cabinets storing cylinders shall be designed such that cylinders can only be placed inside when they are oriented in the upright position.~~
- ~~3. Devices operating door releases for access to stored cylinders shall be permitted to be pneumatic, mechanical or electrically powered.~~
- ~~4. Electrical equipment inside of or within 5 feet of a cabinet storing cylinders, including but not limited to electronics associated with vending operations, shall comply with the requirements for Class 1, Division 2 equipment in accordance with NFPA 70.~~
- ~~5. A manual override control shall be permitted for use by authorized personnel. On newly installed cylinder exchange stations, the vending system shall not be capable of returning to automatic operation after a manual override until the system has been inspected and reset by authorized personnel.~~
- ~~6. Inspections shall be conducted by authorized personnel to verify that all cylinders are secured, access doors are closed and the station has no visible damage or obvious defects that necessitate placing the station out of service. The frequency of inspections shall be as specified by the fire code official.~~

~~D. C. Change Section 3811.2 6111.2 to read:~~

~~3811.2 6111.2. Unattended parking. The unattended parking of LP-gas tank vehicles shall be in accordance with Sections 3811.2.1 6111.2.1 and 3811.2.2 6111.2.2.~~

~~Exception: The unattended outdoor parking of LP-gas tank vehicles may also be in accordance with Section 9.7.2 of NFPA 58.~~

~~13VAC5-51-154.5. IFC Chapter 46. Construction Requirements for Existing Buildings. (Repealed.)~~

~~Delete Chapter 46 in its entirety.~~

Regulations

13VAC5-51-155. IFC Chapter 47 80. Referenced Standards.

Change the referenced standards as follows (standards not shown remain the same):

Standard reference number	Title	Referenced in code section number
CGA C-6 (2001)	Standards for Visual Inspection of Steel Compressed Gas Cylinders	3806.4 6106.4
UL 1037-99	Standard for Antitheft Alarms and Devices	506.1
UL 1278-00	Standard for Movable and Wall- or Ceiling-Hung Electric Room Heaters	605.10.1

DOCUMENTS INCORPORATED BY REFERENCE (13VAC5-51)

The International Fire Code – ~~2009~~ 2012 Edition, International Code Council, Inc., 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001-2070

CGA C-6 – 2001, Standards for Visual Inspection of Steel Compressed Gas Cylinders, Eighth Edition, Compressed Gas Association, 1725 Jefferson Davis Highway, 5th Floor, Arlington, VA 22202-4102

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471 (<http://www.nfpa.org>):

~~NFPA 58-04 58-11, Liquefied Petroleum Gas Code, 2004 Edition, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269~~

~~NFPA 70-08 70-11, National Electrical Code, 2008 Edition, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269~~

~~NFPA 72-07 72-10, National Fire Alarm and Signaling Code, 2007 Edition, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269~~

NFPA 495-10, Explosives Materials Code

NFPA 701-10, Standard Methods of Fire Tests for Flame - Propagation of Textiles and Films

~~NFPA 1123-06 1123-10, Code for Fireworks Display, 2006 Edition, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269~~

NFPA 1124-06, Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles

~~NFPA 1126-06 1126-11, Standard for the Use of Pyrotechnics Before a Proximate Audience, 2006 Edition, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269~~

~~UL 1037-99, Standard for Antitheft Alarms and Devices, Fifth Edition, February 24, 1999, Underwriters Laboratories, Inc., Northbrook, IL 60062~~

UL 1278-00, Standard for Movable and Wall- or Ceiling-Hung Electric Room Heaters, Third Edition, June 21, 2000, Underwriters Laboratories, Inc., Northbrook, IL 60062

VA.R. Doc. No. R12-3161; Filed June 27, 2013, 9:54 a.m.

Proposed Regulation

REGISTRAR'S NOTICE: The Board of Housing and Community Development is claiming an exemption from the Administrative Process Act pursuant to § 2.2-4006 A 12 of the Code of Virginia, which excludes regulations adopted by the Board of Housing and Community Development pursuant to the Uniform Statewide Building Code (§ 36-97 et seq. of the Code of Virginia).

Title of Regulation: **13VAC5-63. Virginia Uniform Statewide Building Code (amending 13VAC5-63-10, 13VAC5-63-20, 13VAC5-63-30, 13VAC5-63-40, 13VAC5-63-80, 13VAC5-63-110, 13VAC5-63-120, 13VAC5-63-130, 13VAC5-63-160, 13VAC5-63-170, 13VAC5-63-180, 13VAC5-63-190, 13VAC5-63-200, 13VAC5-63-210, 13VAC5-63-220, 13VAC5-63-230, 13VAC5-63-240, 13VAC5-63-245, 13VAC5-63-250, 13VAC5-63-260, 13VAC5-63-264, 13VAC5-63-270, 13VAC5-63-280, 13VAC5-63-300, 13VAC5-63-310, 13VAC5-63-320, 13VAC5-63-330, 13VAC5-63-350, 13VAC5-63-360, 13VAC5-63-390, 13VAC5-63-400, 13VAC5-63-410, 13VAC5-63-420, 13VAC5-63-430, 13VAC5-63-434, 13VAC5-63-438, 13VAC5-63-440, 13VAC5-63-450, 13VAC5-63-460, 13VAC5-63-470, 13VAC5-63-480, 13VAC5-63-490, 13VAC5-63-500, 13VAC5-63-510, 13VAC5-63-520, 13VAC5-63-530, 13VAC5-63-540; adding 13VAC5-63-225, 13VAC5-63-235, 13VAC5-63-295, 13VAC5-63-335, 13VAC5-63-445; repealing 13VAC5-63-267, 13VAC5-63-525).**

Statutory Authority: § 36-98 of the Code of Virginia.

Public Hearing Information:

September 23, 2013 - 10 a.m. - Virginia Housing Center, 4224 Cox Road, Glen Allen, VA

Public Comment Deadline: September 29, 2013.

Agency Contact: Stephen W. Calhoun, Regulatory Coordinator, Department of Housing and Community Development, Main Street Centre, 600 East Main Street, Suite 300, Richmond, VA 23219, telephone (804) 371-7000,

TAB 2

Date: 10/16/13

SUMMARY – SFPC CODE CHANGES

DHCD WORKGROUP MEETING 2012 Code Change Cycle

October 11, 2013 at 9:30
Virginia Housing Center

Consensus Code Changes.

<u>Proposal</u>	<u>Description of Change</u>
SFPC 107.5.1, 107.6, and 107.13	Adds an exception for issuance of explosive and firework permits by the SFMO.
SFPC 107.16	Establishes a refund policy. Question on if it applies to permits or to compliance inspections. Ed A. explained that they were trying to make clear that if they do the work and then an event is canceled, they don't get a refund.
SFPC 5601.4.3.1	Establishes a fee if replacement certificates are needed. Would apply to blasters and pyrotechnic certificates.
SFPC 202 and 308.1.6.3	Sky lanterns - Concern over language. National IFC language is the same. Firework industry in support of this change. Sky lanterns are already prohibited by the fire code, this is an attempt to define what they are.
SFPC 307.1	Approved outdoor live fire training exception. Without this change live burnings could not be conducted.
SFPC Chapter 4	Rewrite of Chapter 4 – This is 2015 language that has been approved. Glenn D. indicated that there was no change, it just organizes groups. Ed will substitute fire drills for I-1 condition 2 that ALF's would support.
SFPC 404.2	Fire evacuation plans required for R-3 and R-5 bed and breakfasts. B and B's support.
SFPC IFC 3406.1	Fire apparatus access roads for tire storage yards. Some thought it might be retrofit and impact existing tire yards to build access roads 20 feet wide with at least stone base within 150 feet of tire storage. However, the change is an operational matter used today by fire officials.
SFPC 5601.5 (new section)	Establishes an advisory panel to hear denial, suspension or revocation of existing certificate programs.
SFPC 5603.4	Requires filing of blaster's accident information.
SFPC 5607.16	Establishes uniform statewide blast records form.
USBC/SFPC 2306.7.1	E85 Standard.
SFPC 202	Definition of Responsible Management.
SFPC 5001.3	Adds new alternative for fire official to use for maintenance and operation of educational, instructional and research laboratories.

Date: 10/16/13

Non-Consensus Code Changes.

<u>Proposal</u>	<u>Description of Change</u>
SFPC 103.2	Strikes language from this section for permits, inspections and scoping. Owners oppose. Need to read this section in conjunction with 106 for inspections and T107 for operational permit. Concern is around permits and scoping that might go outside the SFPC in the referenced model code and standards. In Section 901 would give authorization to Fire Official to require construction documents. Question raised on this generating FOIA requests. Question whether this would randomly require construction documents from owners who may not have them after the building has changed hands. Building officials can give fire official copies. Construction documents can be disposed of after 3 years. Solution might be digitizing plans. Too sweeping. Staff has no problem with changes in T107.
SFPC 107.13 (items 5 and 6)	Established permissible firework fee used on state owned buildings. Industry opposes. OAG opinion provided that cannot set fee. Fire Marshal Office disagrees with opinion.
SFPC 107.6 and 107.14	These proposed changes established compliance inspections and fees for registered complaints, display of permissible fireworks, bon fires. Fireworks industry adamantly opposed to fees for inspecting permissible fireworks. Question on how often compliance permits would be issued since the term annual is being struck. Compliant inspection fee could be used for proposed new annual inspections for retail sale of permissible fireworks to find illegal fireworks or storage issues until data and more about program is outlined by the SFMO. Consensus is possible for new proposed permissible firework fees and programs to be rolled into complaint fee as starting point. Should there be a cap on complaint fee? Was noted complaint fee doesn't include time for appeals or court.
SFPC 107.13	Establishes increased fees for late applications and changes threshold for daycares. The late fees were already part of the proposed regs and this change increases them more. Question on why increases for daycares. This would reduce fees for child care over 100; kept the same for 151-200 and raise fee over 201. Question on how many this would effect. Would fee be charged if no inspection made. Ed indicates that they invoice quarterly and they do not invoice anyone that they don't inspect.
SFPC 107.14	This establishes fees for B&B's, hotels and motels. Changed term "annual" to "compliance". B and B Industry doesn't feel they should pay the same as hotels. Question why they struck annual and inserted compliance. Also struck permits and inserted compliance inspection. Question if this would void permits to operate. Ed stated it would not. Hotel industry voiced concern over additional fees impact on their clients. Ed pointed out that major chains don't always comply with the code. B and B would support for now only the complaint fee. Should consider cap such as the \$2500 on existing fees. The SFMO was not proposing one. VHTA not supporting new fees and inspections. The complaint inspection fee found industry were more supportive to establish this program so that the SFMO could compile fire risk and data and have a more detailed supporting statement in the next regulatory cycle. Complaint inspection fee would not apply for appeals and court cases Ed noted.
SFPC – R5	Adds language to match the definition of R-5 in the building code. Struck out language that has to remain due to the assisted care facilities and that there are IFC sections that might then be applied for R-5 IRC homes such as the use of grill. Staff noted, If they leave the stricken language, it would be okay.
SFPC 108.3	Conditions of a permit. Adds an information note. Staff opined that this was changed last cycle and 108.5 is already deleted. Fire Officials indicated that the intent of this was to make it clear that the building official issues permits. SFPC chapter one already states. VBCOA members and owners not supportive.
SFPC 403.3.1 and 403.2	Crowd managers for training current language requires them to be trained but doesn't say how they are to be trained. Question on proposed language that VHTA is concerned that this is not clear. Same text is in 2015 IFC.
SFPC 403.3	Crowd managers – thresholds. Leaves the 1,000 threshold but fire officials do support supports 250 for nightclub. Question on how nightclubs will end up being defined. At the end of the

Date: 10/16/13

	sentence and just use nightclub term but not A2. Clarifies that the 1,000 is ok for no crowd managers, but some are reading current text that if 1001 need 5 crowd managers while change will say only after 1,000 then one for each 250 thereafter. DHCD will amend to delete A 2 and add back in events and facilities in 1st sentence based on feedback.
SFPC IFC 503.1	Fire apparatus access roads for new and existing buildings adds exception for fire apparatus roads in recognition of zoning and land use requirements.
SFPC IFC 607.1 (and other sections)	Strikes references to USBC construction elements for existing buildings and structures. Didn't catch them all. Need to make sure if intent is to eliminate all, then more work needs to be done. Staff indicated that right now all retrofit and construction requirements in the IFC are not enforceable. Should be addressed on a larger scale for the entire IFC in the 2015 cycle as carry-over issue.
SFPC IFC 609.3.3.3	Tags for commercial hood systems. Adds flexibility for maintenance compliance. Concern over having report on site. Consensus for AM if amendments are made to allow restaurants to provide proof of record as many chain restaurants keep these reports at corporate office. Staff has done AM code change.
SFPC 703.1	Requires all building owners to do an annual visual inspection of fire rated construction in all buildings. Massive shift of responsibility to mandate in all buildings and all occupancies without what to do, how to do, documentation, etc. Owners support AS and fire officials oppose.
SFPC 902.3 and 906.4	SFMO new certification program for maintenance of fire extinguishers with test, application fee and 3 year renewal fee at 90 dollars each. Owners were concerned that this would add unnecessary cost when no problems or data has been provided. Definitions are not clear. Would put all firehouses in violation when the fill their water cans. Answer was that those are not included. Most property owners use the same companies that test the sprinklers and they seem to be well qualified. No documentation of how vetted with industry. Fire service indicated that fire extinguisher industry is okay with this. It was suggested that it would be helpful if they could provide information from the industry that they were on board. If approved why have a 3-year renewal once person is certified. Certification for anyone doing work on fire extinguishers and need to be certified on-site, but what then what is the impact on small companies? What is the estimated numbers of companies and certificate holders based on this on-site requirement? Just an overall lack of how the program would operate and the problems not being documented.
SFPC 5706.6.2.1	Fuel and propane truck parking in residential areas opposed to this code change. An ad-hoc group met twice and developed a proposal that will be carried-over to 2015.
SFPC/VCC IBC/IFC 906.1	Code change would require more fire extinguishers to be installed. Is on agenda for the BHCD's CSC too. Opposed by owners.
SFPC/VCC IBC/IFC 906	Code change moves out of USBC into the SFPC as being an operational matter and not a fire system matter. Owners and building officials oppose.
IWUIC	Urban interface code Was vetted for 2009 USBC/SFPC. Opposition included owners, design professionals, builders and building officials.

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC Sections 107.5.1, 107.6, and 107.13

Proposed Change (including all relevant section numbers, if multiple sections):

Delete and relocate with modifications as follows:

~~107.5.1 Specials conditions for the State Fire Marshal's Office: Permits issued by the State Fire Marshal's Office for the use of explosives in special operations or under emergency conditions shall be valid for 1 week from the date of issuance and shall not be renewable.~~

~~107.6 State Fire Marshal: Permits will not be required by the State Fire Marshal except those permits listed in Section 107.13 and 107.14 of this code.~~

~~Exception: Such permits shall not be required for the storage of explosives or blasting agents by the Virginia Department of State Police provided notification to the State Fire Marshal is made annually by the Chief Arson Investigator listing all storage locations within areas where enforcement is provided by the State Fire Marshal's office.~~

Change to read as follows:

107.13. State explosives, blasting agents, theatrical flame effects and firework permit fees: Except as modified herein, Applications for firework or pyrotechnic displays shall be submitted to and received by the State Fire Marshal's Office not less than 15 days prior to the planned event. Fees for permits issued by the State Fire Marshal's office for the storage, use, sale or manufacture of explosives or blasting agents, and for the display of fireworks and flame effects on state-owned property shall be as follows: State Fire Marshal's Office permit fees shall be as follows:

1. \$125 per year per magazine to store explosives and blasting agents.
2. \$200 per year per city or county to use explosives and blasting agents.
3. \$150 per year to sell explosives and blasting agents.
4. \$200 per year to manufacture explosives, blasting agents and fireworks.
5. \$350 the first day of fireworks, pyrotechnics or proximate audience displays conducted in any state-owned building and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 15 days prior to the planned event, the permit fee shall be \$450 per day and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 7 days prior to the planned event, the permit fee shall be \$550 per day and \$150 per day for each consecutive day for identical multi-day events.

Code Change - F107.5.1, SFMO.docx

AS _____ AM _____ Disapprove _____ Carry over _____

6. \$250 the first day of fireworks, pyrotechnics or proximate audience displays conducted out-of-doors on any state-owned property and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 15 days prior to the planned event, the permit fee shall be \$450 per day and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 7 days prior to the planned event, the permit fee shall be \$550 per day and \$150 per day for each consecutive day for identical multi-day events.

7. \$100 per ~~event~~non-renewable permit, valid for one week from date of issuance, for the use of explosives in special operations or emergency conditions.

8. \$300 the first day for flame effects conducted in accordance with Section 308.3.6 indoors of any state-owned building or outdoors on state-owned property and \$150 per day for each consecutive day for identical multi-day events, or, if conducted as part of a firework (pyrotechnic) display, \$100 the first day and \$75 per day for each consecutive day for identical multi-day events. If an application for flame effects is received by the SFMO less than 15 days prior to the planned event, the permit fee shall be \$450 per day and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 7 days prior to the planned event, the permit fee shall be \$550 per day and \$150 per day for each consecutive day for identical multi-day events.

Exception: Permits shall not be required for the storage of explosives or blasting agents by the Virginia Department of State Police provided notification to the State Fire Marshal is made annually by the Chief Arson Investigator listing all storage locations within areas where enforcement is provided by the State Fire Marshal's office.

Supporting Statement (including intent, need, and impact of the proposal):

This a SFMO desired consolidation, clean-up and realignment without altering or affecting any technical provisions.

Submittal Information

Date Submitted: 6/3/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC Section 107.16.1

Proposed Change (including all relevant section numbers, if multiple sections):

Add new section 107.16.1 to read:

107.16.1 SFMO certification and permit fees not refundable. No refund of any part of the amount paid as a permit or certification fee will be made where the applicant, permit or certification holder, for any reason, discontinued an activity, changed conditions, or changed circumstances for which the permit or certification was issued. However, the permit or certification fee submitted with an application will be refunded if the permit or certification is cancelled, revoked or suspended subsequent to having been issued through administrative error, or if a permit being applied for is to be obtained from a locally appointed fire official.

Supporting Statement (including intent, need, and impact of the proposal):
The supporting position of this change should be self-evident; the SFMO and agency have invested time and effort to process applications for permit or certifications and that effort should remain properly funded. By the same token, if the SFMO and agency have committed an administrative error that is not the fault of the applicant, or an application were mistakenly submitted to the SFMO when instead, a local fire official is the proper issuing authority; the means is provided to process a refund.

Submittal Information

Date Submitted: 6/3/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



Code Change - F107.16.1, SFMO.docx

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): New SFPC Section 5601.4.3.1

Proposed Change (including all relevant section numbers, if multiple sections):

Add new Section 5601.4.3.1 to read:

5601.4.3.1 Fee for replacement certificate. A written request for a replacement blaster or pyrotechnician certificate shall be accompanied the payment of an administrative fee in the amount of twenty dollars (\$20.00) made payable to the Treasurer of Virginia. Verbal requests shall not be accepted.

Supporting Statement (including intent, need, and impact of the proposal):

If a certificate has been lost, destroyed or rendered illegible, there is an associated cost for staff to receive a request and issue a replacement certificate. This fee is to cover the staff/administrative cost.

Submittal Information

Date Submitted: 6/3/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR TASO (Technical Assistance and Services Office)

Main Street Centre
600 E. Main St., Ste. 300
Richmond, VA 23219

Email Address: tsu@dhcd.virginia.gov

Fax Number: (804) 371-7092

Phone Numbers: (804) 371-7140 or (804) 371-7150



Code Change - F5601.4.3.1, SFMO.docx

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Robby Dawson

Representing: Fire Services Board Code Committee

Mailing Address: _____

Email Address: dawsonj@chesterfield.gov

Telephone Number: 804-717-6838

Proposal Information

Code(s) and Section(s): SFPC Section 202 and 308.1.6.3

Proposed Change (including all relevant section numbers, if multiple sections):

Add the following definition to Section 202 to read:

SKY LANTERN. An unmanned device with a fuel source that incorporates an open flame in order to make the device airborne.

Add new Section 308.1.6.3 to read:

308.1.6.3 Sky lanterns. No person shall release or cause to be released an untethered sky lantern.

Supporting Statement (including intent, need, and impact of the proposal):

This change is to provide specificity based on a TRB interpretation issued two years ago. This change also was approved at the Dallas, TX Code Committee hearings with a minor modification included here on a vote of 14-0.

Sky lanterns contain an open flame used to heat the air inside the device to make it airborne. Once airborne, these devices are subject to winds and other atmospheric conditions so that the location of the landfall is completely unknown and uncontrolled by the user. Obviously, uncontrolled open flame devices descending out of the sky have the significant potential to start wildfires and structural fires.

Submittal Information

Date Submitted: June 3, 2013

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

Code Change - F308.1.6.3, FSBCC.doc

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC Section 307.1

Proposed Change (including all relevant section numbers, if multiple sections):

307.1 General. A person shall not kindle or maintain or authorize to be kindled or maintained any *open burning* unless conducted and *approved* in accordance with Sections 307.1.1 through 307.5.

Exception: Approved outdoor live fire training using equipment or appliances accessible or available to the general public, and complies with Section 307.4.

Supporting Statement (including intent, need, and cost impact of the proposal):

If a building's owner or occupant wishes to train building occupants or other personnel in the use of hose systems, portable fire extinguishers, or any other appliance used to suppress or extinguish incipient fires, this exception will exclude the use of live fire from being labeled as "open burning" and any provisions that would inhibit or restrict such training.

Submittal Information

Date Submitted: 6/21/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



Code Change - F307.1, SFMO.docx

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Robby Dawson

Representing: Fire Services Board Code Committee

Mailing Address: _____

Email Address: dawsonj@chesterfield.gov

Telephone Number: 804-717-6838

Proposal Information

Code(s) and Section(s): SFPC Chapter 4 revision

Proposed Change (including all relevant section numbers, if multiple sections):

Revise Section 403 as follows (includes text relocated from Sections 404.2 and 408 and now merged into Section 403):

SECTION 403408
USE AND OCCUPANCY-RELATED EMERGENCY PREPAREDNESS REQUIREMENTS

403.1408.1 General. In addition to the requirements of Section 401, occupancies, uses and outdoor locations shall comply with the emergency preparedness requirements set forth in Sections 403.2 through 403.11. Where a fire safety and evacuation plan is required by Sections 403.2 through 403.11, evacuation drills shall be in accordance with Section 405 and employee training shall be in accordance with Section 406. In addition to the other requirements of this chapter, the provisions of this section are applicable to specific occupancies listed herein.

403.2408.2 Group A occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group A occupancies, other than those occupancies used exclusively for purposes of religious worship with an occupant load less than 2,000, and for buildings containing both a Group A occupancy and an atrium. Group A occupancies shall also comply with the requirements of Sections 403.2.1 through 403.2.4408.2.1 and 408.2.2 and Sections 401 through 406.

403.2.1408.2.1 Seating plan. In addition to the requirements of Section 404.2, the fire safety and evacuation plans for assembly occupancies shall include the information required by Section 404.3 and a detailed seating plan, occupant load and occupant load limit. Deviations from the approved plans shall be allowed provided the occupant load limit for the occupancy is not exceeded and the aisles and exit accessways remain unobstructed.

403.2.2408.2.2 Announcements. In theaters, motion picture theaters, auditoriums and similar assembly occupancies in Group A used for noncontinuous programs, an audible announcement shall be made not more than 10 minutes prior to the start of each program to notify the occupants of the location of the exits to be used in the event of a fire or other emergency.

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AS _____ AM _____ Disapprove _____ Carry over _____

Exception: In motion picture theaters, the announcement is allowed to be projected upon the screen in a manner *approved by the fire code official*.

403.2.2.1 Night clubs. Night clubs shall comply with Sections 408.2.2.1.1 and 408.2.2.1.2.

408.2.2.1.1 Audible announcements. Audible announcements shall be made to the occupants no longer than 10 minutes prior to the start of the entertainment and at each intermission to notify the occupants of the location of the exits to be used in the event of a fire or other emergency.

408.2.2.1.2. Occupant load count. Upon request of the fire code official, the owner or operator, or both, will be required to keep a running count of the occupant load to provide to the fire code official during performance hours of operation, entertainment hours of operation, or both.

403.2.3 Fire watch personnel. Fire watch personnel shall be provided where required by Section 403.11.1.

403.2.4 Crowd managers. Crowd managers shall be provided where required by Section 403.11.3.

403.3 Group B occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group B occupancy where the Group B occupancy has an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge .

403.4 Group E occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group E occupancies and for buildings containing both a Group E occupancy and an atrium. Group E occupancies shall also comply with Section 403.4.1

~~**403.4.1-408.3 Group E occupancies and Group R-2 college and university buildings.** Group E occupancies shall comply with the requirements of Sections 403.4.1.1 through 403.4.1.3, 408.3.1 through 408.3.4 and Sections 401 through 406. Group R-2 college and university buildings shall comply with the requirements of Sections 408.3.1 and 408.3.3 and Sections 401 through 406.~~

~~**403.4.1.1-408.3.1 First emergency evacuation drill.** The first emergency evacuation drill of each school year shall be conducted within 10 days of the beginning of classes.~~

~~**408.3.2 Emergency evacuation drill deferral.** In severe climates, the *fire code official* shall have the authority to modify the emergency evacuation drill frequency specified in Section 405.2.~~

~~**403.4.1.2-408.3.3 Time of day.** Emergency evacuation drills shall be conducted at different hours of the day or evening, during the changing of classes, when the school is at assembly, during the recess or gymnastic periods, or during other times to avoid distinction between drills and actual fires. In Group R-2 college and university buildings, one required drill shall be held during hours after sunset or before sunrise.~~

~~**403.4.1.3-408.3.4 Assembly points.** Outdoor assembly areas shall be designated and shall be located a safe distance from the building being evacuated so as to avoid interference with fire department operations. The assembly areas shall be arranged to keep each class separate to provide accountability of all individuals.~~

403.5 Group F occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group F occupancy where the Group F occupancy has an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge .

403.6 Group H Occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group H occupancies. Group H-5 occupancies shall also comply with Section 403.6.1.

403.6.1.408.4 Group H-5 occupancies. Group H-5 occupancies shall comply with the requirements of Sections 403.6.1.1 through 403.6.1.4408.4.1 through 408.4.4 and Sections 401 through 407.

403.6.1.1408.4.4 Plans and diagrams. In addition to the requirements of Section 404 and Section 407.6, plans and diagrams shall be maintained in *approved* locations indicating the approximate plan for each area, the amount and type of HPM stored, handled and used, locations of shutoff valves for HPM supply piping, emergency telephone locations and locations of exits.

403.6.1.2408.4.2 Plan updating. The plans and diagrams required by Section 404, 403.6.1.1 and 407.6408.4.1 shall be maintained up to date and the *fire code official* and fire department shall be informed of all major changes.

403.6.1.3408.4.3 Emergency response team. Responsible persons shall be designated ~~the~~ as an on-site emergency response team and trained to be liaison personnel for the fire department. These persons shall aid the fire department in preplanning emergency responses, identifying locations where HPM is stored, handled and used, and be familiar with the chemical nature of such material. An adequate number of personnel for each work shift shall be designated.

403.6.1.4408.4.4 Emergency drills. Emergency drills of the on-site emergency response team shall be conducted on a regular basis but not less than once every three months. Records of drills conducted shall be maintained.

403.7 Group I occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group I occupancies. Group I occupancies shall also comply with Sections 403.7.1 through 403.7.3

403.7.1408.5 Group I-1 occupancies. Group I-1 occupancies shall comply with the requirements of Sections 403.7.1.1 through 403.7.1.6408.5.1 through 408.5.5 and Sections 401 through 406.

403.7.1.1408.5.1 Fire safety and evacuation plan. The fire safety and evacuation plan required by Section 404 shall include special ~~staff-employee~~ actions, including fire protection procedures necessary for residents, and shall be amended or revised upon admission of any resident with unusual needs.

403.7.1.2408.5.2 Staff-Employee training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Such instruction shall be reviewed by the ~~staff-employees~~ at intervals not exceeding least every two months. A copy of the plan shall be readily available at all times within the facility.

403.7.1.3408.5.3 Resident training. Residents capable of assisting in their own evacuation shall be trained in the proper actions to take in the event of a fire. The training shall include actions to take if the primary escape route is blocked. Where the resident is given rehabilitation or habilitation training, training in fire prevention and actions to take in the event of a fire shall be a part of the rehabilitation training program. Residents shall be trained to assist each other in case of fire to the extent their physical and mental abilities permit them to do so without additional personal risk.

403.7.1.4408.5.4 Drill frequency. Emergency evacuation drills shall be conducted at least six times per year, two times per year on each shift. Twelve drills shall be conducted in the first year of operation.

403.7.1.5 Drill times. Drills times are not required to comply with the ~~time requirements of Section 405.4.~~

403.7.1.6~~408.5.5~~ Resident participation in drills. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point.

403.7.2~~408.6~~ Group I-2 occupancies. Group I-2 occupancies shall comply with the ~~requirements of Sections 403.7.2.1 through 403.7.2.3~~~~408.6.1 and 408.6.2 and Sections 401 through 406.~~

403.7.2.1 Drill times. Drills times are not required to comply with the ~~time requirements of Section 405.4.~~

403.7.2.2~~408.6.1~~ Evacuation not required. During emergency evacuation drills, the movement of patients to safe areas or to the exterior of the building is not required.

403.7.2.3~~408.6.2~~ Coded alarm signal. When emergency evacuation drills are conducted after visiting hours or when patients or residents are expected to be asleep, a coded announcement is allowed instead of audible alarms.

403.7.3~~408.7~~ Group I-3 occupancies. Group I-3 occupancies shall comply with the ~~requirements of Sections 403.7.3.1 through 403.7.3.4~~~~408.7.1 through 408.7.4 and Sections 401 through 406.~~

403.7.3.1~~408.7.1~~ Employee training. Employees shall be instructed in the proper use of portable fire extinguishers and other manual fire suppression equipment. Training of new ~~staff-employees~~ shall be provided promptly upon entrance on duty. Refresher training shall be provided at least annually.

403.7.3.2~~408.7.2~~ Employee sStaffing. Group I-3 occupancies shall be provided with 24-hour staffing. ~~Staff-~~An employee shall be within three floors or 300 feet (91 440 mm) horizontal distance of the access door of each resident housing area. In Use-Conditions 3, 4 and 5, as defined in "Occupancy Classification – Institutional Group I-3" in Chapter 2, the arrangement shall be such that the ~~staff employee~~ involved can start release of locks necessary for emergency evacuation or rescue and initiate other necessary emergency actions within 2 minutes of an alarm.

Exception: An employee Staff shall not be required to be within three floors or 300 feet (9144 mm) in areas in which all locks are unlocked remotely and automatically in accordance with Section 408.4 of the *International Building Code*.

403.7.3.3~~408.7.3~~ Notification. Provisions shall be made for residents in Use-Conditions 3, 4 and 5, as defined in "Occupancy Classification – Institutional Group I-3" in Chapter 2, to readily notify an employee staff of an emergency.

403.7.3.4~~408.7.4~~ Keys. Keys necessary for unlocking doors installed in a *means of egress* shall be individually identifiable by both touch and sight.

403.8 Group M occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group M occupancy, where the Group M occupancy has an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge, and for buildings containing both a Group M occupancy and an atrium.

403.9 Group R occupancies.

403.9.1~~408.8~~ Group R-1 occupancies. An approved fire safety and evacuation plan in accordance with Section

404 shall be prepared and maintained for Group R-1 occupancies. Group R-1 occupancies shall also comply with the requirements of Sections 403.9.1.1 through 403.9.1.3, 408.8.1 through 408.8.3 and Sections 401 through 406.

403.9.1.1408.8.1 Evacuation diagrams. A diagram depicting two evacuation routes shall be posted on or immediately adjacent to every required egress door from each hotel or motel sleeping unit.

403.9.1.2408.8.2 Emergency duties. Upon discovery of a fire or suspected fire, hotel and motel employees shall perform the following duties:

1. Activate the fire alarm system, where provided.
2. Notify the public fire department.
3. Take other action as previously instructed.

403.9.1.3408.8.3 Fire safety and evacuation instructions. Information shall be provided in the fire safety and evacuation plan required by Section 404 to allow guests to decide whether to evacuate to the outside, evacuate to an *area of refuge*, remain in place, or any combination of the three.

403.9.2408.9 Group R-2 occupancies. Group R-2 occupancies shall comply with the requirements of Sections 403.9.2.1 through 403.9.2.3, 408.9.1 through 408.9.4 and Sections 401 through 406.

403.9.2.1. College and University Buildings. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-2 college and university buildings. Group R-2 college and university buildings shall also comply with Sections 403.9.2.1 and 403.9.2.2.

403.9.2.1.1 First emergency evacuation drill. The first emergency evacuation drill of each school year shall be conducted within 10 days of the beginning of classes.

403.9.2.1.2 Time of day. Emergency evacuation drills shall be conducted at different hours of the day or evening, during the changing of classes, when the school is at assembly, during the recess or gymnastic periods, or during other times to avoid distinction between drills and actual fires. One required drill shall be held during hours after sunset or before sunrise.

403.9.2.2408.9.4 Emergency guide. Fire emergency guides shall be provided for Group R-2 occupancies. Guide contents, maintenance and distribution shall comply with Sections 403.9.2.2.1 through 403.9.2.2.3

403.9.2.2.1 Guide contents. A fire emergency guides shall be provided which describes the location, function and use of fire protection equipment and appliances accessible to residents, including fire alarm systems, smoke alarms, and portable fire extinguishers. The guides shall also include an emergency evacuation plan for each dwelling unit.

403.9.2.2.2408.9.3 Emergency guide mMaintenance. Emergency guides shall be reviewed and approved by the fire code official in accordance with Section 401.2. Evacuation diagrams shall be reviewed and updated in accordance with Section 404.4.

403.9.2.2.3408.9.4 Emergency guide dDistribution. A copy of the emergency guide shall be given to each tenant prior to initial occupancy.

403.9.2.3 Evacuation diagrams for dormitories. A diagram depicting two evacuation routes shall be posted on or immediately adjacent to every required egress door from each dormitory sleeping unit.

Evacuation diagrams shall be reviewed and updated as needed to maintain accuracy.

403.9.3.408.10 Group R-4 occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-4 occupancies. Group R-4 occupancies shall also comply with the requirements of Sections 403.9.3.1 through 403.9.3.6 408.10.1 through 408.10.5 and Sections 401 through 406.

403.9.3.1408.10.1 Fire safety and evacuation plan. The fire safety and evacuation plan required by Section 404 shall include special ~~staff~~employee actions, including fire protection procedures necessary for residents, and shall be amended or revised upon admission of a resident with unusual needs.

403.9.3.2408.10.2 Staff Employee training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Such instruction shall be reviewed by employees at intervals not exceeding the staff at least every two months. A copy of the plan shall be readily available at all times within the facility.

403.9.3.3408.10.3 Resident training. Residents capable of assisting in their own evacuation shall be trained in the proper actions to take in the event of a fire. The training shall include actions to take if the primary escape route is blocked. Where the resident is given rehabilitation or habilitation training, training in fire prevention and actions to take in the event of a fire shall be a part of the rehabilitation training program. Residents shall be trained to assist each other in case of fire to the extent their physical and mental abilities permit them to do so without additional personal risk.

403.9.3.4408.10.4 Drill frequency. Emergency evacuation drills shall be conducted at least six times per year, two times per year on each shift. Twelve drills shall be conducted in the first year of operation.

403.9.3.5 Drill times. Drills times are not required to comply with the ~~time requirements of Section 405.4.~~

403.9.3.6408.10.5 Resident participation in drills. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point and shall provide residents with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.

Exception: Actual exiting from windows shall not be required. Opening the window and signaling for help shall be an acceptable alternative.

403.10 Special uses.

403.10.1408.11 Covered and open mall buildings. Covered and open mall buildings shall comply with the ~~provisions requirements of Sections 403.10.1.1 through 403.10.1.6 408.11.1 through 408.11.3.~~

403.10.1.1 Malls and mall buildings exceeding 50,000 square feet. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for covered malls exceeding 50,000 square feet (4645 m²) in aggregate floor area and for open mall buildings exceeding 50,000 square feet (4645 m²) in aggregate area within perimeter line.

403.10.1.2408.11.1 Lease plan. In addition to the requirements of Section 404.2.2, a lease plan that includes the following information shall be prepared for each covered and open mall building: ~~The plan shall include the following information in addition to that required by Section 404.3.2:~~

1. Each occupancy, including identification of tenant.
2. *Exits* from each tenant space.

3. Fire protection features, including the following:
 - 3.1. Fire department connections.
 - 3.2. *Fire command center.*
 - 3.3. Smoke management system controls.
 - 3.4. Elevators, elevator machine rooms and controls.
 - 3.5. Hose valve outlets.
 - 3.6. Sprinkler and standpipe control valves.
 - 3.7. Automatic fire-extinguishing system areas.
 - 3.8. Automatic fire detector zones.
 - 3.9. *Fire barriers.*

403.10.1.3408.11.1.1 Lease plan aApproval. The lease plan shall be submitted to the *fire code official* for approval, and shall be maintained on site for immediate reference by responding fire service personnel.

403.10.1.4408.11.1.2 Lease plan rRevisions. The lease plans shall be revised annually or as often as necessary to keep them current. Modifications or changes in tenants or occupancies shall not be made without prior approval of the *fire code official* and building official.

403.10.1.5408.11.2 Tenant identification. Tenant identification shall be provided for secondary exits from occupied tenant spaces that lead to an *exit corridor* or directly to the exterior of the building. Each occupied tenant space provided with a secondary exit to the exterior or *exit corridor* shall be provided with tenant identification by Tenant identification shall be posted on the exterior side of the exit or exit access door and shall identify the business name and/or address. Letters and numbers shall be posted on the *corridor* side of the door, be using plainly legible letters and numbers that and shall contrast with their background.

Exception: Tenant identification is not required for anchor stores.

403.10.1.6 Unoccupied tenant spaces. The fire safety and evacuation plan shall provide for compliance with the requirements for unoccupied tenant spaces in Section 311.

408.11.3 Maintenance. Unoccupied tenant spaces shall be:

- ~~1. Kept free from the storage of any materials.~~
- ~~2. Separated from the remainder of the building by partitions of at least 0.5 inch thick (12.7 mm) gypsum board or an approved equivalent to the underside of the ceiling of the adjoining tenant spaces.~~
- ~~3. Without doors or other access openings other than one door that shall be kept key locked in the closed position except during that time when opened for inspection.~~
- ~~4. Kept free from combustible waste and be broomswept clean.~~

403.10.2 High-rise buildings. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for high-rise buildings.

403.10.3 Underground buildings. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for underground buildings.

403.10.4 SCRF. And approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for SRCFs.

403.11 Special requirements for public safety.

SECTION 403 PUBLIC ASSEMBLAGES AND EVENTS

403.11.1403.1 Fire watch personnel. When, in the opinion of the *fire code official*, it is essential for public safety in a place of assembly or any other place where people congregate, because of the number of persons, or the nature of the performance, exhibition, display, contest or activity, the *owner*, agent or lessee shall provide one or more fire watch personnel, as required and *approved*. Fire watch personnel shall comply with Sections 403.11.1.1 and 403.11.1.2. to remain on duty during the times such places are open to the public, or when such activity is being conducted.

403.1.1 Duties. ~~Fire watch personnel shall keep diligent watch for fires, obstructions to means of egress and other hazards during the time such place is open to the public or such activity is being conducted and take prompt measures for remediation of hazards, extinguishment of fires that occur and assist in the evacuation of the public from the structures.~~

403.11.1.1 Duty Times. Fire watch personnel shall remain on duty during the times places requiring a fire watch are open to the public, or when an activity requiring a fire watch is being conducted.

403.11.1.2 Duties. On-duty fire watch personnel shall have the following duties:

1. Keep diligent watch for fires, obstructions to means of egress and other hazards
2. Take prompt measures for remediation of hazards and extinguishment of fires that occur
3. Take prompt measures to assist in the evacuation of the public from the structures.

403.11.2403.2 Public safety plan for gatherings. In other than Group A or E occupancies, where the *fire code official* determines that an indoor or outdoor gathering of persons has an adverse impact on public safety through diminished access to buildings, structures, fire hydrants and fire apparatus access roads or where such gatherings adversely affect public safety services of any kind, the *fire code official* shall have the authority to order the development of or prescribe a public safety plan that provides an approved level of public safety and addresses the following items; ~~or prescribe a plan for, the provision of an approved level of public safety.~~

403.2.1 Contents. ~~The public safety plan, where required by Section 403.2, shall address such items~~

1. ~~as e~~Emergency vehicle ingress and egress
2. ~~F~~fire protection
3. ~~e~~Emergency egress or escape routes
4. ~~e~~Emergency medical services
5. ~~p~~Public assembly areas
6. ~~and t~~The directing of both attendees and vehicles, ~~(including the parking of vehicles)~~
7. ~~v~~Vendor and food concession distribution
8. ~~and t~~The need for the presence of law enforcement
9. ~~and~~ The need for fire and emergency medical services personnel at the event.

403.11.3403.3 Crowd managers for gatherings exceeding 1,000 people. ~~Trained crowd managers shall be provided for. Where facilities or events involve a gathering of where more than 1,000 people, crowd managers shall be provided in accordance with Section 403.11.3.1, persons congregate. The minimum number of crowd managers shall be established at a ratio of one crowd manager to every 250 persons. Where approved by the fire code official, the ratio of crowd managers shall be permitted to be reduced where the facility is equipped throughout with an approved automatic sprinkler system or based upon the nature of the event.~~

403.11.3.1 Number of crowd managers. The minimum number of crowd managers shall be established at a ratio of one crowd manager for to every 250 persons.

Exception: Where approved by the fire code official, the ratio number of crowd managers shall

be permitted to be reduced where the facility is equipped throughout with an *approved automatic sprinkler system* or based upon the nature of the event.

Revise Section 404 as follows:

**SECTION 404
FIRE SAFETY, ~~AND~~ EVACUATION AND LOCKDOWN PLANS**

404.1 General. Where required by Section 403, ~~Fire safety, evacuation and lockdown plans and associated drills shall comply with the requirements of Sections 404.2 through 404.4.1~~404.5.1.

(existing Section 404.2 is relocated and merged into Section 403 with the remaining sections renumbered)

404.2 Where required. ~~An approved fire safety and evacuation plan shall be prepared and maintained for the following occupancies and buildings:~~

- ~~1. Group A, other than Group A occupancies used exclusively for purposes of religious worship that have an occupant load less than 2,000.~~
- ~~2. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.~~
- ~~3. Group E.~~
- ~~4. Group F buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.~~
- ~~5. Group H.~~
- ~~6. Group I.~~
- ~~7. Group R-1.~~
- ~~8. Group R-2 college and university buildings.~~
- ~~9. Group R-4.~~
- ~~10. High-rise buildings.~~
- ~~11. Group M buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.~~
- ~~12. Covered malls exceeding 50,000 square feet (4645 m²) in aggregate floor area.~~
- ~~13. Open mall buildings exceeding 50,000 square feet (4645 m²) in aggregate area within perimeter line.~~
- ~~14. Underground buildings.~~
- ~~15. Buildings with an atrium and having an occupancy in Group A, E or M.~~
- ~~16. SRCF.3~~

Revise Section 405 as follows:

**SECTION 405
EMERGENCY EVACUATION DRILLS**

405.1 General. Emergency evacuation drills complying with ~~the provisions of this section~~ Sections 405.2 through 405.9 shall be conducted at least annually ~~in the occupancies listed in Section 404.2~~ where fire safety and evacuation plans are required by Section 403 or when required by the *fire code official*. Drills shall be designed in cooperation with the local authorities.

Exception: Emergency evacuation drills shall not be conducted in school buildings during periods of mandatory testing required by the Virginia Board of Education.

405.2 Frequency. Required emergency evacuation drills shall be held at the intervals specified in Table 405.2 or more frequently where necessary to familiarize all occupants with the drill procedure.

405.2.1 High-rise buildings. Fire exit drills shall be conducted annually by building staff personnel or the owner of the building in accordance with the fire safety plan and shall not affect other current occupants.

405.3 Leadership. Responsibility for the planning and conduct of drills shall be assigned to competent persons designated to exercise leadership.

405.4 Time. Drills shall be held at unexpected times and under varying conditions to simulate the unusual conditions that occur in case of fire.

405.5 Record keeping. Records shall be maintained of required emergency evacuation drills and include the following information:

1. Identity of the person conducting the drill.
2. Date and time of the drill.
3. Notification method used.
4. ~~Staff members~~ Employees on duty and participating.
5. Number of occupants evacuated.
6. Special conditions simulated.
7. Problems encountered.
8. Weather conditions when occupants were evacuated.
9. Time required to accomplish complete evacuation.

**TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION**

Group or Occupancy	Frequency	Participation
Group A	Quarterly	Employees
Group B ^c	Annually	Employees
Group E	Monthly ^z	All occupants
Group F	Annually	Employees
Group I	Quarterly on each shift	Employees ^b
Group R-1	Quarterly on each shift	Employees
Group R-2 ^d	Four annually	All occupants
Group R-4	Quarterly on each shift	Employees ^b
High-rise buildings	Annually	Employees
SRCF	Monthly	All occupants

- a. In severe climates, the fire code official shall have the authority to modify the emergency evacuation drill frequency. ~~The frequency shall be allowed to be modified in accordance with Section 408.3.2.~~
- b. Fire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with Section 403.9.3.6~~408.10.5~~. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.
- c. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
- d. Applicable to Group R-2 college and university buildings in accordance with Section 403.9.2.14~~408.3~~.

405.6 Notification. Where required by the *fire code official*, prior notification of emergency evacuation drills shall be given to the *fire code official*.

405.7 Initiation. Where a fire alarm system is provided, emergency evacuation drills shall be initiated by activating the fire alarm system.

405.8 Accountability. As building occupants arrive at the assembly point, efforts shall be made to determine if all occupants have been successfully evacuated or have been accounted for.

405.9 Recall and reentry. An electrically or mechanically operated signal used to recall occupants after an evacuation shall be separate and distinct from the signal used to initiate the evacuation. The recall signal initiation means shall be manually operated and under the control of the person in charge of the premises or the official in charge of the incident. No one shall reenter the premises until authorized to do so by the official in charge.

Revise Section 406 as follows:

406.1 General. Where fire safety and evacuation plans are required by Section 403, Employees in the occupancies listed in Section 404.2 shall be trained in the fire emergency procedures described in their fire evacuation and fire safety plans. Training shall be based on plans prepared in accordance with Section 404, these plans and as described in Section 404.3.

406.2 Frequency. Employees shall receive training in the contents of fire safety and evacuation plans and their duties as part of new employee orientation and at least annually thereafter. Records shall be kept and made available to the *fire code official* upon request.

406.3 Employee training program. Employees shall be trained in fire prevention, evacuation and fire safety in accordance with Sections 406.3.1 through 406.3.4.

406.3.1 Fire prevention training. Employees shall be apprised of the fire hazards of the materials and processes to which they are exposed. Each employee shall be instructed in the proper procedures for preventing fires in the conduct of their assigned duties.

406.3.2 Evacuation training. Employees shall be familiarized with the fire alarm and evacuation signals, their assigned duties in the event of an alarm or emergency, evacuation routes, areas of refuge, exterior assembly areas and procedures for evacuation.

~~**406.3.3 Emergency lockdown training.** Where a facility has a lockdown plan, employees shall be trained on their assigned duties and procedures in the event of an emergency lockdown. (moved to Section 406.4)~~

406.3.34 Fire safety training. Employees assigned firefighting duties shall be trained to know the locations and proper use of portable fire extinguishers or other manual fire-fighting equipment and the protective clothing or equipment required for its safe and proper use.

~~**406.4**~~**406.3.3 Emergency lockdown training.** Where a facility has a lockdown plan, employees shall be trained on their assigned duties and procedures in the event of an emergency lockdown.

Delete Section 408 (existing Section 408 has been relocated to Section 403) and revise Section 311.1 as follows:

311.1 General. Temporarily unoccupied buildings, structures, premises or portions thereof, including tenant spaces, shall be safeguarded and maintained in accordance with Sections 311.1.1 through 311.5.65.

Add a Section 311.6 as follows:

311.6. ~~408.11.3 Maintenance~~ Unoccupied tenant spaces in mall buildings. Unoccupied tenant spaces in covered and open mall buildings shall be:

1. Kept free from the storage of any materials.
2. Separated from the remainder of the building by partitions of at least 0.5-inch-thick (12.7 mm) gypsum board or an *approved* equivalent to the underside of the ceiling of the adjoining tenant spaces.
3. Without doors or other access openings other than one door that shall be kept key locked in the closed position except during that time when opened for inspection.
4. Kept free from combustible waste and be broom swept clean.

Supporting Statement (including intent, need, and impact of the proposal):

This proposal restructures Chapter 4 to place all of the core requirements in the front of the chapter in Section 403. The current code splits such requirements between Section 404.2 and Section 408, making the code difficult to follow and apply. Section 403 in this proposal includes the requirements previously included in Sections 404.2 and 408, which have been merged by occupancy classification or as otherwise appropriate.

This is a replication of ICC Code Change F25-13 that was accepted "As Submitted" on a 14-0 vote at the Dallas CAH, April 2013.

The overall intent of this proposal is editorial revision. Provisions have been relocated and text has been edited in an effort to clarify what is believed to be the current intent without technical change and to improve readability. One section dealing with maintenance of unoccupied tenant spaces in malls was determined to be improperly located in Chapter 4 and was moved to Chapter 3 with other vacant use regulations.

In preparing this proposal, it was noted that the provisions for emergency evacuation drills for Group I-1 (403.7.1.6 of the rewrite) and Group R-4 (403.9.3.6 of the rewrite) are not consistent. This may have been deliberate when Chapter 4 was originally written, but it warrants a review to determine if the inconsistency is appropriate.

One change that was made corrects an error made by the Code Correlation Committee when they made what was believed to be an editorial addition to the code in Section 408.9.3 of the 2012 edition. That addition referenced Section 404.4 for review and updating of evacuation diagrams for any Group R-2 dormitory. The reference to Section 404.4 was incorrect because that section only relates to fire safety and evacuation plans, which are not required for Group R-2 except for college and university buildings. This error has been fixed in Section 403.9.2.3.

Because of the complexity of these revisions in legislative format, a clean copy of the final text is provided below to allow an easier review of the proposed text.

SECTION 403 EMERGENCY PREPAREDNESS REQUIREMENTS

403.1 General. In addition to the requirements of Section 401, occupancies, uses and outdoor locations shall comply with the emergency preparedness requirements set forth in Sections 403.2 through 403.11. Where a firesafety and evacuation plan is required by Sections 403.2 through 403.11, evacuation drills shall be in accordance with Section 405 and employee training shall be in accordance with Section 406.

403.2 Group A occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group A occupancies, other than those occupancies used exclusively for purposes of religious worship with an *occupant load* less than 2,000, and for buildings containing both a Group A occupancy and an atrium. Group A occupancies shall also comply with Sections 403.2.1 through 403.2.4.

403.2.1 Seating plan. In addition to the requirements of Section 404.2, the fire safety and evacuation plans for assembly occupancies shall include a detailed seating plan, *occupant load* and *occupant load limit*. Deviations from the *approved* plans shall be allowed provided the *occupant load limit* for the occupancy is not exceeded and the *aisles* and exit accessways remain unobstructed.

403.2.2 Announcements. In theaters, motion picture theaters, auditoriums and similar assembly occupancies in Group A used for noncontinuous programs, an audible announcement shall be made not more than 10 minutes prior to the start of each program to notify the occupants of the location of the exits to be used in the event of a fire or other emergency.

Exception: In motion picture theaters, the announcement is allowed to be projected upon the screen in a manner *approved* by the *fire code official*.

403.2.2.1 Night clubs. Night clubs shall comply with Sections 408.2.2.1.1 and 408.2.2.1.2.

408.2.2.1.1 Audible announcements. Audible announcements shall be made to the occupants no longer than 10 minutes prior to the start of the entertainment and at each intermission to notify the occupants of the location of the exits to be used in the event of a fire or other emergency.

408.2.2.1.2. Occupant load count. Upon request of the fire code official, the owner or operator, or both, will be required to keep a running count of the occupant load to provide to the fire code official during performance hours of operation, entertainment hours of operation, or both.

403.2.3 Fire watch personnel. Fire watch personnel shall be provided where required by Section 403.11.1.

403.2.4 Crowd managers. Crowd managers shall be provided where required by Section 403.11.3.

403.3 Group B occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group B occupancy where the Group B occupancy has an *occupant load* of 500 or more persons or more than 100 persons above or below the lowest *level of exit discharge*.

403.4 Group E occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group E occupancies and for buildings containing both a Group E occupancy and an atrium. Group E occupancies shall also comply with Section 403.4.1

403.4.1 Group E occupancy college and university buildings. Group E occupancy college and university buildings shall comply with Sections 403.4.1.1 through 403.4.1.3

403.4.1.1 First emergency evacuation drill. The first emergency evacuation drill of each school year shall be conducted within 10 days of the beginning of classes.

403.4.1.2 Time of day. Emergency evacuation drills shall be conducted at different hours of the day or evening, during the changing of classes, when the school is at assembly, during the recess or gymnastic periods, or during other times to avoid distinction between drills and actual fires.

403.4.1.3 Assembly points. Outdoor assembly areas shall be designated and shall be located a safe distance from the building being evacuated so as to avoid interference with fire department operations. The assembly areas shall be arranged to keep each class separate to provide accountability of all individuals.

403.5 Group F occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group F occupancy where the Group F occupancy has an *occupant load* of 500 or more persons or more than 100 persons above or below the lowest *level of exit discharge*.

403.6 Group H Occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group H occupancies. Group H-5 occupancies shall also comply with Section 403.6.1.

403.6.1 Group H-5 occupancies. Group H-5 occupancies shall comply with Sections 403.6.1.1 through 403.6.1.4

403.6.1.1 Plans and diagrams. In addition to the requirements of Section 404 and Section 407.6, plans and diagrams shall be maintained in *approved* locations indicating the approximate plan for each area, the amount and type of HPM stored, handled and used, locations of shutoff valves for HPM supply piping, emergency telephone locations and locations of exits.

403.6.1.2 Plan updating. The plans and diagrams required by Section 404, 403.6.1.1 and 407.6 shall be maintained up to date and the *fire code official* and fire department shall be informed of major changes.

403.6.1.3 Emergency response team. Responsible persons shall be designated as an on-site emergency response team and trained to be liaison personnel for the fire department. These persons shall aid the fire department in preplanning emergency responses, identifying locations where HPM is stored, handled and used, and be familiar with the chemical nature of such material. An adequate number of personnel for each work shift shall be designated.

403.6.1.4 Emergency drills. Emergency drills of the on-site emergency response team shall be conducted on a regular basis but not less than once every three months. Records of drills conducted shall be maintained.

403.7 Group I occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group I occupancies. Group I occupancies shall also comply with Sections 403.7.1 through 403.7.3

403.7.1 Group I-1 occupancies. Group I-1 occupancies shall comply with Sections 403.7.1.1 through 403.7.1.6

403.7.1.1 Fire safety and evacuation plan. The fire safety and evacuation plan required by Section 404 shall include special employee actions, including fire protection procedures necessary for residents, and shall be amended or revised upon admission of any resident with unusual needs.

403.7.1.2 Employee training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Such instruction shall be reviewed by employees at intervals not exceeding two months. A copy of the plan shall be readily available at all times within the facility.

403.7.1.3 Resident training. Residents capable of assisting in their own evacuation shall be trained in the proper actions to take in the event of a fire. The training shall include actions to take if the primary

escape route is blocked. Where the resident is given rehabilitation or habilitation training, training in fire prevention and actions to take in the event of a fire shall be a part of the rehabilitation training program. Residents shall be trained to assist each other in case of fire to the extent their physical and mental abilities permit them to do so without additional personal risk.

403.7.1.4 Drill frequency. Emergency evacuation drills shall be conducted at least six times per year, two times per year on each shift. Twelve drills shall be conducted in the first year of operation.

403.7.1.5 Drill times. Drill times are not required to comply with Section 405.4.

403.7.1.6 Resident participation in drills. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point.

403.7.2 Group I-2 occupancies. Group I-2 occupancies shall comply with Sections 403.7.2.1 through 403.7.2.3.

403.7.2.1 Drill times. Drill times are not required to comply with Section 405.4.

403.7.2.2 Evacuation not required. During emergency evacuation drills, the movement of patients to safe areas or to the exterior of the building is not required.

403.7.2.3 Coded alarm signal. When emergency evacuation drills are conducted after visiting hours or when patients or residents are expected to be asleep, a coded announcement is allowed instead of audible alarms.

403.7.3 Group I-3 occupancies. Group I-3 occupancies shall comply with Sections 403.7.3.1 through 403.7.3.4.

403.7.3.1 Employee training. Employees shall be instructed in the proper use of portable fire extinguishers and other manual fire suppression equipment. Training of new employees shall be provided promptly upon entrance on duty. Refresher training shall be provided at least annually.

403.7.3.2 Employee staffing. Group I-3 occupancies shall be provided with 24-hour staffing. An employee shall be within three floors or 300 feet (91 440 mm) horizontal distance of the access door of each resident housing area. In Conditions 3, 4 and 5, as defined in "Occupancy Classification – Institutional Group I-3" in Chapter 2, the arrangement shall be such that the employee involved can start release of locks necessary for emergency evacuation or rescue and initiate other necessary emergency actions within 2 minutes of an alarm.

Exception: An employee shall not be required to be within three floors or 300 feet (9144 mm) in areas in which all locks are unlocked remotely and automatically in accordance with Section 408.4 of the *International Building Code*.

403.7.3.3 Notification. Provisions shall be made for residents in Conditions 3, 4 and 5, as defined in "Occupancy Classification – Institutional Group I-3" in Chapter 2, to readily notify an employee of an emergency.

403.7.3.4 Keys. Keys necessary for unlocking doors installed in a *means of egress* shall be individually identifiable by both touch and sight.

403.8 Group M occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group M occupancy, where the Group M occupancy has an

occupant load of 500 or more persons or more than 100 persons above or below the lowest *level of exit discharge*, and for buildings containing both a Group M occupancy and an atrium.

403.9 Group R occupancies.

403.9.1 Group R-1 occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-1 occupancies. Group R-1 occupancies shall also comply with Sections 403.9.1.1 through 403.9.1.3.

403.9.1.1 Evacuation diagrams. A diagram depicting two evacuation routes shall be posted on or immediately adjacent to every required egress door from each hotel or motel sleeping unit.

403.9.1.2 Emergency duties. Upon discovery of a fire or suspected fire, hotel and motel employees shall perform the following duties:

1. Activate the fire alarm system, where provided.
2. Notify the public fire department.
3. Take other action as previously instructed.

403.9.1.3 Fire safety and evacuation instructions. Information shall be provided in the fire safety and evacuation plan required by Section 404 to allow guests to decide whether to evacuate to the outside, evacuate to an *area of refuge*, remain in place, or any combination of the three.

403.9.2 Group R-2 occupancies. Group R-2 occupancies shall comply with Sections 403.9.2.1 through 403.9.2.3.

403.9.2.1. College and University Buildings. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-2 college and university buildings. Group R-2 college and university buildings shall also comply with Sections 403.9.2.1 and 403.9.2.2.

403.9.2.1.1 First emergency evacuation drill. The first emergency evacuation drill of each school year shall be conducted within 10 days of the beginning of classes.

403.9.2.1.2 Time of day. Emergency evacuation drills shall be conducted at different hours of the day or evening, during the changing of classes, when the school is at assembly, during the recess or gymnastic periods, or during other times to avoid distinction between drills and actual fires. One required drill shall be held during hours after sunset or before sunrise.

403.9.2.2 Emergency guide. Fire emergency guides shall be provided for Group R-2 occupancies. Guide contents, maintenance and distribution shall comply with Sections 403.9.2.2.1 through 403.9.2.2.3

403.9.2.2.1 Guide contents. Fire emergency guides shall describe the location, function and use of fire protection equipment and appliances accessible to residents, including fire alarm systems, smoke alarms, and portable fire extinguishers. Guides shall also include an emergency evacuation plan for each *dwelling unit*.

403.9.2.2.2 Emergency guide maintenance. Emergency guides shall be reviewed and *approved by the fire code official*.

403.9.2.2.3 Emergency guide distribution. A copy of the emergency guide shall be given to each tenant prior to initial occupancy.

403.9.2.3 Evacuation diagrams for dormitories. A diagram depicting two evacuation routes shall be posted on or immediately adjacent to every required egress door from each dormitory sleeping unit. Evacuation diagrams shall be reviewed and updated as needed to maintain accuracy.

403.9.3 Group R-4 occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-4 occupancies. Group R-4 occupancies shall also comply with Sections 403.9.3.1 through 403.9.3.6.

403.9.3.1 Fire safety and evacuation plan. The fire safety and evacuation plan required by Section 404 shall include special employee actions, including fire protection procedures necessary for residents, and shall be amended or revised upon admission of a resident with unusual needs.

403.9.3.2 Employee training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Such instruction shall be reviewed by employees at intervals not exceeding two months. A copy of the plan shall be readily available at all times within the facility.

403.9.3.3 Resident training. Residents capable of assisting in their own evacuation shall be trained in the proper actions to take in the event of a fire. The training shall include actions to take if the primary escape route is blocked. Where the resident is given rehabilitation or habilitation training, training in fire prevention and actions to take in the event of a fire shall be a part of the rehabilitation training program. Residents shall be trained to assist each other in case of fire to the extent their physical and mental abilities permit them to do so without additional personal risk.

403.9.3.4 Drill frequency. Emergency evacuation drills shall be conducted at least six times per year, two times per year on each shift. Twelve drills shall be conducted in the first year of operation.

403.9.3.5 Drill times. Drills times are not required to comply with Section 405.4.

403.9.3.6 Resident participation in drills. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point and shall provide residents with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.

Exception: Actual exiting from windows shall not be required. Opening the window and signaling for help shall be an acceptable alternative.

403.10 Special uses.

403.10.1 Covered and open mall buildings. Covered and open mall buildings shall comply with the requirements of Sections 403.10.1.1 through 403.10.1.5.

403.10.1.1 Malls and mall buildings exceeding 50,000 square feet. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for covered malls exceeding 50,000 square feet (4645 m²) in aggregate floor area and for open mall buildings exceeding 50,000 square feet (4645 m²) in aggregate area within perimeter line.

403.10.1.2 Lease plan. In addition to the requirements of Section 404.2.2, a lease plan that includes the following information shall be prepared for each covered and open mall building:

1. Each occupancy, including identification of tenant.
2. Exits from each tenant space.

3. Fire protection features, including the following:
 - 3.1. Fire department connections.
 - 3.2. *Fire command center*.
 - 3.3. Smoke management system controls.
 - 3.4. Elevators, elevator machine rooms and controls.
 - 3.5. Hose valve outlets.
 - 3.6. Sprinkler and standpipe control valves.
 - 3.7. Automatic fire-extinguishing system areas.
 - 3.8. Automatic fire detector zones.
 - 3.9. *Fire barriers*.

403.10.1.3 Lease plan approval. The lease plan shall be submitted to the *fire code official* for approval, and shall be maintained on site for immediate reference by responding fire service personnel.

403.10.1.4 Lease plan revisions. The lease plans shall be revised annually or as often as necessary to keep them current. Modifications or changes in tenants or occupancies shall not be made without prior approval of the *fire code official* and building official.

403.10.1.5 Tenant identification. Tenant identification shall be provided for secondary exits from occupied tenant spaces that lead to an *exit corridor* or directly to the exterior of the building. Tenant identification shall be posted on the exterior side of the exit or exit access door and shall identify the business name and/or address using plainly legible letters and numbers that contrast with their background.

Exception: Tenant identification is not required for anchor stores.

403.10.1.6 Unoccupied tenant spaces. The fire safety and evacuation plan shall provide for compliance with the requirements for unoccupied tenant spaces in Section 311.

403.10.2 High-rise buildings. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for high-rise buildings.

403.10.3 Underground buildings. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for underground buildings.

403.10.4 SCRF. And approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for SRCFs.

403.11 Special requirements for public safety.

403.11.1 Fire watch personnel. When, in the opinion of the *fire code official*, it is essential for public safety in a place of assembly or any other place where people congregate, because of the number of persons or the nature of the performance, exhibition, display, contest or activity, the *owner*, agent or lessee shall provide one or more fire watch personnel, as required and *approved*. Fire watch personnel shall comply with Sections 403.11.1.1 and 403.11.1.2.

403.11.1.1 Duty Times. Fire watch personnel shall remain on duty during the times places requiring a fire watch are open to the public, or when an activity requiring a fire watch is being conducted.

403.11.1.2 Duties. On-duty fire watch personnel shall have the following duties:

1. Keep diligent watch for fires, obstructions to *means of egress* and other hazards
2. Take prompt measures for remediation of hazards and extinguishment of fires that occur

3. Take prompt measures to assist in the evacuation of the public from the structures.

403.11.2 Public safety plan for gatherings. In other than Group A or E occupancies, where the *fire code official* determines that an indoor or outdoor gathering of persons has an adverse impact on public safety through diminished access to buildings, structures, fire hydrants and fire apparatus access roads or where such gatherings adversely affect public safety services of any kind, the *fire code official* shall have the authority to order the development of or prescribe a public safety plan that provides an approved level of public safety and addresses the following items:

1. Emergency vehicle ingress and egress
2. Fire protection
3. Emergency egress or escape routes
4. Emergency medical services
5. Public assembly areas
6. The directing of both attendees and vehicles, including the parking of vehicles
7. Vendor and food concession distribution
8. The need for the presence of law enforcement
9. The need for fire and emergency medical services personnel.

403.11.3 Crowd managers for gatherings exceeding 1,000 people. Where facilities or events involve a gathering of more than 1,000 people, crowd managers shall be provided in accordance with Section 403.11.3.1.

403.11.3.1 Number of crowd managers. The minimum number of crowd managers shall be established at a ratio of one crowd manager for every 250 persons.

Exception: Where *approved* by the *fire code official*, the number of crowd managers shall be permitted to be reduced where the facility is equipped throughout with an *approved automatic sprinkler system* or based upon the nature of the event.

SECTION 404 FIRE SAFETY, EVACUATION AND LOCKDOWN PLANS

404.1 General. Where required by Section 403, fire safety, evacuation and lockdown plans shall comply with Sections 404.2 through 404.4.1.

(existing Section 404.2 is relocated and merged into Section 403 with the remaining sections renumbered)

SECTION 405 EMERGENCY EVACUATION DRILLS

405.1 General. Emergency evacuation drills complying with Sections 405.2 through 405.9 shall be conducted at least annually where firesafety and evacuation plans are required by Section 403 or when required by the *fire code official*. Drills shall be designed in cooperation with the local authorities.

405.2 Frequency. Required emergency evacuation drills shall be held at the intervals specified in Table 405.2 or more frequently where necessary to familiarize all occupants with the drill procedure.

405.3 Leadership. Responsibility for the planning and conduct of drills shall be assigned to competent persons designated to exercise leadership.

405.4 Time. Drills shall be held at unexpected times and under varying conditions to simulate the unusual conditions that occur in case of fire.

405.5 Record keeping. Records shall be maintained of required emergency evacuation drills and include the following information:

1. Identity of the person conducting the drill.
2. Date and time of the drill.
3. Notification method used.
4. Employees on duty and participating.
5. Number of occupants evacuated.
6. Special conditions simulated.
7. Problems encountered.
8. Weather conditions when occupants were evacuated.
9. Time required to accomplish complete evacuation.

**TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION**

Group or Occupancy	Frequency	Participation
Group A	Quarterly	Employees
Group B ^c	Annually	Employees
Group E	Monthly ^z	All occupants
Group F	Annually	Employees
Group I	Quarterly on each shift	Employees ^b
Group R-1	Quarterly on each shift	Employees
Group R-2 ^d	Four annually	All occupants
Group R-4	Quarterly on each shift	Employees ^b
High-rise buildings	Annually	Employees
SRCF	Monthly	All occupants

- a. In severe climates, the *fire code official* shall have the authority to modify the emergency evacuation drill frequency.
- b. Fire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with Section 403.9.3.6. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.
- c. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
- d. Applicable to Group R-2 college and university buildings in accordance with Section 403.9.2.1.

405.6 Notification. Where required by the *fire code official*, prior notification of emergency evacuation drills shall be given to the *fire code official*.

405.7 Initiation. Where a fire alarm system is provided, emergency evacuation drills shall be initiated by activating the fire alarm system.

405.8 Accountability. As building occupants arrive at the assembly point, efforts shall be made to determine if all occupants have been successfully evacuated or have been accounted for.

405.9 Recall and reentry. An electrically or mechanically operated signal used to recall occupants after an evacuation shall be separate and distinct from the signal used to initiate the evacuation. The recall signal initiation means shall be manually operated and under the control of the person in charge of the premises or the official in charge of the incident.

No one shall reenter the premises until authorized to do so by the official in charge.

SECTION 406 EMPLOYEE TRAINING AND RESPONSE PROCEDURES

406.1 General. Where fire safety and evacuation plans are required by Section 403, employees shall be trained in fire emergency procedures based on plans prepared in accordance with Section 404.

406.2 Frequency. Employees shall receive training in the contents of fire safety and evacuation plans and their duties as part of new employee orientation and at least annually thereafter. Records shall be kept and made available to the *fire code official* upon request.

406.3 Employee training program. Employees shall be trained in fire prevention, evacuation and fire safety in accordance with Sections 406.3.1 through 406.3.4.

406.3.1 Fire prevention training. Employees shall be apprised of the fire hazards of the materials and processes to which they are exposed. Each employee shall be instructed in the proper procedures for preventing fires in the conduct of their assigned duties.

406.3.2 Evacuation training. Employees shall be familiarized with the fire alarm and evacuation signals, their assigned duties in the event of an alarm or emergency, evacuation routes, areas of refuge, exterior assembly areas and procedures for evacuation.

406.3.3 Fire safety training. Employees assigned firefighting duties shall be trained to know the locations and proper use of portable fire extinguishers or other manual fire-fighting equipment and the protective clothing or equipment required for its safe and proper use.

406.4 Emergency lockdown training. Where a facility has a lockdown plan, employees shall be trained on their assigned duties and procedures in the event of an emergency lockdown.

CHAPTER 3

311.1 General. Temporarily unoccupied buildings, structures, premises or portions thereof, including tenant spaces, shall be safeguarded and maintained in accordance with Sections 311.1.1 through 311.5.6.

311.6. Unoccupied tenant spaces in mall buildings. Unoccupied tenant spaces in covered and open mall buildings shall be:

1. Kept free from the storage of any materials.
2. Separated from the remainder of the building by partitions of at least 0.5-inch-thick (12.7 mm) gypsum board or an *approved* equivalent to the underside of the ceiling of the adjoining tenant spaces.
3. Without doors or other access openings other than one door that shall be kept key locked in the closed position except during that time when opened for inspection.
4. Kept free from combustible waste and be broom swept clean.

Submittal Information

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC Section 404.2 and 405.5.1

Proposed Change (including all relevant section numbers, if multiple sections):

404.2 Where required. An approved fire safety and evacuation plan shall be prepared and maintained for the following occupancies and buildings.

1. Group A, other than Group A occupancies used exclusively for purposes of religious worship that have an *occupant load* less than 2,000.
2. Group B buildings having an *occupant load* of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
3. Group E.
4. Group F buildings having an *occupant load* of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
5. Group H.
6. Group I.
7. Group R-1.
8. Group R-2 college and university buildings.
9. Group R-4.
10. High-rise buildings.
11. Group M buildings having an *occupant load* of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
12. Covered malls exceeding 50,000 square feet (4645 m²) in aggregate floor area.
13. Open mall buildings exceeding 50,000 square feet (4645 m²) in aggregate area within perimeter line.
14. Underground buildings.
15. Buildings with an atrium and having an occupancy in Group A, E or M.
16. SRCF.
17. Group R-3 and R-5 bed and breakfast and other transient boarding facilities that are either proprietor or non-proprietor occupied.

404.5 Availability. Fire safety and evacuation plans shall be available in the workplace for reference and review by employees, and copies shall be furnished to the *fire code official* for review upon request.

404.5.1 Distribution. The fire safety and evacuation plans shall be distributed to the tenants and building service employees by the *owner* or *owner's* agent. Tenants shall distribute to their employees applicable parts of the fire safety plan affecting the employees' actions in the event of a fire or other emergency. Fire safety and evacuation plans shall be made available by the proprietor of Group R-3 and R-5 bed and breakfast and other transient boarding facilities to transient guests upon their arrival or are present in each transient guest room.

Code Change - F404.2, SFMO.docx

AS _____ AM _____ Disapprove _____ Carry over _____

Supporting Statement (including intent, need, and cost impact of the proposal):

For the same reasons fire safety and evacuation information is to be provided to hotel and motel guests (Group R-1), it should be made to guests of B&Bs (R-3 and R-5). These guests are transient and not readily familiar with the building and may only be present for one night.

The proposed requirement is not intended to be a vehicle to require the installation of equipment beyond what is required by the USBC for these specific transient facilities. Nor is there a requirement to conduct drills. By example, while the fire code requires a fire safety plan to contain the procedures to report a fire or other emergency, or location of "occupant-use hose stations", the plan for B&Bs would only note the procedure for reporting an emergency and would be silent on hose stations. The proposed change could not be used to get hose stations installed. The same is said of the "identification and assignment of personnel responsible for maintenance of systems and equipment installed to prevent or control fires" versus showing a primary and secondary evacuation route out of the building. The plan would show the routes out of a building but would be silent on maintenance of systems and equipment. Only those items in Sections 404.3 and 404.3.2 that are within the nature of B&Bs would be listed in the plan's content.

Submittal Information

Date Submitted: X/XX/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Robby Dawson

Representing: Fire Services Board Code Committee

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

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Telephone Number: 804-748-1426

Proposal Information

Code(s) and Section(s): SFPC Section 3406.1

Proposed Change (including all relevant section numbers, if multiple sections):

**SECTION 3406
FIRE DEPARTMENT ACCESS**

3406.1 Required access. New and existing tire storage yards shall be provided with fire apparatus access roads in accordance with Section 503 and Section 3406.2. ~~Existing tire storage yards shall be provided with fire apparatus access roads where required in Chapter 11.~~

3406.2 Location. Fire apparatus access roads shall be located within all pile clearances identified in Section 3405.4 and within all fire breaks required in Section 3405.5. Access roadways shall be within 150 feet (45 720 mm) of any point in the storage yard where storage piles are located, at least 20 feet (6096 mm) from any storage pile.

Supporting Statement (including intent, need, and impact of the proposal):

Due to the deletion of Chapter 11, the proposed change to Section 3406.1 will incorporate the deleted requirements into that for existing piles...to put back what was taken out.

This does not impact the manner or materials of construction prohibited by current Virginia Code as it deals with fire apparatus access that is beyond the scope of the USBC.

Submittal Information

Date Submitted: June 3, 2013

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Code Change - F3406.1, FSBCC.doc

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC 5601.5 through 5601.5.2

Proposed Change (including all relevant section numbers, if multiple sections):

5601.5 Denial, suspension or revocation of a certificate. If issuance or renewal of a Blaster or Pyrotechnician certificate is denied, or upon the filing of a complaint against an applicant or certificate holder for non-performance, or performance in violation of the SFPC and the appropriate referenced NFPA 495, 1123 or 1126 standards, the State Fire Marshal may convene a 3-member panel to hear the particulars of the complaint or denial. The 3-member panel will be comprised of the following persons:

1. A Virginia Certified Fire Official excluding any person certified as a Blaster or Pyrotechnician or is on the staff of the SFMO.
2. A Virginia certified Blaster or Pyrotechnician who's certification is the same as that of the person to whom a complaint is lodged, and who is not associated in any way with the person against whom a complaint is lodged and whose work or employer is geographically remote, as much as practically possible, from the person to whom a complaint is lodged.
3. A member of the general public who does not have a vested financial interest in conducting a fireworks display, or the manufacture, sale, storage or use of explosives.

Upon the State Fire Marshal convening such panel the hearing is to commence within 60 calendar days of the filing of the complaint or denial. The 3-member panel is to hear the complaint and render a written recommendation to the State Fire Marshal for certificate issuance, no action, revocation, or suspension of a certificate for a period not to exceed 6 months.

Notwithstanding the discretionary decision and action to convene such panel, the State Fire Marshal reserves the authority to choose an action that may be contrary to the panel's recommendation. A written decision of the State Fire Marshal is to be delivered to the party within 14 days of the hearing's conclusion. If the certificate is denied, revoked or suspended by the SFMO, in accordance with SFPC Section 112.9 the party may file an appeal with the State Technical Review Board (TRB). The party's appeal to TRB must be filed within 14 calendar days of the receipt of the State Fire Marshal's written decision to deny, revoke, or suspend.

Code Change - F5601.5, SFMO.docx

AS _____ AM _____ Disapprove _____ Carry over _____

The denial, revocation or suspension of a license is independent of any criminal proceedings that may be initiated by any state or local authority.

5601.5.1 Replacement of revoked certificate. Any person whose certificate as a Pyrotechnician or Blaster was revoked upon cause may apply for certification as a Pyrotechnician or Blaster six months or more from the date of the revocation and upon compliance with Section 5601.4.1. All elements of Section 5601.4.1 are required to be obtained and dated after the date of revocation.

5601.5.2 Return of suspended certificate. Any certificate that was suspended upon cause will be reinstated at the end of the suspension period without change to its expiration date.

Re-number all subsequent sections and tables without any technical changes.

Supporting Statement (including intent, need, and cost impact of the proposal):

This change provides an internal process available at the State Fire Marshal's discretion that's intended to be used as a means to assist or advise the State Fire Marshal in a determination to take no action, or to deny, revoke or suspend a person's certificate based on allegations that the manner in which explosives were manufactured, stored, sold or used, or that a fireworks display was not performed in compliance with the requirements as set forth in the VSFPC and the commensurate referenced standard(s). This is particularly important enough if records or reports of violations were egregious or repeated enough to warrant a necessary action for the continued protection of the public.

The proposed process is not intended to supplant, subvert or avoid criminal proceedings, the issuance of a notice of violation, a summons, or the duty, power or authority of the State Technical Review Board as established and provided for in §§ 36-108 through 36-117 of the Code of Virginia if the State Fire Marshal takes an adverse action against a certificate holder, whether that action is taken with or without the assistance of the convened panel as proposed and a subsequent appeal is filed.

Submittal Information

Date Submitted: 6/3/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC, Change Section 5603.4

Proposed Change (including all relevant section numbers, if multiple sections):

Change Section 5603.4 to read as follows:

5603.4 Accidents. Accidents involving the use of *explosives, explosive materials* and fireworks, which result in injuries or property damage, shall be immediately reported by the permit holder to the fire code official and State Fire Marshal immediately.

Supporting Statement (including intent, need, and impact of the proposal):

Supported by FSBCC.

With this change the SFMO will be able to accumulate basic information on incidents that produce injuries, deaths or property damage from the use of explosives and fireworks. The accumulated information may produce valuable information on the continued competency of the involved Pyrotechnician, Blaster and/or their employer for the purpose of evaluating and/or recommending suspension, revocation or some other measure of remedial action against the Pyrotechnician, Blaster or the permit holder.

A somewhat similar provision previously existed in the '87, '90 and '93 editions of the SFPC.

Submittal Information

Date Submitted: 6/3/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

Code Change - F5603.4, SFMO.docx

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Robby Dawson

Representing: Fire Services Board Code Committee

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: dawsonj@chesterfield.gov

Telephone Number: 804-748-1426

Proposal Information

Code(s) and Section(s): SFPC Section 5607.16 and new Table 5607.16

Proposed Change (including all relevant section numbers, if multiple sections):

Change Section 5607.16 to read as follows:

5607.16 Blast records: A record of each blast shall be kept and retained for at least five years and shall be readily available for inspection by the *fire code official*. The record shall ~~contain the following minimum data:~~ be in a format selected by the blaster and shall contain the minimum data and information indicated in Table 5607.16.

- ~~1. Name of contractor;~~
- ~~2. Location and time of blast;~~
- ~~3. Name of certified blaster in charge;~~
- ~~4. Type of material blasted;~~
- ~~5. Number of holes bored and spacing;~~
- ~~6. Diameter and depth of holes;~~
- ~~7. Type and amount of explosives;~~
- ~~8. Amount of explosive per delay of 8 milliseconds or greater;~~
- ~~9. Method of firing and type of circuit;~~
- ~~10. Direction and distance in feet to nearest dwelling, public building, school, church, commercial or institutional building;~~
- ~~11. Weather conditions;~~
- ~~12. Whether or not mats or other precautions were used;~~
- ~~13. Type of detonator and delay period;~~
- ~~14. Type and height of stemming; and~~
- ~~15. Seismograph record when utilized.~~

Exception: ~~Subdivisions 8 and 13 of this section are not applicable to *restricted blasters*.~~

(See new Table 5607.16 on attached pages.)

Code Change - F5607.16, FSBCC.doc

AS _____ AM _____ Disapprove _____ Carry over _____

Supporting Statement (including intent, need, and impact of the proposal):

This change is to provide guidance and some measure of uniformity of the information gathered and retained. Without such guidance the quality and value of information recorded will vary by location, company, and certified blaster. This information has value when conducting an investigation on a claim of damage, for instance, whether that investigation is conducted by the fire official or an insurance company. At the very least, such comprehensive information has definite value to the blaster themselves.

Four (4) fire officials and nine (9) users of explosives, both large and small blasting contractors, were invited to evaluate the proposed change. Comments and suggestions were seriously considered and incorporated into refining the change. It must be pointed out that the change does not require a blaster to use this particular table or format so long as whatever record format is chosen by the blaster produces the same minimum information. But it is suggested the table be reproduced large enough in the code to fill-in the blanks or spaces in the event a blaster uses the table as printed in the code for their chosen format.

Submittal Information

Date Submitted: 12/7/12

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR TASO (Technical Assistance and Services Office)

Main Street Centre
600 E. Main St., Ste. 300
Richmond, VA 23219

Email Address: tsu@dhcd.virginia.gov

Fax Number: (804) 371-7092

Phone Numbers: (804) 371-7140 or (804) 371-7150

13VAC5-51-150

R. Add Section 3307.16 to read:

3307.16. Blast records. A record of each blast shall be kept and retained for at least five years and shall be readily available for inspection by the code official. The record shall ~~contain the following minimum data:~~ be in a format selected by the blaster and shall contain the minimum data and information indicated in Form 3307.16.

1. Name of contractor;
2. Location and time of blast;
3. Name of certified blaster in charge;
4. Type of material blasted;
5. Number of holes bored and spacing;
6. Diameter and depth of holes;
7. Type and amount of explosives;
8. Amount of explosive per delay of 8 milliseconds or greater;
9. Method of firing and type of circuit;
10. Direction and distance in feet to nearest dwelling, public building, school, church, commercial or institutional building;
11. Weather conditions;
12. Whether or not mats or other precautions were used;
13. Type of detonator and delay period;
14. Type and height of stemming; and
15. Seismograph record when utilized.

~~Exception: Subdivisions 8 and 13 of this section are not applicable to restricted blasters.~~

Form 3307.16
Blast (shot) Record

Block 1 General Information				
1	<u>Blast date:</u>	<u>Blast No.:</u>	<u>Blast Time:</u>	<u>Permit No.:</u>
2	<u>Blast location by address including city, county or town:</u>			
3	<u>Blast location by GPS coordinates:</u>		<input type="checkbox"/> <u>check box if unknown</u>	
4	<u>Name of Permit Holder:</u>			
5	<u>Name of Blaster in charge (print):</u>			
6	<u>Signature of Blaster in charge:</u>			

**Table 5607.16
Blast (shot) Record**

Block 1				
General Information				
1	Blast date:	Blast No.:	Blast Time:	Permit No.:
2	Blast location by address including city, county or town:			
3	Blast location by GPS coordinates: <input type="checkbox"/> check box if unknown			
4	Name of Permit Holder:			
5	Name of Blaster in charge (print):			
6	Signature of Blaster in charge:			
7	Certification Number of Blaster in charge:			

Block 2			
General environmental conditions			
1	Weather (Clear? Cloudy? Overcast?)	Wind direction and speed @_____mph	Temperature F° / C°
2	Topography: (Flat? Hilly? Mountainous?)	Distance from blast site to nearest inhabited building:	Distance from nearest inhabited building determined by: <input type="checkbox"/> GPS coordinates <input type="checkbox"/> Measurement <input type="checkbox"/> Estimated
3	Use of nearest inhabited building? (Dwelling? Business? Apartment Building? School?)	Direction from blast site to nearest inhabited building:	Direction from blast site to nearest inhabited building determined by: <input type="checkbox"/> GPS instrument <input type="checkbox"/> Compass <input type="checkbox"/> Estimated
Additional Blaster notations on environmental conditions:			

Block 3			
Shot layout and precautions taken (N/A = Not Applicable)			
1	No. of holes	Diameter of hole(s)	Depth of hole(s)
2	Were any holes decked? <input type="checkbox"/> Yes <input type="checkbox"/> No	How many holes were decked? <input type="checkbox"/> N/A	How many decks per hole? <input type="checkbox"/> N/A
	(If applicable, indicate on any attached shot pattern drawing which holes were decked and the number of decks for the hole[s].)		
3	Shot pattern <input type="checkbox"/> Check this box if only single hole.	Depth of sub-drilling	Drilling angle
4	Burden	Spacing of holes	Water height
5	Stemming height	Material used for stemming	Check box for flyrock precautions taken <input type="checkbox"/> Mats <input type="checkbox"/> Overburden <input type="checkbox"/> None taken
Additional Blaster notations on shot layout and precautions:			

Block 4			
Seismic control measures (N/A = Not Applicable)			
1	Was Scaled Distance Formula used? <input type="checkbox"/> Yes <input type="checkbox"/> No	Indicate which Scaled Distance equation was used. <input type="checkbox"/> N/A <input type="checkbox"/> $W(\text{lb})=[D(\text{ft})/50]^2$ <input type="checkbox"/> $W(\text{lb})=[D(\text{ft})/55]^2$ <input type="checkbox"/> $W(\text{lb})=[D(\text{ft})/65]^2$	Max. Allow. Chg. Wt. per 8 ms based on Scaled Distance. <input type="checkbox"/> N/A
2	Was seismograph used? <input type="checkbox"/> Yes <input type="checkbox"/> No	Seismograph manufacturer and model number: <input type="checkbox"/> N/A	Seismograph serial number: <input type="checkbox"/> N/A
			Seismograph's last calibration date. <input type="checkbox"/> N/A
3	Distance and direction seismograph from blast site <input type="checkbox"/> N/A	Distance determined by: <input type="checkbox"/> N/A <input type="checkbox"/> GPS coordinates <input type="checkbox"/> Estimated <input type="checkbox"/> Measurement	
4	Seismograph <input type="checkbox"/> N/A Geophone Minimum Frequency _____ Hz Seismograph Microphone Minimum Frequency _____ Hz	Seismograph recordings: <input type="checkbox"/> N/A Transverse _____ in/s _____ Hz Vertical _____ in/s _____ Hz Longitudinal _____ in/s _____ Hz Acoustic _____ dB _____ Hz	
5	Seismograph trigger level <input type="checkbox"/> N/A _____ in/s _____ dB		
Additional Blaster notations on seismic control measures:			

Block 5

Quantity and product

1	Max. Allow. Chg. Wt. per 8 ms Interval <input type="checkbox"/> Delay not used _____ lbs	Initiation (Check) <input type="checkbox"/> Electric <input type="checkbox"/> Non-electric <input type="checkbox"/> Electronic
2	Max. No. of Holes/Decks per 8 ms interval <input type="checkbox"/> Delay not used _____ lbs	
3	Max. Wt. or sticks of Explosive per hole _____ lbs	Firing device manufacturer and model: <input type="checkbox"/> N/A

Explosive Product listing (Attach additional pages as needed.)

4	<u>Manufacturer</u>	<u>Product name, description or brand</u>	<u>Number of units</u>	<u>Unit weight (lb)</u>

5	Total explosive weight in this shot:	_____ lbs.
---	---	-------------------

Additional Blaster notations on product and quantities:

Block 6

Completion of shot record and general comments

General comments on shot not included in notes above:

Date shot report completed:	Time shot report completed:
-----------------------------	-----------------------------

Printed name and signature of person completing shot report if different from Block 1, Lines 5 and 6.	(Print) _____
	(Signature) _____



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: DHCD Placeholder _____

Representing: _____

Mailing Address: _____

Email Address: _____

Telephone Number: _____

Proposal Information

Code(s) and Section(s): USBC IFC 2306.7.1

Proposed Change (including all relevant section numbers, if multiple sections):

E85 dispensing systems now U.L. listed.

Supporting Statement (including intent, need, and impact of the proposal):

Enable building officials to approve these E85 systems without a modification. 2015 IFC code change was approved.

Submittal Information

Date Submitted: 6/25/13

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DEBAR State Building Codes Office
600 East Main Street,
Suite 300
Richmond, VA 23219

Email Address: vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



AS _____ AM _____ Disapprove _____ Carry over _____

F246 – 13

2306.8.1, 2306.8.2 (New), Chapter 80

Proponent: Bob Eugene, representing UL LLC

Revise as follows:

2306.8 Alcohol-blended fuel-dispensing operations. The design, fabrication and installation of alcohol-blended fuel dispensing systems shall also be in accordance with Section 2306.7 and Sections 2306.8.1 through 2306.8.5.

2306.8.1 Listed Approval of equipment. Dispensers shall be listed in accordance with UL 87A. Hoses, nozzles, breakaway fittings, swivels, flexible connectors or dispenser emergency shutoff valves, vapor recovery systems, leak detection devices and pumps used in alcohol-blended fuel-dispensing systems shall be listed ~~or approved~~ for the specific purpose.

2306.8.2 Compatibility. Dispensers shall only be used with the fuels for which they have been listed, which are marked on the product. Field installed components including hose assemblies, breakaway couplings, swivel connectors and hose nozzle valves shall be provided in accordance with the listing and the marking on the unit.

(Renumber subsequent sections)

Add a new standard to Chapter 80 as follows:

UL

87A – 12 Outline of Investigation for Power-Operated Dispensing Devices for Gasoline and Gasoline/ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent

Reason: In 2007 UL submitted proposal F230 07/08 which added the section on alcohol-blended fuel-dispensing operations. This was done to address the growing number of E-85 installations. Part of that proposal allowed alcohol-blended fuel-dispensers and components to be listed or approved, where normal gasoline dispensers were required to be listed. This was done in recognition that standards and listings for these dispensers did not exist at the time.

The UL 87A Outline of Investigation for Power-Operated Dispensing Devices for Gasoline and Gasoline/ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent was subsequently developed to cover dispensers intended for use with high concentration ethanol blends. Listed dispensers and the related hanging hardware are now listed for high concentration ethanol blends, and are being installed across the U.S. This proposal recognizes the current E-85 dispensing practices and accomplishes the following:

1. Reintroduces the requirements for these dispensers and related hardware to be listed, rather than listed or approved.
2. Includes reference to the UL 87A Outline of Investigation used to investigate these products.

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information (Check one): Individual Government Entity Company

Name: DHCD Staff (at the direction of the BHCD) Representing: _____

Mailing Address: _____

Email Address: _____ Telephone Number: _____

Proposal Information

Code(s) and Section(s): SFPC Section 202

Proposed Change (including all relevant section numbers, if multiple sections):

Change the definition of "Responsible management" as shown:

RESPONSIBLE MANAGEMENT. A person who is any of the following:

1. The sole proprietor of a sole proprietorship.
2. The partners of a general partnership.
3. The managing partners of a limited partnership.
4. The officers or directors of a corporation.
5. The managers or members of a limited liability company.
6. The managers, officers or directors of an association, ~~or both~~.
7. Individuals in other business entities recognized under the laws of the Commonwealth as having a fiduciary responsibility to the firm.

Supporting Statement (including intent, need, and cost impact of the proposal):

During consideration of the proposed 2012 regulations, the Board of Housing and Community Development directed staff to review the definition of responsible management in the SFPC to assure that the categories of persons in the different business organizational structures listed were inclusive of those persons likely to desire to become responsible management. The term is used in relation to obtaining a background clearance card to be a blaster or pyrotechnician. Staff found that the categories should be expanded to be more equitable between the types of categories. The suggested changes are shown above.

Submittal Information

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ron Reynolds

Representing: SFMO

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ron.reynolds@vdfp.virginia.gov

Telephone Number: 804-612-7268

Proposal Information

Code(s) and Section(s): USBC Sections 116.2, 307.1, 425.1, and SFPC Section 5001.3 **SUBSTITUTE CHANGE**

Proposed Change (including all relevant section numbers, if multiple sections):

NOTE: If Kenney Payne's code change proposal on laboratories is passed, only SFPC Section 5001.3 below would be required in this code change proposal. The corresponding USBC Section changes are addressed in Mr. Payne's proposal.

Change USBC Section 116.2 to read as follows:

116.2 Contents of certificate. A certificate of occupancy shall specify the following:

1. The edition of the USBC under which the permit is issued.
2. The group classification and occupancy in accordance with the provisions of Chapter 3.
3. The type of construction as defined in Chapter 6.
4. If an automatic sprinkler system is provided and whether or not such system was required.
5. Any special stipulations and conditions of the building permit and if any modifications or approved alternatives were issued under the permit, there shall be a notation on the certificate that alternatives were approved or modifications were issued.

Add new exception #14 to USBC Section 307.1 to read as follows:

14. Laboratory buildings and facilities in which hazardous materials are stored, used or handled when such laboratory buildings and facilities comply with Virginia Construction Code Section 425.

Add new USBC Section 425 to read as follows:

425.1 General. When approved as an acceptable design and construction alternative to the requirements set forth elsewhere in the Virginia Construction Code, laboratory buildings and facilities shall comply with the design and construction requirements of NFPA 45 and its referenced standards and Section 425.1.1.

425.1.1. Requirements for life safety. The life safety and construction features of laboratories and facilities shall comply with the following:

1. Penetrations through fire rated floor/ceiling and wall assemblies, rated window assemblies, and protection of vertical shaft openings shall comply with Chapter 7 of the VCC.
2. The hourly fire separation specified in Table 5.1.1. of NFPA 45 for laboratory units shall be constructed as a fire barrier or horizontal assembly in accordance with the VCC. The floor

AS _____ AM _____ Disapprove _____ Carry over _____

assembly and supporting construction shall be of the same hourly rating as required for laboratory unit separation.

3. Emergency lighting and exit requirements shall comply with Chapter 10 of the VCC.

425.2 Quantity limitations. When used as an acceptable design and construction alternative for laboratories and facilities, the chemical inventories in each laboratory unit shall be maintained within the maximum allowable quantities specified in the applicable fire prevention or building code except as modified by NFPA 45, Chapter 10 for buildings with more than three stories.

425.2.1 Hazardous materials not listed. When hazardous materials to be stored, handled or used in laboratories or facilities are not listed in NFPA 45, the requirements for the hazardous materials not listed shall comply with the VCC.

Add the following standard to **USBC** Chapter 35, Referenced Standards:
NFPA 45-11, Standard on Fire Protection for Laboratories Using Chemicals

Change **SFPC** Section 5001.3 to read as follows:

5001.3 Performance-based design alternative. When approved by the fire code official, buildings and facilities where hazardous materials are stored, used or handled shall be permitted to comply with this section as an alternative to compliance with the other requirements set forth in this chapter and Chapters 51 through 67. When approved by the building code official, laboratories where hazardous materials are stored, used or handled shall be permitted to comply with VCC Section 425 and Exception #14 to VCC Section 307.1

Add the following standard to **SFPC** Chapter 80, Referenced Standards:
NFPA 45-11, Standard on Fire Protection for Laboratories Using Chemicals

Supporting Statement (including intent, need, and cost impact of the proposal):

This is a substitute change to what was previously submitted by the SFMO. It is a proposal developed at a August 7th meeting held at UVA, DHCD Work Group Meetings, and a subsequent exchanges of emails.

The concept in the original supporting statement is still applicable and valid. This substitute change refines the desired change and to address issues, concerns and technicalities that arose from previous meetings on the matter.

Based on input from client groups, this could save thousands of dollars in new construction and renovation costs, while at the same time, provide an equal or higher level of safety to a building's occupants.

Submittal Information

Date Submitted: 10/7/13 as a substitute to change submitted 6/3/13 and 8/21/13

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



10-10-13

DHCD substitute for revision submitted by the SFMO on 10-9-13 for the SFPC

SFPC IFC Section 5001.3 Performance-based design alternatives. Delete entire existing 5001.3

SFPC IFC 5001.3 Performance-based design alternative. The fire official shall maintain in buildings and facilities where hazardous materials are stored, used or handled in accordance with the VCC Sections 106, 415, 428 or IFC Chapters 51-57 and in accordance with the VRC Sections 1001.1 and 1013.

This language clearly states the role for the fire official under the scope of the SFPC. The language clearly cannot be misapplied and provides the appropriate links back to the VCC and VRC.

AS _____ AM _____ Disapprove _____ Carry over _____

TAB 3

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Robby Dawson

Representing: Fire Services Board Code Committee

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: dawsonj@chesterfield.gov

Telephone Number: 804-748-1426

Proposal Information

Code(s) and Section(s): Statewide Fire Prevention Code – various sections as listed below

Proposed Change (including all relevant section numbers, if multiple sections):

103.2. Amendments. All requirements of the referenced codes and standards that relate to fees, permits, unsafe notices, disputes, condemnation, inspections, scope of enforcement and all other procedural, and administrative matters are deleted and replaced by the provisions of Chapter 1 of the SFPC.

107.2 Permits Required. Operational Permits may be required by the fire official as permitted under the SFPC in accordance with Table 107.2, except that the fire official shall require permits for the manufacturing, storage, handling, use and sale of explosives. (remainder of section unchanged)

**Table 107.2
Operational Permit Requirements (to be filled in by local jurisdiction)**

Description	Permit Required (yes or no)	Permit Fee	Inspection Fee				
Battery systems. A permit is required to install stationary lead-acid battery systems having a liquid capacity of more than 50 gallons (189 L).							
<p>Compressed gas. An operational permit is required for the storage, use or handling at normal temperature and pressure (NTP) of compressed gases in excess of the amounts listed below.</p> <p>Exception: Vehicles equipped for and using compressed gas as a fuel for propelling the vehicle.</p> <p style="text-align: center;">PERMIT AMOUNTS FOR COMPRESSED GASES</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">TYPE OF GAS</td> <td style="width: 50%;">AMOUNT</td> </tr> <tr> <td></td> <td style="text-align: center;">(cubic feet at NTP)</td> </tr> </table>	TYPE OF GAS	AMOUNT		(cubic feet at NTP)			
TYPE OF GAS	AMOUNT						
	(cubic feet at NTP)						

Corrosive	200			
Flammable (except cryogenic fluids and liquefied petroleum gases)	200			
Highly toxic	Any amount			
Inert and simple asphyxiant	6,000			
Oxidizing (including oxygen)	504			
Pyrophoric	Any amount			
Toxic	Any amount			
For SI: 1 cubic foot = 0.02832 m ³				
Covered and open mall buildings. An operational permit is required for:				
1. The placement of retail fixtures and displays, concession equipment, displays of highly combustible goods and similar items in the mall.				
2. The display of liquid- or gas-fired equipment in the mall.				
3. The use of open-flame or flame-producing equipment in the mall.				
LP-gas. An operational permit is required for:				
1. Storage and use of LP-gas. Exception: A permit is not required for individual containers with a 500-gallon (1893 L) water capacity or less <u>or multiple container systems having an aggregate quantity not exceeding 500 gallons (1893 L), serving occupancies in Group R-3.</u>				
2. Operation of cargo tankers that transport LP-gas.				
Cryogenic fluids. An operational permit is required to produce, store, transport on site, use, handle or dispense cryogenic fluids in excess of the amounts listed below. Exception: Operational permits are not required for vehicles equipped for and using cryogenic fluids as a fuel for propelling the vehicle or for refrigerating the lading.				
Explosives, fireworks and pyrotechnics. An operational permit is required for the manufacture, storage, handling, sale or use of any quantity of explosive, explosive materials, fireworks, or pyrotechnic special effects, or pyrotechnic special effects material within the scope of Chapter 3356. Exception: Storage in Group R-3 or R-5 occupancies of smokeless propellant, black powder and small arms primers for personal use, not for resale and in accordance with the quantity limitations and conditions set forth in Section 5601.1, exceptions 4 and 12.				
For SI: 1 gallon = 3.785 L				
Type of Cryogenic Fluid	Inside Building (gallons)	Outside Building (gallons)		
Flammable	More than 1	60		
Inert	60	500		
Oxidizing (includes oxygen)	10	50		
Physical or health hazard not indicated above	Any amount	Any amount		
Fumigation, and thermal and insecticidal fogging. An operational permit is required to operate a business of fumigation, or thermal or insecticidal fogging and to maintain a room, vault or chamber in which a toxic or flammable fumigant is used.				
Hazardous materials. An operational permit is required to store, transport on site, dispense, use or handle hazardous materials in excess of the following amounts:				
Type of material		Amount		
Combustible liquids		See Flammable and Combustible Liquids		
Corrosive materials		See Compressed Gases		
Gases		55 gallons		
Liquids		1000 pounds		
Solids				
Explosive materials		See Explosives		
Flammable materials		See Compressed Gases		
Gases		See Flammable and Combustible Liquids		
Liquids		100 pounds		
Solids				

Highly toxic materials Gases Liquids Solids	See Compressed Gases Any amount Any amount			
Oxidizing materials Gases Liquids Class 4 Class 3 Class 2 Class 1 Solids Class 4 Class 3 Class 2 Class 1	See Compressed Gases Any amount 1 gallon ^a 10 gallons 55 gallons Any amount 10 pounds ^b 100 pounds 500 pounds			
Organic peroxides Liquids Class I Class II Class III Class IV Class V Solids Class I Class II Class III Class IV Class V	 Any amount Any amount 1 gallon 2 gallons No permit required Any amount Any amount 10 pounds 20 pounds No permit required			
Pyrophoric materials Gases Liquids Solids	See Compressed Gases Any amount Any amount			
Toxic materials Gases Liquids Solids	See Compressed Gases 10 gallons 100 pounds			
Unstable (reactive) materials Liquids Class 4 Class 3 Class 2 Class 1 Solids Class 4 Class 3 Class 2 Class 1	 Any amount Any amount 5 gallons 10 gallons Any amount Any amount 50 pounds 100 pounds			
Water-reactive Materials Liquids Class 3 Class 2 Class 1 Solids Class 3 Class 2 Class 1	 Any amount 5 gallons 55 gallons Any amount 50 pounds 500 pounds			
<u>a. 20 gallons when Table 5003.1.1(1) Note k applies and hazard identification signs in accordance with Section 5003.5 are provided for quantities of 20 gallons or less.</u> <u>b. 20 pounds when Table 5003.1.1(1) Note k applies and hazard identification signs in accordance with Section 5003.5 are provided for quantities of 200 pounds or less.</u>				
Open flames and candles. An operational permit is required to remove paint with a torch; use a torch or open flame device in a hazardous fire area; or to use open				

flames or candles in connection with assembly areas, dining areas of restaurants or drinking establishments.			
Open flames and torches. An operational permit is required to remove paint with a torch, or to use a torch or open-flame device in a wildfire risk area.			
Places of Assembly/educational. An operational permit is required to operate a place of assembly/educational occupancy.			
For SI: 1 cubic foot = 0.02832 m ³ , 1 gallon = 3.785 L., 1 pound = 0.454 kg.			

301.2 Permits. Permits shall be required as set forth in Section ~~105-6~~107.2 for the activities or uses regulated by Sections 306, 307, 308 and 315.

307.2 Permit required. A permit shall be obtained from the *fire code official* in accordance with Section ~~105-6~~107.2 prior to kindling a fire for recognized silvicultural or range or wildlife management practices, prevention or control of disease or pests, or a bonfire. Application for such approval shall only be presented by and permits issued to the *owner* of the land upon which the fire is to be kindled.

308.2 Permits required. Permits shall be obtained from the *fire code official* in accordance with Section ~~105-6~~107.2 prior to engaging in the following activities involving open flame, fire and burning:

1. Use of a torch or flame-producing device to remove paint from a structure.
2. Use of open flame, fire or burning in connection with Group A or E occupancies.
3. Use or operation of torches and other devices, machines or processes liable to start or cause fire in or upon wildfire risk areas.

315.2 Permit required. A permit for miscellaneous combustible storage shall be required as set forth in Section ~~105-6~~107.2.

501.2 Permits. A permit shall be required as set forth in Sections ~~105-6~~107.2 and ~~105-7~~.

601.2 Permits. Permits shall be obtained for refrigeration systems, battery systems and solar photovoltaic power systems as set forth in Sections ~~105-6~~107.2 and ~~105-7~~.

901.2 Construction documents. The *fire code official* shall have the authority to require and receive copies of construction documents and calculations for all *fire protection systems where such documents exist*, ~~and to require permits be issued for the installation, rehabilitation or modification of any fire protection system to be installed, rehabilitated or modified.~~ *Construction documents for fire protection systems shall be submitted for review and approval prior to system installation.*

901.3 Permits. Permits shall be required as set forth in Sections ~~105-6~~107.2 and ~~105-7~~.

2001.3 Permits. For permits to operate aircraft-refueling vehicles, application of flammable or combustible finishes and hot work, see Section ~~105-6~~107.2.

2101.2 Permit required. Permits shall be required as set forth in Section ~~105-6~~107.2.

2201.2 Permits. Permits shall be required for *combustible dust*-producing operations as set forth in Section ~~105-6~~107.2.

2301.2 Permits. Permits shall be required as set forth in Section ~~105-6~~107.2.

2401.3 Permits. Permits shall be required as set forth in Sections ~~105-6~~107.2 and ~~105-7~~.

2501.2 Permits. Permits shall be required as set forth in Section ~~105-6~~107.2.

2601.2 Permits. Permits shall be required as set forth in Section ~~105-6~~107.2.

2701.5 Permits. Permits shall be required as set forth in Section ~~105-6~~107.2.

2801.2 Permit. Permits shall be required as set forth in Section ~~105-6~~107.2.

2901.2 Permits. Permits shall be required as set forth in Section ~~105-6~~107.2.

3001.2 Permits. Permits shall be required as set forth in Sections ~~105-6~~107.2 and ~~105-7~~.

3103.4 Permits. Permits shall be required as set forth in Sections ~~105-6107.2~~ and ~~105-7~~.

3201.2 Permits. A permit shall be required as set forth in Section ~~105-6107.2~~.

3401.2 Permit required. Permits shall be required as set forth in Section ~~105-6107.2~~.

5001.5 Permits. Permits shall be required as set forth in Sections ~~105-6107.2~~ and ~~105-7~~.

5101.2 Permit required. Permits shall be required as set forth in Section ~~105-6107.2~~.

5201.3 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

5301.2 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

5401.2 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

5501.2 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

5601.2 Permit required. Permits shall be required as set forth in Section ~~105-6107.2~~ and regulated in accordance with this section.

5701.4 Permits. Permits shall be required as set forth in Sections ~~105-6107.2~~ and ~~105-7~~.

5801.2 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

5901.2 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

6001.2 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

6201.2 Permits. Permits shall be required for organic peroxides as set forth in Section ~~105-6107.2~~.

6301.2 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

6401.2 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

6501.2 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

6601.2 Permits. Permits shall be required as set forth in Section ~~105-6107.2~~.

Supporting Statement (including intent, need, and impact of the proposal):

NOTE: This original change was proposed by the FSBCC 12/5/2012. This revision reflects comments and clarifications requested by members of the BHCD Codes and Standards Committee. This revision's changes are noted by highlighted areas in the text of the proposal.

The overall objective for this proposed change is to ensure the proper and accurate coordination of the code's permit provisions and to clearly identify how reference standards are to be applied and when.

1. Section 103.2 amends by eliminating "permits" and "scope of enforcement" from this section. The corrected sections of the SFPC now correctly identify what section of the SFPC (107.2) identifies which operational permits are required. If the term "permits" remains, confusion is created that the permitting requirements in the explosives chapter are not enforceable. But with the proper reference to 107.2, it becomes clear that not only are permits potentially required, they are referenced back to the proper administrative provisions of chapter 1.

The "scope of enforcement" is also removed to clearly indicate those referenced standards (like NFPA) do have limitations on their scope. Without the deletion of this section, one could argue the door is left wide open to take the standard out of context or there is no basis for the standard to be used. The SFPC already has a catch all provision in 102.4 that clearly states any conflict between the SFPC and a reference standard – such as differences in scope –

that the SFPC prevails.

2. References to the permit section of Chapter 1 are often encountered in the technical chapters of the code. When encountered in a technical chapter, this proposed change will provide for the proper and accurate reference of the Chapter 1 permit provisions.
3. The changes to Table 107.2 are intended to incorporate the changes found in the 2012 edition of the IFC with the following notable differences:
 - a. An operational permit requirement for battery systems was deleted from the IFC in October 2004 through action by the ICC Code Correlation Committee (CCC). The stated reason for the CCC action was,

"Section 105.6.5 is the only section in 105.6 that contains the word "install", which clearly indicates that the permit requirement is one of construction, not operation.

Section 105.6.5 was added to the code by code change F203-99 (AM). It originally said "...install or operate..." but the modification deleted the phrase "...or operate...". At that time, there was only one section, 105.6, that regulated all permits.

In the same code change cycle, code change F46-99 (AM) divided Section 105.6 into the current separate Required Operational Permits Section 105.6 and Required Construction Permits Section 105.7.

Since both code changes F46-99 and F203-99 were approved simultaneously, relocating the new construction-oriented permit requirements created by F203-99 for the installation of battery systems from Section 105.6 to the new Section 105.7 should have been accomplished as a correlation change prior to publication of the 2000 edition, however it was overlooked. This correlation change will place the permit requirement for installation of battery systems into the proper section."

(The ICC references to Section 105.6 equate to SFPC Section 107.2.)
 - b. For fumigation, thermal and insecticidal fogging, the model code deleted the reference to "thermal" treatment but its felt this treatment must be retained. To produce high temperatures (thermal) within a building or space may still be a viable method for treating bed bug infestations. One of the methods of thermal pest control is the use of propane. If propane is used to treat bed bug infestations, then a permit may have to be obtained through or coordinated with other chapters of the code such as Chapter 61, Liquefied Petroleum Gas. The changes shown are for the benefit of clarity and distinction for the 3 methods of treatment; fumigation, thermal and fogging.
 - c. The SI units of measurement are relocated to the end of the table as opposed to repeating them in multiple locations. The units of measurement would still be applicable throughout the table.
 - d. Through an omission, the '09 edition of the SFPC did not have notes "a" and "b" as they relate to liquid and solid oxidizing hazardous materials. This change properly puts those notes back into the table.
 - e. As a statewide minimum, the added language regarding explosives, display fireworks and pyrotechnics reflects the combining of separate IFC model code lines and its list of required operational permits. This produces no fundamental or significant operational changes within or for the SFPC and **does not** impact "permissible fireworks".
 - f. The exception for the line for explosives is a reiteration for propellants and primers found in Chapter 56 and those contained in previous editions of the SFPC. There's no attempt to change those SFPC exceptions.
 - g. As a point of information, no edition of the referenced IFC model code has had educational occupancy listed for operational permits, hence the reason for deleting the reference for educational occupancies. The option to amend the code to include Group E is still available at the local level.
4. The change to Section 901.2 allows the fire official to require and receive copies of construction documents related to the installation, rehabilitation or modification of fire protections systems. It is those documents that establish the benchmark for which a level protection or performance is to be maintain for the life of the building and its systems.
5. Additional supporting information submitted 5/2013 in support of 103.2 changes:

Further analysis of the specific sections of the referenced codes and standards reveals that the following inspections are not required, nor can the owner/operator be compelled to conduct any inspections under the SFPC:

 - a. Fire hydrants to can not be inspected (507.5.2)
 - b. There can be no required inspection of emergency or standby power systems, and no records maintained (604.3). These requirements are in the IFC and NFPA 110, 111 – both are deleted by existing language.

- c. Commercial kitchen hoods including ducts and fans can no longer be required to be inspected. (609.3.3.1).
- d. Portable fire extinguishers are not required to be inspected, however the exception may now be required since issues dealing with "inspections" is not in the SFPC, so the exception is not included (906.2 Ex 2).
- e. The inspection of "fire detection, alarm and extinguishing system" as well as non-required systems are not required to be inspected (901.6).
- f. Fire resistance rated construction does not need to be inspected by the owner of the property (703.1).
- g. Records can no long be "inspected" concerning the monitoring for excessive temperatures in dust piles (1908.6).
- h. Shells of pyrotechnic devices do not need to be inspected for damage after transport (3308.5.3)
- i. Magazines of explosive do not have to be routinely inspected for damaged, degrading or missing explosives (3304.9).
- j. Records of explosives transactions can not be inspected (3303.2).
- k. There is no requirement to inspect the fallout area of a fireworks display to collect any un-exploded shells (3308.9).

The Scoping provisions of the referenced NFPA Standards do not apply as 103.2 is currently written. Additionally, since the scope of NFPA 25 is effectively deleted, the exception is also eliminated making NFPA 25 applicable to ALL water based fire protection systems including NFPA13D systems.

Opposition to much of the change to this section has not been objectively illustrated. There have been no examples (like those listed above to the contrary) that show how the proposed change has a detrimental impact on the fire official's ability to enforce the code or any potential expansion of what was understood scope prior to the TRB ruling earlier this year.

Modification to section 906.2 clarifies this is not directed at the building official, but whoever has possession of these documents to ensure they are available for future fire code enforcement.

6. The change to section 107.2 clarifies that these permits are operational in nature and do not allow or require the fire official to issue permits under any other provision of state code other than the SFPC for the operations noted in Table 107.2 when adopted locally as part of the local fire code adoption process.

Supporting documentation of the referenced adopted standards are also attached to this revised proposal.

Submittal Information

Date Submitted: 12/5/12 – Revision submitted 6/3/13

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR TASO (Technical Assistance and Services Office)

Main Street Centre
600 E. Main St., Ste. 300
Richmond, VA 23219

Email Address: tsu@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7140 or (804) 371-7150



NFPA 25

Standard for the

Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

2002 Edition

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

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet between the paragraphs that remain.

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, Annex D lists the complete title and edition of the source documents for both mandatory and nonmandatory extracts. 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 appropriate technical committee.

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

Chapter 1 Administration

1.1 Scope. This document establishes the minimum requirements for the periodic inspection, testing, and maintenance of water-based fire protection systems, including land-based and marine applications. The types of systems addressed by this standard include, but are not limited to, sprinkler, stand-pipe and hose, fixed water spray, and foam water. Included are the water supplies that are part of these systems, such as private fire service mains and appurtenances, fire pumps and water storage tanks, and valves that control system flow. The document also addresses impairment handling and reporting. This standard applies to fire protection systems that have been properly installed in accordance with generally accepted practices. Where a system has not been installed in accordance with generally accepted practices, the corrective action is beyond the scope of this standard. The corrective action to ensure that the system performs in a satisfactory manner shall be in accordance with the appropriate installation standard.

1.1.1 This standard shall not apply to sprinkler systems designed and installed in accordance with NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*.

1.2* Purpose. The purpose of this document is to provide requirements that ensure a reasonable degree of protection for life and property from fire through minimum inspection, testing, and maintenance methods for water-based fire protection systems. In those cases where it is determined that an

existing situation involves a distinct hazard to life or property, the authority having jurisdiction shall be permitted to require inspection, testing, and maintenance methods in excess of those required by the standard.

1.3* Application. It is not the intent of this document to limit or restrict the use of other inspection, testing, or maintenance programs that provide an equivalent level of system integrity and performance to that detailed in this document. The authority having jurisdiction shall be consulted and approval obtained for such alternative programs.

1.4* Units. Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI).

1.4.1 If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated shall be regarded as the requirement. A given equivalent value shall be considered to be approximate.

1.4.2 SI units have been converted by multiplying the quantity by the conversion factor and then rounding the result to the appropriate number of significant digits. Where nominal or trade sizes exist, the nominal dimension has been recognized in each unit.

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, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 11, *Standard for Low-Expansion Foam*, 1998 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 1999 edition.

NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, 1999 edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2001 edition.

NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*, 1999 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 1999 edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 1998 edition.

NFPA 72®, *National Fire Alarm Code*®, 1999 edition.

NFPA 110, *Standard for Emergency and Standby Power Systems*, 2002 edition.

NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, 2000 edition.

NFPA 409, *Standard on Aircraft Hangars*, 2001 edition.

NFPA 1962, *Standard for the Care, Use, and Service Testing of Fire Hose Including Couplings and Nozzles*, 1998 edition.

2.3 Other Publications.

2.3.1 ASTM Publication. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 3359, *Standard Test Methods for Measuring Adhesion by Tape Test*, 1997.

10.2 Plans. Where plans are required, they shall be prepared by qualified persons trained in the design and application of these systems.

10.2.1 The plans shall be drawn to an indicated scale or be suitably dimensioned and shall be reproducible.

10.2.2 The plans shall contain sufficient detail to enable the authority having jurisdiction to evaluate the hazard or hazards and to evaluate the effectiveness of the system.

10.2.2.1 The details on the hazards shall include the materials involved, the location and arrangement, and the exposure to the hazard.

10.2.3 The details on the system shall include sufficient information and calculations on the following:

- (1) Amount of dry chemical
- (2) The size, length, and arrangement of connected piping, or piping and hose
- (3) The description and location of nozzles so that the adequacy of the system can be determined

10.2.3.1 Flow rates of nozzles used shall be provided for engineered systems.

10.2.3.2 Information shall be submitted pertaining to the location and function of detection devices, operating devices, auxiliary equipment, and electrical circuitry, if used.

10.2.3.3 Sufficient information shall be indicated to properly identify the apparatus and devices used.

10.3 Approval of Plans. Where plans are required, they shall be submitted to the authority having jurisdiction for approval before work starts.

10.3.1 Where field conditions necessitate any substantial change from the approved plan, the corrected as-installed plans shall be submitted to the authority having jurisdiction for approval.

10.4 Approval of Installations. The completed system shall be tested by qualified personnel.

10.4.1 The tests shall determine that the system has been properly installed and will function as intended.

10.4.1.1 Only listed equipment and devices shall be used in these systems.

10.4.2 The installer shall certify that the installation has been made in accordance with the approved plans and the listing of a testing laboratory.

10.4.3 Acceptance tests shall include a discharge of dry chemical in sufficient amounts to verify that the system is properly installed and functional.

10.4.3.1 The method of verification shall be acceptable to the authority having jurisdiction.

10.4.3.2 Piping shall not be hydrostatically tested.

10.4.3.3 Where pressure testing is required, it shall be by means of a dry gas.

10.4.3.4 The labeling of devices with proper designations and instructions shall be checked.

10.4.3.5 The use of dry chemical for the approval test shall be permitted to be waived by the authority having jurisdiction.

10.4.4 After any discharge of dry chemical, all piping and nozzles shall be blown clean using compressed dry air or nitrogen.

10.4.4.1 The system shall be properly charged and placed in the normal "set" condition.

10.5 Manual. The owner shall be provided with a copy of the manufacturer's listed installation and maintenance manual or listed owner's manual.

Chapter 11 Inspection, Maintenance, and Recharging

11.1 General Requirements.

11.1.1 Where dry chemical pressure containers are not attached to piping or hand hose lines, the discharge outlet shall be provided with a protective diffusing safety cap to protect personnel from recoil and high-flow discharge in case of accidental actuation.

11.1.1.1 Protective caps also shall be used on empty pressure containers to protect threads.

11.1.1.2 Protective caps shall be provided by the manufacturer of the equipment.

11.1.2 Storage. Storage of charging supplies of dry chemical shall be in a constantly dry area, and the dry chemical shall be contained in metal drums or other containers that will prevent the entrance of moisture even in small quantities.

11.1.2.1 Prior to the dry chemical chamber being charged, the dry chemical shall be checked carefully to determine that it is in a flowing condition.

11.1.3* A trained person who has undergone the instructions necessary to perform the maintenance and recharge service reliably and has the applicable manufacturer's installation and maintenance manual and service bulletins shall service the dry chemical extinguishing system at intervals not more than 6 months apart as outlined in Section 11.3.

11.1.4 All dry chemical extinguishing systems shall be inspected in accordance with the owner's manual and maintained and recharged in accordance with the manufacturer's listed installation and maintenance manual and service bulletins.

11.1.5 Recharge Agents.

11.1.5.1 Quality. The dry chemical used in the system shall be supplied by the equipment manufacturer.

11.1.5.1.1 The characteristics of the system are dependent on the composition of the dry chemical and the type of expellant gas, as well as other factors.

11.1.5.1.2 It is imperative to use the dry chemical provided by the equipment manufacturer and the type of expellant gas specified by the equipment manufacturer.

11.1.5.1.3 Where carbon dioxide or nitrogen is used as the expellant gas, it shall be of good commercial grade and free of water and other contaminants that might cause container corrosion.

11.1.6 System access for inspection or maintenance that requires opening panels in fire chases or ducts, or both, shall not be permitted while any appliance(s) or equipment protected by that system is in operation.

11.2 Owner's Inspection.

11.2.1 On a monthly basis, inspection shall be conducted in accordance with the manufacturer's listed installation and maintenance manual or owner's manual.

11.2.1.1 As a minimum, this "quick check" or inspection shall include verification of the following:

- (1) The extinguishing system is in its proper location.
- (2) The manual actuators are unobstructed.
- (3) The tamper indicators and seals are intact.
- (4) The maintenance tag or certificate is in place.
- (5) The system shows no physical damage or condition that might prevent operation.
- (6) The pressure gauge(s), if provided, is in operable range.
- (7) The nozzle blowoff caps, where provided, are intact and undamaged.
- (8) Neither the protected equipment nor the hazard has been replaced, modified, or relocated.

11.2.2 If any deficiencies are found, appropriate corrective action shall be taken immediately.

11.2.3 Personnel making inspections shall keep records for those extinguishing systems that were found to require corrective actions.

11.2.4 At least monthly, the date the inspection is performed and the initials of the person performing the inspection shall be recorded. The records shall be retained until the next semi-annual maintenance.

11.3 Maintenance.

11.3.1* At least semiannually, maintenance shall be conducted in accordance with the manufacturer's listed installation and maintenance manual.

11.3.1.1 As a minimum, such maintenance shall include the following:

- (1) A check to see that the hazard has not changed
- (2) An examination of all detectors, expellant gas container(s), agent container(s), releasing devices, piping, hose assemblies, nozzles, signals, and all auxiliary equipment
- (3)*Verification that the agent distribution piping is not obstructed
- (4) Examination of the dry chemical (If there is evidence of caking, the dry chemical shall be discarded and the system shall be recharged in accordance with the manufacturer's instructions.)

11.3.1.2 Dry chemical in stored pressure systems shall not require semiannual examination but shall be examined at least every 6 years.

11.3.1.3 Where semiannual maintenance of any dry chemical containers or system components reveals conditions such as, but not limited to, corrosion or pitting in excess of the manufacturer's limits, structural damage or fire damage, or repairs by soldering, welding, or brazing, the affected part(s) shall be replaced or hydrostatically tested in accordance with the recommendations of the manufacturer or the listing agency. The hydrostatic testing of dry chemical containers shall follow the applicable procedures outlined in Section 11.5.

11.3.1.4* All dry chemical systems shall be tested, which shall include the operation of the detection system, signals, and releasing devices, including manual stations and other associated equipment.

11.3.1.5 Where the maintenance of the system(s) reveals defective parts that could cause an impairment or failure of proper operation of the system(s), the affected parts shall be replaced or repaired in accordance with the manufacturer's recommendations.

11.3.1.6 The maintenance report, including any recommendations, shall be filed with the owner or with the designated party responsible for the system.

11.3.1.7* Each dry chemical system shall have a tag or label indicating the month and year the maintenance is performed and identifying the person performing the service. Only the current tag or label shall remain in place.

11.3.2* Fixed temperature-sensing elements of the fusible metal alloy type shall be replaced at least annually from the date of installation.

11.3.2.1 Upon removal the links shall be destroyed.

11.3.2.2 The year of manufacture and the date of installation of the fixed temperature-sensing element shall be marked on the system inspection tag.

11.3.2.3 The tag shall be signed or initialed by the installer.

11.3.3 Fixed temperature-sensing elements other than the fusible metal alloy type shall be permitted to remain continuously in service, provided they are inspected and cleaned or replaced if necessary in accordance with the manufacturer's instructions every 12 months or more frequently to ensure proper operation of the system.

11.4 Recharging.

11.4.1 All extinguishing systems shall be recharged after use or as indicated by an inspection or a maintenance check.

11.4.2 Systems shall be recharged in accordance with the manufacturer's listed installation and maintenance manual.

11.5 Hydrostatic Testing. Hydrostatic testing shall be performed by persons trained in pressure-testing procedures and safeguards and having available suitable testing equipment, facilities, and an appropriate service manual(s).

11.5.1* The following parts of dry chemical extinguishing systems shall be subjected to a hydrostatic pressure test at intervals not exceeding 12 years:

- (1) Dry chemical containers
- (2) Auxiliary pressure containers
- (3) Hose assemblies

Exception No. 1: Dry chemical containers that are part of extinguishing systems having an agent capacity exceeding 150 lb (68 kg).

Exception No. 2: Auxiliary pressure containers not exceeding 2 in. (0.05 m) outside diameter and less than 2 ft (0.6 m) in length.

Exception No. 3: Auxiliary pressure containers bearing the DOT "3E" marking.

11.5.2 Dry chemical containers, auxiliary pressure containers, and hose assemblies shall be subjected to a hydrostatic test pressure equal to the marked factory test pressure or the test pressure specified in the manufacturer's listed installation and maintenance manual.

11.5.2.1 No leakage, rupture, or movement of hose couplings shall be permitted.

8.3.2 Smoking shall be strictly prohibited, except in designated smoking areas.

8.3.3* Welding, cutting, and similar spark-producing operations shall not be permitted in areas that contain aerosol products until a written permit authorizing the work has been issued.

8.3.3.1 The permit shall be issued by a person in authority following an inspection of the area to assure that proper precautions have been taken and will be followed until completion of the work.

8.4 Aisles. Storage in aisles shall be prohibited so as to permit access for fire fighting, salvage, and removal of stored commodities.

8.5 Waste Disposal.

8.5.1 Filled or partly filled aerosol containers shall be separated from all other rubbish and trash.

8.5.1.1 Filled or partly filled aerosol containers shall be placed in noncombustible waste containers.

8.5.2 Filled or partly filled aerosol containers shall not be disposed of in compactors, balers, or incinerators that crush the container or heat its contents.

8.5.2.1 Equipment and facilities that are specifically designed for the disposal of aerosol containers shall be permitted to dispose of filled or partly filled aerosol containers.

8.6 Inspection and Maintenance.

8.6.1 A written and documented preventive maintenance program shall be developed for equipment, machinery, and processes that are critical to fire-safe operation of the facility.

8.6.2 Critical detection systems and their components, emergency trips and interlocks, alarms, and safety shutdown systems shall be inspected on a regularly scheduled basis and any deficiencies shall be immediately corrected.

8.6.2.1 Items in this inspection schedule include, but are not limited to, the following:

- (1) Gas detection systems
- (2) Deflagration suppression systems
- (3) Deflagration vent systems
- (4) Ventilation and local exhaust systems
- (5) Propellant charging room door interlocks
- (6) Process safety devices
- (7) Fire alarm systems

8.7* Static Electricity. All process equipment and piping involved in the transfer of flammable liquids or gases shall be connected to a static-dissipating earth ground system to prevent accumulations of static charge.

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.1.1.2 An example of an aerosol product that is not flammable and, therefore, not covered by this code is whipped cream: the base product is a water-based material and the propellant is nitrous oxide, which is nonflammable.

A.1.1.3 See NFPA 58, *Liquefied Petroleum Gas Code*.

A.1.2 This code provides minimum acceptable requirements for fire prevention and protection in facilities that manufacture and store aerosol products and in mercantile occupancies where aerosol products are displayed and sold. As explained in A.5.1 the hazards presented by each stage of the manufacturing process will vary, depending on the flammability of the base product and on the flammability of the propellant. Considerable judgment will be required of the designer and of the authority having jurisdiction to provide an adequate level of fire protection. (See also Annex B, *Mechanism of Fire Growth in Aerosol Containers*.)

A.1.4 This section should not be interpreted as discouraging the upgrading of existing aerosol manufacturing or storage facilities. Improvements to fire protection systems in existing facilities should be allowed without requiring retroactive compliance with all of the requirements of this code. It is the intent of this code, however, that major renovations to such a facility should meet, to the greatest extent practical, the requirements of this code.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 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.3.2.3 Code. The decision to designate a standard as a "code" is based on such factors as the size and scope of the document, its intended use and form of adoption, and whether it contains substantial enforcement and administrative provisions.

A.3.3.1 Aerosol. The base product can be dispensed from the container in such form as a mist, spray, foam, gel, or aerated powder.

A.3.3.2 Aerosol Container. Maximum sizes, minimum strengths, and other critical limitations for aerosol containers are set by the U.S. Department of Transportation (49 CFR). These regulations assure that aerosol products can be safely

passage by vehicles. Signs shall be of an *approved* size, weather resistant and be maintained until replaced by permanent signs.

**SECTION 506
KEY BOXES / ELEVATOR KEYS**

SEE SFPC #

506.1 Where required. Where access to or within a structure or an area is restricted because of secured openings or where immediate access is necessary for life-saving or fire-fighting purposes, the *fire code official* is authorized to require a key box to be installed in an *approved* location. The key box shall be of an *approved* type and shall contain keys to gain necessary access as required by the *fire code official*.

506.1.1 Locks. An *approved* lock shall be installed on gates or similar barriers when required by the *fire code official*.

506.2 Key box maintenance. The operator of the building shall immediately notify the *fire code official* and provide the new key when a lock is changed or rekeyed. The key to such lock shall be secured in the key box.

→ 506.3 = SFPC = KEYS TO ELEVATORS

**SECTION 507
FIRE PROTECTION WATER SUPPLIES**

507.1 Required water supply. An *approved* water supply capable of supplying the required fire flow for fire protection shall be provided to premises upon which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction.

507.2 Type of water supply. A water supply shall consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of providing the required fire flow.

507.2.1 Private fire service mains. Private fire service mains and appurtenances shall be installed in accordance with NFPA 24.

507.2.2 Water tanks. Water tanks for private fire protection shall be installed in accordance with NFPA 22.

507.3 Fire flow. Fire flow requirements for buildings or portions of buildings and facilities shall be determined by an *approved* method.

SFPC

SEE SFPC - SPRINKLER ALLOWANCES.
507.4 Water supply test. The *fire code official* shall be notified prior to the water supply test. Water supply tests shall be witnessed by the *fire code official* or *approved* documentation of the test shall be provided to the *fire code official* prior to final approval of the water supply system.

507.5 Fire hydrant systems. Fire hydrant systems shall comply with Sections 507.5.1 through 507.5.6.

SFPC MOD

507.5.1 Where required. Where a portion of the facility or building hereafter constructed or moved into or within the jurisdiction is more than 400 feet (122 m) from a hydrant on a fire apparatus access road, as measured by an *approved* route around the exterior of the facility or building, on-site

fire hydrants and mains shall be provided where required by the *fire code official*.

Exceptions:

1. For Group R-3 and Group U occupancies, the distance requirement shall be 600 feet (183 m).
2. For buildings equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the distance requirement shall be 600 feet (183 m).

507.5.2 Inspection, testing and maintenance. Fire hydrant systems shall be subject to periodic tests as required by the *fire code official*. Fire hydrant systems shall be maintained in an operative condition at all times and shall be repaired where defective. Additions, repairs, *alterations* and servicing shall comply with *approved* standards.

507.5.3 Private fire service mains and water tanks. Private fire service mains and water tanks shall be periodically inspected, tested and maintained in accordance with NFPA 25 at the following intervals:

1. Private fire hydrants (all types): Inspection annually and after each operation; flow test and maintenance annually.
2. Fire service main piping: Inspection of exposed, annually; flow test every 5 years.
3. Fire service main piping strainers: Inspection and maintenance after each use.

507.5.4 Obstruction. Unobstructed access to fire hydrants shall be maintained at all times. The fire department shall not be deterred or hindered from gaining immediate access to fire protection equipment or fire hydrants.

507.5.5 Clear space around hydrants. A 3-foot (914 mm) clear space shall be maintained around the circumference of fire hydrants except as otherwise required or *approved*.

507.5.6 Physical protection. Where fire hydrants are subject to impact by a motor vehicle, guard posts or other *approved* means shall comply with Section 312.

**SECTION 508
FIRE COMMAND CENTER**

508.1 General. Where required by other sections of this code and in all buildings classified as high-rise buildings by the *International Building Code*, a *fire command center* for fire department operations shall be provided and shall comply with Sections 508.1.1 through 508.1.5.

508.1.1 Location and access. The location and accessibility of the *fire command center* shall be *approved* by the fire chief.

508.1.2 Separation. The *fire command center* shall be separated from the remainder of the building by not less than a 1-hour *fire barrier* constructed in accordance with Section 707 of the *International Building Code* or *horizontal assem-*

604.2.16 Group I-3 occupancies. Power-operated sliding doors or power-operated locks for swinging doors in Group I-3 occupancies shall be operable by a manual release mechanism at the door, and either emergency power or a remote mechanical operating release shall be provided.

Exception: Emergency power is not required in facilities where provisions for remote locking and unlocking of occupied rooms in Occupancy Condition 4 are not required as set forth in the *International Building Code*.

604.2.17 Airport traffic control towers. A standby power system shall be provided in airport traffic control towers more than 65 feet (19 812 mm) in height. Power shall be provided to the following equipment:

1. Pressurization equipment, mechanical equipment and lighting.
2. Elevator operating equipment.
3. Fire alarm and smoke detection systems.

604.2.18 Elevators. In buildings and structures where standby power is required or furnished to operate an elevator, the operation shall be in accordance with Sections 604.2.18.1 through 604.2.18.4.

604.2.18.1 Manual transfer. Standby power shall be manually transferable to all elevators in each bank.

604.2.18.2 One elevator. Where only one elevator is installed, the elevator shall automatically transfer to standby power within 60 seconds after failure of normal power.

604.2.18.3 Two or more elevators. Where two or more elevators are controlled by a common operating system, all elevators shall automatically transfer to standby power within 60 seconds after failure of normal power where the standby power source is of sufficient capacity to operate all elevators at the same time. Where the standby power source is not of sufficient capacity to operate all elevators at the same time, all elevators shall transfer to standby power in sequence, return to the designated landing and disconnect from the standby power source. After all elevators have been returned to the designated level, at least one elevator shall remain operable from the standby power source.

604.2.18.4 Venting. Where standby power is connected to elevators, the machine room ventilation or air conditioning shall be connected to the standby power source.

604.3 Maintenance. Emergency and standby power systems shall be maintained in accordance with NFPA 110 and NFPA 111 such that the system is capable of supplying service within the time specified for the type and duration required.

604.3.1 Schedule. Inspection, testing and maintenance of emergency and standby power systems shall be in accordance with an *approved* schedule established upon completion and approval of the system installation.

604.3.2 Written record. Written records of the inspection, testing and maintenance of emergency and standby power systems shall include the date of service, name of the servicing technician, a summary of conditions noted and a

detailed description of any conditions requiring correction and what corrective action was taken. Such records shall be kept on the premises served by the emergency or standby power system and be available for inspection by the *fire code official*.

604.3.3 Switch maintenance. Emergency and standby power system transfer switches shall be included in the inspection, testing and maintenance schedule required by Section 604.3.1. Transfer switches shall be maintained free from accumulated dust and dirt. Inspection shall include examination of the transfer switch contacts for evidence of deterioration. When evidence of contact deterioration is detected, the contacts shall be replaced in accordance with the transfer switch manufacturer's instructions.

604.4 Operational inspection and testing. Emergency power systems, including all appurtenant components shall be inspected and tested under load in accordance with NFPA 110 and NFPA 111.

Exception: Where the emergency power system is used for standby power or peak load shaving, such use shall be recorded and shall be allowed to be substituted for scheduled testing of the generator set, provided that appropriate records are maintained.

604.4.1 Transfer switch test. The test of the transfer switch shall consist of electrically operating the transfer switch from the normal position to the alternate position and then return to the normal position.

604.5 Supervision of maintenance and testing. Routine maintenance, inspection and operational testing shall be overseen by a properly instructed individual.

604.6 TESTING OF EM. SYSTEMS

SECTION 605

ELECTRICAL EQUIPMENT, WIRING AND HAZARDS

605.1 Abatement of electrical hazards. Identified electrical hazards shall be abated. Identified hazardous electrical conditions in permanent wiring shall be brought to the attention of the responsible code official. Electrical wiring, devices, appliances and other equipment that is modified or damaged and constitutes an electrical shock or fire hazard shall not be used.

605.2 Illumination. Illumination shall be provided for service equipment areas, motor control centers and electrical panelboards.

605.3 Working space and clearance. A working space of not less than 30 inches (762 mm) in width, 36 inches (914 mm) in depth and 78 inches (1981 mm) in height shall be provided in front of electrical service equipment. Where the electrical service equipment is wider than 30 inches (762 mm), the working space shall not be less than the width of the equipment. No storage of any materials shall be located within the designated working space.

Exceptions:

1. Where other dimensions are required or allowed by NFPA 70.

608.6 Ventilation. Ventilation of stationary storage battery systems shall comply with Sections 608.6.1 and 608.6.2.

608.6.1 Room ventilation. Ventilation shall be provided in accordance with the *International Mechanical Code* and the following:

1. For flooded lead-acid, flooded Ni-Cad and VRLA batteries, the ventilation system shall be designed to limit the maximum concentration of hydrogen to 1.0 percent of the total volume of the room; or
2. Continuous ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot (1 ft³/min/ft²) [0.0051 m³/s × m²] of floor area of the room.

Exception: Lithium-ion and lithium metal polymer batteries shall not require ventilation.

608.6.2 Cabinet ventilation. When VRLA batteries are installed inside a cabinet, the cabinet shall be *approved* for use in occupied spaces and shall be mechanically or naturally vented by one of the following methods:

1. The cabinet ventilation shall limit the maximum concentration of hydrogen to 1 percent of the total volume of the cabinet during the worst-case event of simultaneous "boost" charging of all the batteries in the cabinet; or
2. When calculations are not available to substantiate the ventilation rate, continuous ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot [1 ft³/min/ft² or 0.0051 m³/(s · m²)] of floor area covered by the cabinet. The room in which the cabinet is installed shall also be ventilated as required in Section 608.6.1.

608.6.3 Supervision. Mechanical ventilation systems where required by Sections 608.6.1 and 608.6.2 shall be supervised by an *approved* central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.

608.7 Signage. Signs shall comply with Sections 608.7.1 and 608.7.2.

608.7.1 Equipment room and building signage. Doors into electrical equipment rooms or buildings containing stationary battery systems shall be provided with *approved* signs. The signs shall state that:

1. The room contains energized battery systems.
2. The room contains energized electrical circuits.
3. The battery electrolyte solutions, where present, are *corrosive* liquids.

608.7.2 Cabinet signage. Cabinets shall have exterior labels that identify the manufacturer and model number of the system and electrical rating (voltage and current) of the contained battery system. There shall be signs within the cabinet that indicate the relevant electrical, chemical and fire hazards.

608.8 Seismic protection. The battery systems shall be seismically braced in accordance with the *International Building Code*.

608.9 Smoke detection. An *approved* automatic smoke detection system shall be installed in accordance with Section 907.2 in rooms containing stationary battery systems.

**SECTION 609
COMMERCIAL KITCHEN HOODS**

[M] 609.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of the *International Mechanical Code*.

[M] 609.2 Where required. A Type I hood shall be installed at or above all commercial cooking appliances and domestic cooking appliances used for commercial purposes that produce grease vapors.

609.3 Operations and maintenance. Commercial cooking systems shall be operated and maintained in accordance with Sections 609.3.1 through 609.3.4.

609.3.1 Ventilation system. The ventilation system in connection with hoods shall be operated at the required rate of air movement, and classified grease filters shall be in place when equipment under a kitchen grease hood is used.

609.3.2 Grease extractors. Where grease extractors are installed, they shall be operated when the commercial-type cooking equipment is used.

609.3.3 Cleaning. Hoods, grease-removal devices, fans, ducts and other appurtenances shall be cleaned at intervals as required by Sections 609.3.3.1 through 609.3.3.3.

609.3.3.1 Inspection. Hoods, grease-removal devices, fans, ducts and other appurtenances shall be inspected at intervals specified in Table 609.3.3.1 or as *approved* by the *fire code official*. Inspections shall be completed by qualified individuals.

**TABLE 609.3.3.1
COMMERCIAL COOKING SYSTEM INSPECTION FREQUENCY**

TYPE OF COOKING OPERATIONS	FREQUENCY OF INSPECTION
High-volume cooking operations such as 24-hour cooking, charbroiling or wok cooking	3 months
Low-volume cooking operations such as places of religious worship, seasonal businesses and senior centers	12 months
Cooking operations utilizing solid-fuel burning cooking appliances	1 month
All other cooking operations	6 months

609.3.3.2 Grease accumulation. If during the inspection it is found that hoods, grease-removal devices, fans, ducts or other appurtenances have an accumulation of grease, such components shall be cleaned.

609.3.3.3 Records. Records for inspections shall state the individual and company performing the inspection, a description of the inspection and when the inspection took place. Records for cleanings shall state the individual and company performing the cleaning and when the cleaning took place. Such records shall be completed

FIRE PROTECTION SYSTEMS

**TABLE 906.1—continued
ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS**

SECTION	SUBJECT
2003.5	Organic-coating areas
2106.3	Industrial ovens
2205.5	Motor fuel-dispensing facilities
2210.6.4	Marine motor fuel-dispensing facilities
2211.6	Repair garages
2306.10	Rack storage
2404.12	Tents and membrane structures
2508.2	Tire rebuilding/storage
2604.2.6	Welding and other hot work
2903.6	Combustible fibers
3403.2.1	Flammable and combustible liquids, general
3404.3.3.1	Indoor storage of flammable and combustible liquids
3404.3.7.5.2	Liquid storage rooms for flammable and combustible liquids
3405.4.9	Solvent distillation units
3406.2.7	Farms and construction sites—flammable and combustible liquids storage
3406.4.10.1	Bulk plants and terminals for flammable and combustible liquids
3406.5.4.5	Commercial, industrial, governmental or manufacturing establishments—fuel dispensing
3406.6.4	Tank vehicles for flammable and combustible liquids
3606.5.7	Flammable solids
3808.2	LP-gas
4504.4	Marinas

906.2 General requirements. Portable fire extinguishers shall be selected, installed and maintained in accordance with this section and NFPA 10.

Exceptions:

1. The travel distance to reach an extinguisher shall not apply to the spectator seating portions of Group A-5 occupancies.
2. Thirty-day inspections shall not be required and maintenance shall be allowed to be once every three years for dry-chemical or halogenated agent portable fire extinguishers that are supervised by a *listed* and *approved* electronic monitoring device, provided that all of the following conditions are met:
 - 2.1. Electronic monitoring shall confirm that extinguishers are properly positioned, properly charged and unobstructed.

- 2.2. Loss of power or circuit continuity to the electronic monitoring device shall initiate a trouble signal.
 - 2.3. The extinguishers shall be installed inside of a building or cabinet in a noncorrosive environment.
 - 2.4. Electronic monitoring devices and supervisory circuits shall be tested every three years when extinguisher maintenance is performed.
 - 2.5. A written log of required hydrostatic test dates for extinguishers shall be maintained by the *owner* to verify that hydrostatic tests are conducted at the frequency required by NFPA 10.
3. In Group I-3, portable fire extinguishers shall be permitted to be located at staff locations.

906.3 Size and distribution. The size and distribution of portable fire extinguishers shall be in accordance with Sections 906.3.1 through 906.3.4.

906.3.1 Class A fire hazards. Portable fire extinguishers for occupancies that involve primarily Class A fire hazards, the minimum sizes and distribution shall comply with Table 906.3(1).

**TABLE 906.3(1)
FIRE EXTINGUISHERS FOR CLASS A FIRE HAZARDS**

	LIGHT (Low) HAZARD OCCUPANCY	ORDINARY (Moderate) HAZARD OCCUPANCY	EXTRA (High) HAZARD OCCUPANCY
Minimum Rated Single Extinguisher	2-A ^c	2-A	4-A ^a
Maximum Floor Area Per Unit of A	3,000 square feet	1,500 square feet	1,000 square feet
Maximum Floor Area For Extinguisher ^b	11,250 square feet	11,250 square feet	11,250 square feet
Maximum Travel Distance to Extinguisher	75 feet	75 feet	75 feet

- For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 gallon = 3.785 L.
- a. Two 2½-gallon water-type extinguishers shall be deemed the equivalent of one 4-A rated extinguisher.
 - b. Annex E.3.3 of NFPA 10 provides more details concerning application of the maximum floor area criteria.
 - c. Two water-type extinguishers each with a 1-A rating shall be deemed the equivalent of one 2-A rated extinguisher for Light (Low) Hazard Occupancies.

906.3.2 Class B fire hazards. Portable fire extinguishers for occupancies involving flammable or *combustible liquids* with depths of less than or equal to 0.25-inch (6.35 mm) shall be selected and placed in accordance with Table 906.3(2).

Portable fire extinguishers for occupancies involving flammable or *combustible liquids* with a depth of greater than 0.25-inch (6.35 mm) shall be selected and placed in accordance with NFPA 10.

CHAPTER 9 FIRE PROTECTION SYSTEMS

SECTION 901 GENERAL

901.1 Scope. The provisions of this chapter shall specify where *fire protection systems* are required and shall apply to the design, installation, inspection, operation, testing and maintenance of all *fire protection systems*.

901.2 Construction documents. The *fire code official* shall have the authority to require *construction documents* and calculations for all *fire protection systems* and to require permits be issued for the installation, rehabilitation or modification of any *fire protection system*. *Construction documents* for *fire protection systems* shall be submitted for review and approval prior to system installation.

901.2.1 Statement of compliance. Before requesting final approval of the installation, where required by the *fire code official*, the installing contractor shall furnish a written statement to the *fire code official* that the subject *fire protection system* has been installed in accordance with approved plans and has been tested in accordance with the manufacturer's specifications and the appropriate installation standard. Any deviations from the design standards shall be noted and copies of the approvals for such deviations shall be attached to the written statement.

901.3 Permits. Permits shall be required as set forth in Section 105.6 and 105.7.

901.4 Installation. *Fire protection systems* shall be maintained in accordance with the original installation standards for that system. Required systems shall be extended, altered or augmented as necessary to maintain and continue protection whenever the building is altered, remodeled or added to. *Alterations to fire protection systems* shall be done in accordance with applicable standards.

901.4.1 Required fire protection systems. *Fire protection systems* required by this code or the *International Building Code* shall be installed, repaired, operated, tested and maintained in accordance with this code.

901.4.2 Nonrequired fire protection systems. Any *fire protection system* or portion thereof not required by this code or the *International Building Code* shall be allowed to be furnished for partial or complete protection provided such installed system meets the requirements of this code and the *International Building Code*.

901.4.3 Additional fire protection systems. In occupancies of a hazardous nature, where special hazards exist in addition to the normal hazards of the occupancy, or where the *fire code official* determines that access for fire apparatus is unduly difficult, the *fire code official* shall have the authority to require additional safeguards. Such safeguards include, but shall not be limited to, the following: automatic fire detection systems, fire alarm systems, automatic fire-extinguishing systems, standpipe systems, or portable or fixed extinguishers. Fire protection equipment required

under this section shall be installed in accordance with this code and the applicable referenced standards.

901.4.4 Appearance of equipment. Any device that has the physical appearance of life safety or fire protection equipment but that does not perform that life safety or fire protection function shall be prohibited.

901.5 Installation acceptance testing. Fire detection and alarm systems, fire-extinguishing systems, fire hydrant systems, fire standpipe systems, fire pump systems, private fire service mains and all other *fire protection systems* and appurtenances thereto shall be subject to acceptance tests as contained in the installation standards and as approved by the *fire code official*. The *fire code official* shall be notified before any required acceptance testing.

901.5.1 Occupancy. It shall be unlawful to occupy any portion of a building or structure until the required fire detection, alarm and suppression systems have been tested and approved.

~~901.6 Inspection, testing and maintenance.~~ **901.6 Inspection, testing and maintenance.** Fire detection, alarm and extinguishing systems shall be maintained in an operative condition at all times, and shall be replaced or repaired where defective. Nonrequired *fire protection systems* and equipment shall be inspected, tested and maintained or removed.

901.6.1 Standards. *Fire protection systems* shall be inspected, tested and maintained in accordance with the referenced standards listed in Table 901.6.1.

**TABLE 901.6.1
FIRE PROTECTION SYSTEM MAINTENANCE STANDARDS**

SYSTEM	STANDARD
Portable fire extinguishers	NFPA 10
Carbon dioxide fire-extinguishing system	NFPA 12
Halon 1301 fire-extinguishing systems	NFPA 12A
Dry-chemical extinguishing systems	NFPA 17
Wet-chemical extinguishing systems	NFPA 17A
Water-based fire protection systems	NFPA 25
Fire alarm systems	NFPA 72
Water-mist systems	NFPA 750
Clean-agent extinguishing systems	NFPA 2001

901.6.2 Records. Records of all system inspections, tests and maintenance required by the referenced standards shall be maintained on the premises for a minimum of three years and shall be copied to the *fire code official* upon request.

901.6.2.1 Records information. Initial records shall include the name of the installation contractor, type of components installed, manufacturer of the components,

CHAPTER 7

FIRE-RESISTANCE-RATED CONSTRUCTION

SECTION 701 GENERAL

701.1 Scope. The provisions of this chapter shall specify the requirements for and the maintenance of fire-resistance-rated construction. New buildings shall comply with the *International Building Code*.

701.2 Unsafe conditions. Where any components in this chapter are not maintained and do not function as intended or do not have the *fire resistance* required by the code under which the building was constructed, remodeled or altered, such component(s) or portion thereof shall be deemed an unsafe condition, in accordance with Section 110.1.1. Components or portions thereof determined to be unsafe shall be repaired or replaced to conform to that code under which the building was constructed, remodeled, altered or this chapter, as deemed appropriate by the *fire code official*.

Where the extent of the conditions of components is such that any building, structure or portion thereof presents an imminent danger to the occupants of the building, structure or portion thereof, the *fire code official* shall act in accordance with Section 110.2.

SECTION 702 DEFINITIONS

702.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

[B] **DRAFTSTOP.** A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor/ceiling assemblies, roof/ceiling assemblies and attics.

[B] **FIRE-RESISTANT JOINT SYSTEM.** An assemblage of specific materials or products that are designed, tested and fire-resistance rated in accordance with either ASTM E 1966 or UL 2079 to resist for a prescribed period of time the passage of fire through joints made in or between fire-resistance-rated assemblies.

[B] **FIREBLOCKING.** Building materials, or materials *approved* for use as fireblocking, installed to resist the free passage of flame to other areas of the building through concealed spaces.

SECTION 703 FIRE-RESISTANCE-RATED CONSTRUCTION

703.1 Maintenance. The required *fire-resistance rating* of fire-resistance-rated construction (including walls, firestops, shaft enclosures, partitions, *smoke barriers*, floors, fire-resistant coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems) shall be maintained. Such elements shall be visually inspected by the

owner annually and properly repaired, restored or replaced when damaged, altered, breached or penetrated. Where concealed, such elements shall not be required to be visually inspected by the *owner* unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space. Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason shall be protected with *approved* methods capable of resisting the passage of smoke and fire. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of *approved* construction meeting the fire protection requirements for the assembly.

703.1.1 Fireblocking and draftstopping. Required *fire-blocking* and draftstopping in combustible concealed spaces shall be maintained to provide continuity and integrity of the construction.

703.1.2 Smoke barriers and smoke partitions. Required *smoke barriers* and smoke partitions shall be maintained to prevent the passage of smoke. All openings protected with *approved* smoke barrier doors or smoke dampers shall be maintained in accordance with NFPA 105.

703.1.3 Fire walls, fire barriers and fire partitions. Required *fire walls*, *fire barriers* and *fire partitions* shall be maintained to prevent the passage of fire. All openings protected with *approved* doors or fire dampers shall be maintained in accordance with NFPA 80.

703.2 Opening protectives. Opening protectives shall be maintained in an operative condition in accordance with NFPA 80. Fire doors and *smoke barrier* doors shall not be blocked or obstructed or otherwise made inoperable. Fusible links shall be replaced promptly whenever fused or damaged. Fire door assemblies shall not be modified.

703.2.1 Signs. Where required by the *fire code official*, a sign shall be permanently displayed on or near each fire door in letters not less than 1 inch (25 mm) high to read as follows:

1. For doors designed to be kept normally open: FIRE DOOR—DO NOT BLOCK.
2. For doors designed to be kept normally closed: FIRE DOOR—KEEP CLOSED.

703.2.2 Hold-open devices and closers. Hold-open devices and automatic door closers, where provided, shall be maintained. During the period that such device is out of service for repairs, the door it operates shall remain in the closed position.

703.2.3 Door operation. Swinging fire doors shall close from the full-open position and latch automatically. The door closer shall exert enough force to close and latch the door from any partially open position.

907.9 Inspection, testing and maintenance. The maintenance and testing schedules and procedures for fire alarm and fire detection systems shall be in accordance with Sections 907.9.1 through 907.9.5 and NFPA 72.

907.9.1 Maintenance required. Whenever required for compliance with the provisions of this code, devices, equipment, systems, conditions, arrangements, levels of protection or other features shall thereafter be continuously maintained in accordance with applicable NFPA requirements or as directed by the *fire code official*.

907.9.2 Testing. Testing shall be performed in accordance with the schedules in NFPA 72 or more frequently where required by the *fire code official*.

Exception: Devices or equipment that are inaccessible for safety considerations shall be tested during scheduled shutdowns where *approved* by the *fire code official*, but not less than every 18 months.

907.9.3 Smoke detector sensitivity. Smoke detector sensitivity shall be checked within one year after installation and every alternate year thereafter. After the second calibration test, where sensitivity tests indicate that the detector has remained within its *listed* and marked sensitivity range (or 4-percent obscuration light grey smoke, if not marked), the length of time between calibration tests shall be permitted to be extended to a maximum of five years. Where the frequency is extended, records of detector-caused nuisance alarms and subsequent trends of these alarms shall be maintained. In zones or areas where nuisance alarms show any increase over the previous year, calibration tests shall be performed.

907.9.4 Method. To verify that each smoke detector is within its *listed* and marked sensitivity range, it shall be tested using one of the following methods:

1. A calibrated test method;
2. The manufacturer's calibrated sensitivity test instrument;
3. *Listed* control equipment arranged for the purpose;
4. A smoke detector/control unit arrangement whereby the detector causes a signal at the control unit where the detector's sensitivity is outside its acceptable sensitivity range; or
5. Another calibrated sensitivity test method acceptable to the *fire code official*.

Detectors found to have a sensitivity outside the *listed* and marked sensitivity range shall be cleaned and recalibrated or replaced.

Exceptions:

1. Detectors *listed* as field adjustable shall be permitted to be either adjusted within the *listed* and marked sensitivity range and cleaned and recalibrated or they shall be replaced.
2. This requirement shall not apply to single-station smoke alarms.

907.9.4.1 Testing device. Smoke detector sensitivity shall not be tested or measured using a device that administers an unmeasured concentration of smoke or other aerosol into the detector.

907.9.5 Maintenance, inspection and testing. The building owner shall be responsible to maintain the fire and life safety systems in an operable condition at all times. Service personnel shall meet the qualification requirements of NFPA 72 for maintaining, inspecting and testing such systems. A written record shall be maintained and shall be made available to the *fire code official*.

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**SECTION 908
EMERGENCY ALARM SYSTEMS**

908.1 Group H occupancies. Emergency alarms for the detection and notification of an emergency condition in Group H occupancies shall be provided as required in Chapter 27.

908.2 Group H-5 occupancy. Emergency alarms for notification of an emergency condition in an HPM facility shall be provided as required in Section 1803.12. A continuous gas detection system shall be provided for HPM gases in accordance with Section 1803.13.

908.3 Highly toxic and toxic materials. Where required by Section 3704.2.2.10, a gas detection system shall be provided for indoor storage and use of highly toxic and toxic *compressed gases*.

908.4 Ozone gas-generator rooms. A gas detection system shall be provided in ozone gas-generator rooms in accordance with Section 3705.3.2.

908.5 Repair garages. A flammable-gas detection system shall be provided in repair garages for vehicles fueled by nonodorized gases in accordance with Section 2211.7.2.

908.6 Refrigeration systems. Refrigeration system machinery rooms shall be provided with a refrigerant detector in accordance with Section 606.8.

**SECTION 909
SMOKE CONTROL SYSTEMS**

909.1 Scope and purpose. This section applies to mechanical or passive smoke control systems when they are required for new buildings or portions thereof by provisions of the *International Building Code* or this code. The purpose of this section is to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. These provisions are not intended for the preservation of contents, the timely restoration of operations, or for assistance in fire suppression or overhaul activities. Smoke control systems regulated by this section serve a different purpose than the smoke- and heat-venting provisions found in Section 910. Mechanical smoke control systems shall not be considered exhaust systems under Chapter 5 of the *International Mechanical Code*.

909.2 General design requirements. Buildings, structures, or parts thereof required by the *International Building Code* or

1908.6 Static pile protection. Static piles shall be monitored by an *approved* means to measure temperatures within the static piles. Internal pile temperatures shall be monitored and recorded weekly. Records shall be kept on file at the facility and made available for inspection. An operational plan indicating procedures and schedules for the inspection, monitoring and restricting of excessive internal temperatures in static piles shall be submitted to the *fire code official* for review and approval.

1908.7 Pile fire protection. Automatic sprinkler protection shall be provided in conveyor tunnels and combustible enclosures that pass under a pile. Combustible conveyor systems and enclosed conveyor systems shall be equipped with an *approved automatic sprinkler system*.

1908.8 Fire extinguishers. Portable fire extinguishers complying with Section 906 and with a minimum rating of 4-A:60-B:C shall be provided on all vehicles and equipment operating on piles and at all processing equipment.

1908.9 Material-handling equipment. *Approved* material-handling equipment shall be available for moving wood chips, hogged material, wood fines and raw product during fire-fighting operations.

1908.10 Emergency plan. The *owner* or operator shall develop a plan for monitoring, controlling and extinguishing spot fires and submit the plan to the *fire code official* for review and approval.

SECTION 1909 EXTERIOR STORAGE OF FINISHED LUMBER PRODUCTS

1909.1 General. Exterior storage of finished lumber products shall comply with Sections 1909.1 through 1909.5.

1909.2 Size of piles. Exterior lumber storage shall be arranged to form stable piles with a maximum height of 20 feet (6096 mm). Piles shall not exceed 150,000 cubic feet (4248 m³) in volume.

1909.3 Fire apparatus access roads. Fire apparatus access roads in accordance with Section 503 shall be located so that a maximum grid system unit of 50 feet by 150 feet (15 240 mm by 45 720 mm) is established.

1909.4 Security. Permanent lumber storage areas shall be surrounded with an *approved* fence. Fences shall be a minimum of 6 feet (1829 mm) in height.

Exception: Lumber piles inside of buildings and production mills for lumber, plywood and veneer.

1909.5 Fire protection. An *approved* hydrant and hose system or portable fire-extinguishing equipment suitable for the fire hazard involved shall be provided for open storage yards. Hydrant and hose systems shall be installed in accordance with NFPA 24. Portable fire extinguishers complying with Section 906 shall be located so that the travel distance to the nearest unit does not exceed 75 feet (22 860 mm).

2. The blaster shall allow sufficient time for smoke and fumes to dissipate and for dust to settle before returning to or approaching the blast area.
3. The blaster shall inspect the entire blast site for misfires before allowing other personnel to return to the blast area.

3307.15 Misfires. Where a misfire is suspected, all initiating circuits shall be traced and a search made for unexploded charges. Where a misfire is found, the blaster shall provide proper safeguards for excluding all personnel from the blast area. Misfires shall be reported to the blasting supervisor immediately. Misfires shall be handled under the direction of the *person* in charge of the blasting operation in accordance with NFPA 495.

ADD 3307.16

SECTION 3308 FIREWORKS DISPLAY

3308.1 General. Outdoor fireworks displays, use of pyrotechnics before a *proximate audience* and pyrotechnic special effects in motion picture, television, theatrical and group entertainment productions shall comply with Sections 3308.2 through 3308.10 and NFPA 1123 or NFPA 1126.

3308.2 Permit application. Prior to issuing permits for a fireworks display, plans for the fireworks display, inspections of the display site and demonstrations of the display operations shall be *approved*. A plan establishing procedures to follow and actions to be taken in the event that a shell fails to ignite in, or discharge from, a mortar or fails to function over the fallout area or other malfunctions shall be provided to the *fire code official*.

3308.2.1 Outdoor fireworks displays. In addition to the requirements of Section 403, permit applications for outdoor fireworks displays using Division 1.3G fireworks shall include a diagram of the location at which the fireworks display will be conducted, including the site from which fireworks will be discharged; the location of buildings, highways, overhead obstructions and utilities; and the lines behind which the audience will be restrained.

3308.2.2 Use of pyrotechnics before a proximate audience. Where the separation distances required in Section 3308.4 and NFPA 1123 are unavailable or cannot be secured, fireworks displays shall be conducted in accordance with NFPA 1126 for *proximate audiences*. Applications for use of pyrotechnics before a *proximate audience* shall include plans indicating the required clearances for spectators and combustibles, crowd control measures, smoke control measures and requirements for standby personnel and equipment when provision of such personnel or equipment is required by the *fire code official*.

3308.3 Approved fireworks displays. *Approved* fireworks displays shall include only the *approved* fireworks 1.3G, fireworks 1.4G, fireworks 1.4S and pyrotechnic articles, 1.4G, which shall be handled by an *approved*, competent operator. The *approved* fireworks shall be arranged, located, discharged and fired in a manner that will not pose a hazard to property or endanger any person.

3308.4 Clearance. Spectators, spectator parking areas, and *dwellings*, buildings or structures shall not be located within the display site.

Exceptions:

1. This provision shall not apply to pyrotechnic special effects and fireworks displays using Division 1.4G materials before a *proximate audience* in accordance with NFPA 1126.
2. This provision shall not apply to unoccupied *dwellings*, buildings and structures with the approval of the building owner and the *fire code official*.

3308.5 Storage of fireworks at display site. The storage of fireworks at the display site shall comply with the requirements of this section and NFPA 1123 or NFPA 1126.

3308.5.1 Supervision and weather protection. Beginning as soon as fireworks have been delivered to the display site, they shall not be left unattended.

3308.5.2 Weather protection. Fireworks shall be kept dry after delivery to the display site.

3308.5.3 Inspection. Shells shall be inspected by the operator or assistants after delivery to the display site. Shells having tears, leaks, broken fuses or signs of having been wet shall be set aside and shall not be fired. Aerial shells shall be checked for proper fit in mortars prior to discharge. Aerial shells that do not fit properly shall not be fired. After the fireworks display, damaged, deteriorated or dud shells shall either be returned to the supplier or destroyed in accordance with the supplier's instructions and Section 3304.10.

Exception: Minor repairs to fuses shall be allowed. For electrically ignited displays, attachment of electric matches and similar tasks shall be allowed.

3308.5.4 Sorting and separation. After delivery to the display site and prior to the fireworks display, all shells shall be separated according to size and their designation as salutes.

Exception: For electrically fired displays, or displays where all shells are loaded into mortars prior to the show, there is no requirement for separation of shells according to size or their designation as salutes.

3308.5.5 Ready boxes. Display fireworks, 1.3G, that will be temporarily stored at the site during the fireworks display shall be stored in ready boxes located upwind and at least 25 feet (7620 mm) from the mortar placement and separated according to size and their designation as salutes.

Exception: For electrically fired fireworks displays, or fireworks displays where all shells are loaded into mortars prior to the show, there is no requirement for separation of shells according to size, their designation as salutes or for the use of ready boxes.

3308.6 Installation of mortars. Mortars for firing fireworks shells shall be installed in accordance with NFPA 1123 and shall be positioned so that shells are propelled away from spectators and over the fallout area. Under no circumstances shall mortars be angled toward the spectator viewing area. Prior to placement, mortars shall be inspected for defects, such as

3304.7.1 Security. Magazines shall be kept locked in the manner prescribed in NFPA 495 at all times except during placement or removal of *explosives* or inspection.

3304.7.2 Open flames and lights. Smoking, matches, flame-producing devices, open flames, firearms and firearms cartridges shall not be allowed inside of or within 50 feet (15 240 mm) of magazines.

3304.7.3 Brush. The area located around a magazine shall be kept clear of brush, dried grass, leaves, trash, debris and similar combustible materials for a distance of 25 feet (7620 mm).

3304.7.4 Combustible storage. Combustible materials shall not be stored within 50 feet (15 240 mm) of magazines.

3304.7.5 Unpacking and repacking explosive materials. Containers of *explosive materials*, except fiberboard containers, and packages of damaged or deteriorated *explosive materials* or fireworks shall not be unpacked or repacked inside or within 50 feet (15 240 mm) of a magazine or in close proximity to other *explosive materials*.

3304.7.5.1 Storage of opened packages. Packages of *explosive materials* that have been opened shall be closed before being placed in a magazine.

3304.7.5.2 Nonsparking tools. Tools used for the opening and closing of packages of *explosive materials*, other than metal slitters for opening paper, plastic or fiberboard containers, shall be made of nonsparking materials.

3304.7.5.3 Disposal of packaging. Empty containers and paper and fiber packaging materials that previously contained *explosive materials* shall be disposed of or reused in a *approved* manner.

3304.7.6 Tools and equipment. Metal tools, other than nonferrous transfer conveyors and ferrous metal conveyor stands protected by a coat of paint, shall not be stored in a magazine containing *explosive materials* or detonators.

3304.7.7 Contents. Magazines shall be used exclusively for the storage of *explosive materials*, blasting materials and blasting accessories.

3304.7.8 Compatibility. Corresponding grades and brands of *explosive materials* shall be stored together and in such a manner that the grade and brand marks are visible. Stocks shall be stored so as to be easily counted and checked. Packages of *explosive materials* shall be stacked in a stable manner not exceeding 8 feet (2438 mm) in height.

3304.7.9 Stock rotation. When *explosive material* is removed from a magazine for use, the oldest usable stocks shall be removed first.

3304.8 Maintenance. Maintenance of magazines shall comply with Sections 3304.8.1 through 3304.8.3.

3304.8.1 Housekeeping. Magazine floors shall be regularly swept and be kept clean, dry and free of grit, paper, empty packages and rubbish. Brooms and other cleaning utensils shall not have any spark-producing metal parts. Sweepings from magazine floors shall be disposed of in accordance with the manufacturers' *approved* instructions.

3304.8.2 Repairs. *Explosive materials* shall be removed from the magazine before making repairs to the interior of a magazine. *Explosive materials* shall be removed from the magazine before making repairs to the exterior of the magazine where there is a possibility of causing a fire. *Explosive materials* removed from a magazine under repair shall either be placed in another magazine or placed a safe distance from the magazine, where they shall be properly guarded and protected until repairs have been completed. Upon completion of repairs, the *explosive materials* shall be promptly returned to the magazine. Floors shall be cleaned before and after repairs.

3304.8.3 Floors. Magazine floors stained with liquid shall be dealt with according to instructions obtained from the manufacturer of the *explosive material* stored in the magazine.

3304.9 Inspection. Magazines containing *explosive materials* shall be opened and inspected at maximum seven-day intervals. The inspection shall determine whether there has been an unauthorized or attempted entry into a magazine or an unauthorized removal of a magazine or its contents.

3304.10 Disposal of explosive materials. *Explosive materials* shall be disposed of in accordance with Sections 3304.10.1 through 3304.10.7.

3304.10.1 Notification. The *fire code official* shall be notified immediately when deteriorated or leaking *explosive materials* are determined to be dangerous or unstable and in need of disposal.

3304.10.2 Deteriorated materials. When an *explosive material* has deteriorated to an extent that it is in an unstable or dangerous condition, or when a liquid has leaked from an *explosive material*, the *person* in possession of such material shall immediately contact the material's manufacturer to obtain disposal and handling instructions.

3304.10.3 Qualified person. The work of destroying *explosive materials* shall be directed by *persons* experienced in the destruction of *explosive materials*.

3304.10.4 Storage of misfires. *Explosive materials* and fireworks recovered from blasting or display misfires shall be placed in a magazine until an experienced *person* has determined the proper method for disposal.

3304.10.5 Disposal sites. Sites for the destruction of *explosive materials* and fireworks shall be *approved* and located at the maximum practicable safe distance from inhabited buildings, public highways, operating buildings and all other exposures to ensure keeping air blast and ground vibration to a minimum. The location of disposal sites shall be no closer to magazines, inhabited buildings, railways, highways and other rights-of-way than is allowed by Tables 3304.5.2(1), 3304.5.2(2) and 3304.5.2(3). When possible, *barricades* shall be utilized between the destruction site and inhabited buildings. Areas where *explosives* are detonated or burned shall be posted with adequate warning signs.

3304.10.6 Reuse of site. Unless an *approved* burning site has been thoroughly saturated with water and has passed a safety inspection, 48 hours shall elapse between the com-

one contains or is designed to contain *explosives*, or the distance between a magazine and an operating building.

Minimum separation distance (D_0). The minimum separation distance between adjacent buildings occupied in conjunction with the manufacture, transportation, storage or use of *explosive materials* where one of the buildings contains *explosive materials* and the other building does not.

RAILWAY. A steam, electric or other railroad or railway that carries passengers for hire.

READY BOX. A weather-resistant container with a self-closing or automatic-closing cover that protects fireworks shells from burning debris. Tarpaulins shall not be considered as ready boxes.

SMALL ARMS AMMUNITION. A shotgun, rifle or pistol cartridge and any cartridge for propellant-actuated devices. This definition does not include military ammunition containing bursting charges or incendiary, trace, spotting or pyrotechnic projectiles.

SMALL ARMS PRIMERS. Small percussion-sensitive *explosive* charges, encased in a cap, used to ignite propellant powder.

SMOKELESS PROPELLANTS. Solid propellants, commonly referred to as smokeless powders, used in small arms ammunition, cannons, rockets, propellant-actuated devices and similar articles.

SPECIAL INDUSTRIAL EXPLOSIVE DEVICE. An explosive power pack containing an *explosive* charge in the form of a cartridge or construction device. The term includes but is not limited to explosive rivets, explosive bolts, *explosive* charges for driving pins or studs, cartridges for *explosive*-actuated power tools and charges of *explosives* used in automotive air bag inflators, jet tapping of open hearth furnaces and jet perforation of oil well casings.

THEFT RESISTANT. Construction designed to deter illegal entry into facilities for the storage of *explosive materials*.

SECTION 3303 RECORD KEEPING AND REPORTING

3303.1 General. Records of the receipt, handling, use or disposal of *explosive materials*, and reports of any accidents, thefts or unauthorized activities involving *explosive materials* shall conform to the requirements of this section.

3303.2 Transaction record. The permittee shall maintain a record of all transactions involving receipt, removal, use or disposal of *explosive materials*. Such a record shall be maintained for a period of five years, and shall be furnished to the *fire code official* for inspection upon request.

Exception: Where only Division 1.4G (consumer fireworks) are handled, records need only be maintained for a period of three years.

3303.3 Loss, theft or unauthorized removal. The loss, theft or unauthorized removal of *explosive materials* from a magazine or permitted facility shall be reported to the *fire code official*, local law enforcement authorities and the U.S.

Department of Treasury, Bureau of Alcohol, Tobacco and Firearms within 24 hours.

Exception: Loss of Division 1.4G (consumer fireworks) need not be reported to the Bureau of Alcohol, Tobacco and Firearms.

3303.4 Accidents. Accidents involving the use of *explosives*, *explosive materials* and fireworks, which result in injuries or property damage, shall be reported to the *fire code official* immediately.

3303.5 Misfires. The pyrotechnic display operator or blaster in charge shall keep a record of all aerial shells that fail to fire or charges that fail to detonate.

3303.6 Hazard communication. Manufacturers of *explosive materials* and fireworks shall maintain records of chemicals, chemical compounds and mixtures required by DOL 29 CFR, Part 1910.1200, and Section 407.

3303.7 Safety rules. Current safety rules covering the operation of magazines, as described in Section 3304.7, shall be posted on the interior of the magazine in a visible location.

SECTION 3304 EXPLOSIVE MATERIALS STORAGE AND HANDLING

3304.1 General. Storage of *explosives* and *explosive materials*, small arms ammunition, small arms primers, propellant-actuated cartridges and smokeless propellants in magazines shall comply with the provisions of this section.

3304.2 Magazine required. *Explosives* and *explosive materials*, and Division 1.3G fireworks shall be stored in magazines constructed, located, operated and maintained in accordance with the provisions of Section 3304 and NFPA 495 or NFPA 1124.

Exceptions:

1. Storage of fireworks at display sites in accordance with Section 3308.5 and NFPA 1123 or NFPA 1126.
2. Portable or mobile magazines not exceeding 120 square feet (11 m²) in area shall not be required to comply with the requirements of the *International Building Code*.

3304.3 Magazines. The storage of *explosives* and *explosive materials* in magazines shall comply with Table 3304.3.

3304.3.1 High explosives. *Explosive materials* classified as Division 1.1 or 1.2 or formerly classified as Class A by the U.S. Department of Transportation shall be stored in Type 1, 2 or 3 magazines.

Exceptions:

1. Black powder shall be stored in a Type 1, 2, 3 or 4 magazine.
2. Cap-sensitive *explosive material* that is demonstrated not to be bullet sensitive shall be stored in a Type 1, 2, 3, 4 or 5 magazine.

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dents, bent ends, damaged interiors and damaged plugs. Defective mortars shall not be used.

3308.7 Handling. Aerial shells shall be carried to mortars by the shell body. For the purpose of loading mortars, aerial shells shall be held by the thick portion of the fuse and carefully loaded into mortars.

3308.8 Fireworks display supervision. Whenever in the opinion of the *fire code official* or the operator a hazardous condition exists, the fireworks display shall be discontinued immediately until such time as the dangerous situation is corrected.

3308.9 Post-fireworks display inspection. After the fireworks display, the firing crew shall conduct an inspection of the fallout area for the purpose of locating unexploded aerial shells or live components. This inspection shall be conducted before public access to the site shall be allowed. Where fireworks are displayed at night and it is not possible to inspect the site thoroughly, the operator or designated assistant shall inspect the entire site at first light.

A report identifying any shells that fail to ignite in, or discharge from, a mortar or fail to function over the fallout area or otherwise malfunction, shall be filed with the *fire code official*.

3308.10 Disposal. Any shells found during the inspection required in Section 3308.9 shall not be handled until at least 15 minutes have elapsed from the time the shells were fired. The fireworks shall then be doused with water and allowed to remain for at least 5 additional minutes before being placed in a plastic bucket or fiberboard box. The disposal instructions of the manufacturer as provided by the fireworks supplier shall then be followed in disposing of the fireworks in accordance with Section 3304.10.

SECTION 3309 TEMPORARY STORAGE OF CONSUMER FIREWORKS

3309.1 General. Where the temporary storage of consumer fireworks, 1.4G is allowed by Section 3301.1.3, Exception 4, such storage shall comply with the applicable requirements of NFPA 1124.

NFPA 10
Standard for
Portable Fire Extinguishers
2010 Edition

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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.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

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 K. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. 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 K.

Chapter 1 Administration

1.1* Scope. The provisions of this standard apply to the selection, installation, inspection, maintenance, and testing of portable extinguishing equipment.

1.1.1 Portable fire extinguishers are intended as a first line of defense to cope with fires of limited size.

1.1.2 The selection and installation of extinguishers is independent of whether the building is equipped with automatic sprinklers, standpipe and hose, or other fixed protection equipment. (See 5.5.5, 6.1.1.1, 6.2.1.1, and 6.2.1.5.)

1.1.3 The requirements given herein are minimum.

1.1.4 The requirements do not apply to permanently installed systems for fire extinguishment, even where portions of such systems are portable (such as hose and nozzles attached to a fixed supply of extinguishing agent).

1.2* Purpose. This standard is prepared for use by and guidance of persons charged with selecting, purchasing, installing, approving, listing, designing, and maintaining portable fire-extinguishing equipment.

cific requirements of other NFPA standards for specific occupancies.

1.2.2 Nothing in this standard shall be construed as a restriction on new technologies or alternative arrangements, provided that the level of protection as herein described is not lowered and is acceptable to the authority having jurisdiction.

1.3 Units.

1.3.1 Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI).

1.3.1.1 The units are listed in Table 1.3.1.1 with conversion factors.

Table 1.3.1.1 Metric Units of Measurement

Name of Unit	Abbreviation	Conversion Factor
Liter	L	1 gal = 3.785 L
Millimeter	mm	1 in. = 25.4 mm
Meter	m	1 ft = 0.305 m
Kilogram	kg	1 lb (mass) = 0.454 kg
Degree Celsius	°C	$\frac{5}{9}(\text{°F} - 32) = \text{°C}$
Bar	bar	1 psi = 0.0689 bar

1.3.1.2 If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated is to be regarded as the requirement.

1.3.1.3 A given equivalent value shall be permitted to be considered approximate.

1.3.2 The conversion procedure for the SI units is to multiply the quantity by the conversion factor and then round the result to the appropriate number of significant digits.

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 14, *Standard for the Installation of Standpipe and Hose Systems*, 2010 edition.

NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*, 2008 edition.

NFPA 32, *Standard for Drycleaning Plants*, 2007 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2008 edition.

NFPA 72[®], *National Fire Alarm and Signaling Code*, 2010 edition.

NFPA 86, *Standard for Ovens and Furnaces*, 2007 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2008 edition.

NFPA 120, *Standard for Fire Prevention and Control in Coal Mines*, 2010 edition.

NFPA 122, *Standard for Fire Prevention and Control in Metal/Nonmetal Mining and Metal Mineral Processing Facilities*, 2010 edi-

Table 6.3.1.1 Fire Extinguisher Size and Placement for Class B Hazards

Type of Hazard	Basic Minimum Extinguisher Rating	Maximum Travel Distance to Extinguishers	
		ft	m
Light (low)	5-B	30	9.14
	10-B	50	15.25
Ordinary (moderate)	10-B	30	9.14
	20-B	50	15.25
Extra (high)	40-B	30	9.14
	80-B	50	15.25

Notes:

(1) The specified ratings do not imply that fires of the magnitudes indicated by these ratings will occur, but rather they are provided to give the operators more time and agent to handle difficult spill fires that have the potential to occur.

(2) For fires involving water-soluble flammable liquids, see 5.5.3.

(3) For specific hazard applications, see Section 5.5.

6.3.1.5 Two or more fire extinguishers of lower rating shall not be used to fulfill the protection requirements of Table 6.3.1.1 except as permitted by 6.3.1.3 and 6.3.1.4.

6.3.1.6 The protection requirements shall be permitted to be fulfilled with fire extinguishers of higher ratings, provided the travel distance to such larger fire extinguishers does not exceed 50 ft (15.25 m).

6.3.2 Flammable Liquids of Appreciable Depth.

6.3.2.1 Portable fire extinguishers shall not be installed as the sole protection for flammable liquid hazards of appreciable depth where the surface area exceeds 10 ft² (0.93 m²).

6.3.2.2* Where personnel who are trained in extinguishing fires in the protected hazards are located on the premises and capable of responding immediately, the maximum surface area shall not exceed 20 ft² (1.86 m²).

6.3.2.3 For flammable liquid hazards of appreciable depth, a Class B fire extinguisher shall be provided on the basis of at least 2 numerical units of Class B extinguishing potential per 1 ft² (0.09 m²) of flammable liquid surface of the largest hazard area.

6.3.2.4 AFFF- or FFFP-type fire extinguishers shall be permitted to be provided on the basis of 1-B of protection per 1 ft² (0.09 m²) of hazard. (For fires involving water-soluble flammable liquids, see 5.5.3.)

6.3.2.5 Two or more fire extinguishers of lower ratings, other than AFFF- or FFFP-type fire extinguishers, shall not be used in lieu of the fire extinguisher required for the largest hazard area.

6.3.2.6 Up to three AFFF- or FFFP-type fire extinguishers shall be permitted to fulfill the requirements, provided the sum of the Class B ratings meets or exceeds the value required for the largest hazard area.

6.3.2.7 Travel distances for portable fire extinguishers shall not exceed 50 ft (15.25 m). (See Annex E.)

6.3.2.7.1 Scattered or widely separated hazards shall be individually protected.

6.3.2.7.2 A fire extinguisher in the proximity of a hazard shall be located to be accessible in the presence of a fire without undue danger to the operator.

6.4* Installations for Class C Hazards.

6.4.1 Fire extinguishers with Class C ratings shall be required where energized electrical equipment can be encountered.

6.4.2 The requirement in 6.4.1 shall include situations where fire either directly involves or surrounds electrical equipment.

6.4.3 Because fire is a Class A or Class B hazard, the fire extinguishers shall be sized and located on the basis of the anticipated Class A or Class B hazard.

6.5 Installations for Class D Hazards.

6.5.1 Fire extinguishers or extinguishing agents with Class D ratings shall be provided for fires involving combustible metals.

6.5.2 Fire extinguishers or extinguishing agents (media) shall be located not more than 75 ft (22.9 m) of travel distance from the Class D hazard. (See Section E.6.)

6.5.3 Portable fire extinguishers or extinguishing agents (media) for Class D hazards shall be provided in those work areas where combustible metal powders, flakes, shavings, chips, or similarly sized products are generated.

6.5.4 Size determination shall be on the basis of the specific combustible metal, its physical particle size, area to be covered, and recommendations by the fire extinguisher manufacturer based on data from control tests.

6.6 Installations for Class K Hazards.

6.6.1 Class K fire extinguishers shall be provided for hazards where there is a potential for fires involving combustible cooking media (vegetable or animal oils and fats).

6.6.2 Maximum travel distance shall not exceed 30 ft (9.15 m) from the hazard to the extinguishers.

6.6.3 All solid fuel cooking appliances (whether or not under a hood) with fire boxes of 5 ft³ (0.14 m³) volume or less shall have at least a listed 2-A rated water-type fire extinguisher or a 1.6 gal (6 L) wet chemical fire extinguisher that is listed for Class K fires.

Chapter 7 Inspection, Maintenance, and Recharging of Portable Fire Extinguishers

7.1* General.

7.1.1 Responsibility. The owner or designated agent or occupant of a property in which fire extinguishers are located shall be responsible for inspection, maintenance, and recharging. (See 7.1.2.)

7.1.2 Personnel.

7.1.2.1* Persons performing maintenance and recharging of extinguishers shall be certified.

7.1.2.1.1 Persons training to become certified shall be permitted to perform maintenance and recharging of extinguishers under the direct supervision and in the immediate presence of a certified person.

7.1.2.1.2* Certification requires that a person pass a test administered by an organization acceptable to the AHJ.

7.1.2.1.3 The test shall at a minimum be based upon knowledge of the chapters and annexes of this standard.

7.1.2.1.4 The testing process shall permit persons to use the standard during the test.

7.1.2.1.5 Persons passing the test required in 7.1.2.1.2 shall be issued a document or a certificate.

7.1.2.1.6 The document or certificate shall be made available when requested by the authority having jurisdiction.

7.1.2.2 Persons performing maintenance and recharging of extinguishers shall be trained and shall have available the appropriate manufacturer's servicing manual(s), the correct tools, recharge materials, lubricants, and manufacturer's replacement parts or parts specifically listed for use in the fire extinguisher.

7.1.2.3* Persons performing 90-day inspections shall not be required to be certified.

7.1.3 Replacement While Servicing. Fire extinguishers removed from service for maintenance or recharging shall be replaced by a fire extinguisher suitable for the type of hazard being protected and shall be of at least equal rating.

7.1.4 Tags or Labels.

7.1.4.1 Tags or labels intended for recording inspections, maintenance, or recharging shall not be placed on the front of the fire extinguishers.

7.1.4.2 Labels indicating fire extinguisher use or classification or both shall be permitted to be placed on the front of the fire extinguisher.

7.1.5 Electronic Monitoring Systems.

7.1.5.1 When used in conjunction with fire alarm systems, fire extinguisher electronic monitoring devices shall be inspected and maintained in accordance with *NFPA 72, National Fire Alarm and Signaling Code*, and 7.3.2.5.

7.1.5.2 When used in conjunction with non-fire alarm systems, fire extinguisher electronic monitoring devices shall be inspected and maintained as required in 7.1.5.2.1 through 7.1.5.2.3 and the manufacturer's listed installation and maintenance manual(s).

7.1.5.2.1 The connection to the electronic monitoring device shall be continuously supervised for integrity.

7.1.5.2.2 The power source for the electronic monitoring device shall be supervised for continuity of power.

7.1.5.2.3 The monitoring device shall be tested and maintained annually in accordance with 7.3.2.5.

7.2 Inspection.

7.2.1 Frequency.

7.2.1.1* Fire extinguishers shall be manually inspected when initially placed in service.

7.2.1.2* Fire extinguishers shall be inspected either manually or by means of an electronic monitoring device/system at a minimum of 90-day intervals.

7.2.1.3* Fire extinguishers shall be inspected at more frequent intervals when circumstances require.

7.2.2 Procedures. Periodic inspection or electronic monitoring of fire extinguishers shall include a check of at least the following items:

- (1) Location in designated place
- (2) No obstruction to access or visibility
- (3) Pressure gauge reading or indicator in the operable range or position
- (4) Fullness determined by weighing or hefting for self-expelling-type extinguishers, cartridge-operated extinguishers, and pump tanks
- (5) Condition of tires, wheels, carriage, hose, and nozzle for wheeled extinguishers
- (6) Indicator for nonrechargeable extinguishers using push-to-test pressure indicators

7.2.2.1 In addition to 7.2.2, fire extinguishers shall be visually inspected in accordance with 7.2.2.2 if they are located where any of the following conditions exists:

- (1) High frequency of fires in the past
- (2) Severe hazards
- (3) Locations that make fire extinguishers susceptible to mechanical injury or physical damage
- (4) Exposure to abnormal temperatures or corrosive atmospheres

7.2.2.2 Where required by 7.2.2.1, the following inspection procedures shall be in addition to those addressed in 7.2.2:

- (1) Verifying that operating instructions on nameplates are legible and face outward
- (2) Checking for broken or missing safety seals and tamper indicators
- (3) Examination for obvious physical damage, corrosion, leakage, or clogged nozzle

7.2.3 Corrective Action. When an inspection of any fire extinguisher reveals a deficiency in any of the conditions listed in 7.2.2, immediate corrective action shall be taken.

7.2.3.1 Rechargeable Fire Extinguishers. When an inspection of any rechargeable fire extinguisher reveals a deficiency in any of the conditions listed in 7.2.2(3) or 7.2.2(4), the extinguisher shall be subjected to applicable maintenance procedures.

7.2.3.2 Nonrechargeable Dry Chemical Fire Extinguisher. When an inspection of any nonrechargeable dry chemical fire extinguisher reveals a deficiency in any of the conditions listed in 7.2.2(3), 7.2.2(4), or 7.2.2(6), the extinguisher shall be removed from further use, discharged, and destroyed at the direction of the owner or returned to the manufacturer.

7.2.3.3 Nonrechargeable Halon Agent Fire Extinguisher. When an inspection of any nonrechargeable fire extinguisher containing a halon agent reveals a deficiency in any of the conditions listed in 7.2.2(3), 7.2.2(4), or 7.2.2(6), the extinguisher shall be removed from service, not discharged, and returned to the manufacturer, a fire equipment dealer, or a distributor to permit recovery of the halon.

7.2.4 Inspection Record Keeping.

NFPA 72

National Fire Alarm and Signaling Code

2010 Edition

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A reference in parentheses () following a paragraph indicates the committee responsibility for that section or paragraph. Committee acronyms are keyed to the acronyms shown with the committee lists at the front of the document.

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

Chapter 1 Administration

1.1 Scope.

1.1.1 NFPA 72 covers the application, installation, location, performance, inspection, testing, and maintenance of fire alarm systems, supervising station alarm systems, public emergency alarm reporting systems, fire warning equipment and emergency communications systems (ECS), and their components.

1.1.2 The provisions of this chapter apply throughout the Code unless otherwise noted.

1.2* Purpose.

1.2.1 The purpose of this Code is to define the means of signal initiation, transmission, notification, and annunciation; the levels of performance; and the reliability of the various types of fire alarm systems, supervising station alarm systems, public emergency alarm reporting systems, fire warning equipment, emergency communications systems, and their components.

1.2.2 This Code defines the features associated with these systems and also provides information necessary to modify or upgrade an existing system to meet the requirements of a particular system classification.

1.2.3 This Code establishes minimum required levels of performance, extent of redundancy, and quality of installation but does not establish the only methods by which these requirements are to be achieved.

1.2.4* This Code shall not be interpreted to require a level of protection that is greater than that which would otherwise be required by the applicable building or fire code.

1.3 Application.

1.3.1 Alarm systems shall be classified as follows:

- (1) Fire alarm systems
 - (a) Household fire alarm systems
 - (b) Protected premises (local) fire alarm systems
- (2) Supervising station alarm systems
 - (a) Central station (service) alarm systems
 - (b) Remote supervising station alarm systems
 - (c) Proprietary supervising station alarm systems
- (3) Public emergency alarm reporting systems
 - (a) Auxiliary alarm systems — local energy type
 - (b) Auxiliary alarm systems — shunt type

1.3.2 Emergency communications systems shall be classified as follows:

- (1) One-way emergency communications systems
 - (a) Distributed recipient mass notification systems
 - (b) In-building fire emergency voice/alarm communications systems
 - (c) In-building mass notification systems
 - (d) Wide area mass notification systems
- (2) Two-way emergency communications systems
 - (a) In-building emergency communications systems

1.3.3 Any reference or implied reference to a particular type of hardware shall be for the purpose of clarity and shall not be interpreted as an endorsement.

1.3.4 The intent and meaning of the terms used in this Code shall be, unless otherwise defined herein, the same as those of NFPA 70, *National Electrical Code*[®].

1.4 Retroactivity.

1.4.1 Unless otherwise noted, it is not intended that the provisions of this document be applied to facilities, equipment, structures, or installations that were existing or approved for construction or installation prior to the effective date of the document.

1.4.2 In those cases where it is determined by the authority having jurisdiction that the existing situation involves a distinct hazard to life or property, retroactive application of the provisions of this document shall be permitted.

1.5 Equivalency.

1.5.1 Nothing in this Code shall prevent the use of systems, methods, devices, or appliances of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this Code.

NFPA 13
Standard for the
Installation of Sprinkler Systems
2010 Edition

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

Chapter 1 Administration

1.1* Scope.

1.1.1 This standard shall provide the minimum requirements for the design and installation of automatic fire sprinkler systems and exposure protection sprinkler systems covered within this standard.

1.1.2 This standard is written with the assumption that the sprinkler system shall be designed to protect against a single fire originating within the building.

1.2* Purpose.

1.2.1 The purpose of this standard shall be to provide a reasonable degree of protection for life and property from fire through standardization of design, installation, and testing requirements for sprinkler systems, including private fire service mains, based on sound engineering principles, test data, and field experience.

1.2.2 Sprinkler systems and private fire service mains are specialized fire protection systems and shall require knowledgeable and experienced design and installation.

1.3 Application.

1.3.1 This standard shall apply to the following:

- (1) Character and adequacy of water supplies
- (2) Selection of sprinklers
- (3) Fittings
- (4) Piping
- (5) Valves
- (6) All materials and accessories, including the installation of private fire service mains

1.3.2 This standard shall also apply to "combined service mains" used to carry water for both fire service and other uses as well as to mains for fire service use only.

1.4 **Retroactivity.** The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.4.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.4.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.4.3 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.5 **Equivalency.** Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.5.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.6 New Technology.

1.6.1 Nothing in this standard shall be intended to restrict new technologies or alternate arrangements, provided the level of safety prescribed by this standard is not lowered.

1.6.2 Materials or devices not specifically designated by this standard shall be utilized in complete accord with all conditions, requirements, and limitations of their listings.

1.7 Units and Symbols.

1.7.1 Units.

1.7.1.1 Metric units of measurement in this standard shall be in accordance with the modernized metric system known as the International System of Units (SI).

1.7.1.2 Two units (liter and bar), outside of but recognized by SI, are commonly used in international fire protection.

1.7.1.3 These units with conversion factors shall be used as listed in Table 1.7.1.3.

1.7.1.4 If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated shall be regarded as the requirement.

25.7.3.12.2 In addition, a system that is required to have more than one pump shall be designed to accommodate the following features:

- (1) *Pump controls and system sensors shall be arranged such that the secondary pump will automatically operate if the primary pump fails to operate or deliver the required water pressure and flow. [Figure A.25.7.3.12.2(1) is an example of an acceptable dual pump arrangement.]
- (2) Both pumps shall be served from normal and emergency power sources. However, where approved by the authority having jurisdiction, the secondary pump shall be permitted to be nonelectrically driven.
- (3) Pump failure or operation shall be indicated at the central safety station.

25.7.3.13* If not specifically prohibited, the fire pump that supplies the fire main shall be permitted to be used as the second pump, provided the following conditions are met:

- (1) The pump is adequately sized to meet the required fire hose and sprinkler system pressure and flow demands simultaneously.
- (2) The fire main system is segregated from the sprinkler system by a normally closed valve that is designed to automatically open upon failure of the designated fire pump.
- (3) The fire pump that supplies the fire main is automatically started in the event of dedicated fire pump failure or loss of pressure in the sprinkler main. (See Figure A.25.7.3.13.)

25.7.4 Water Supply Configurations.

25.7.4.1 The pressure tank and fire pump shall be located in a position reasonably remote from any machinery space of Category A.

25.7.4.2 All valves within the water supply piping system shall be supervised.

25.7.4.3 Only freshwater shall be used as the initial charge within the piping network.

25.7.4.4 The sprinkler system shall be cross-connected with the ship's fire main system and fitted with a lockable screw-down nonreturn valve such that backflow from the sprinkler system to the fire main is prevented.

25.7.4.5 The piping, tanks, and pumps that make up the water supply shall be installed in accordance with the applicable requirements of 46 CFR, Subchapter F, "Marine Engineering."

25.7.4.6* When a shore water supply is to be used during extended dockside periods, the water supply shall be qualified in the manner described in 23.2.1.

25.7.4.7 Tests shall be conducted in accordance with the requirements of the local shore-based authority having jurisdiction.

25.7.4.8 The water supply information listed in Section 11.3 shall then be provided to the authority having jurisdiction.

25.8 System Acceptance.

25.8.1 Hydrostatic Tests. In addition to the interior piping, the test required by 24.2.1.10 shall also be conducted on all external water supply connections including international shore and fireboat connections.

25.8.2 Alarm Test. A waterflow test shall result in an alarm at the central safety station within 30 seconds after flow through the test connection begins.

25.8.3 Operational Tests.

25.8.3.1 Pressure tank and pump operation, valve actuation, and waterflow shall also be tested.

25.8.3.2 Pump operation and performance shall be tested in accordance with Chapter 14 of NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*.

25.9 System Instructions and Maintenance.

25.9.1 Instructions for operation, inspection, maintenance, and testing shall be kept on the vessel.

25.9.2 Records of inspections, tests, and maintenance required by NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, shall also be kept on the vessel.

Chapter 26 System Inspection, Testing, and Maintenance

26.1* General. A sprinkler system installed in accordance with this standard shall be properly inspected, tested, and maintained by the property owner or their authorized representative in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, to provide at least the same level of performance and protection as designed.

26.2* Inactive Sprinkler Systems Abandoned in Place.

26.2.1 Where all or part of an inactive sprinkler system is abandoned in place, components including sprinklers, hose valves and hoses, and alarm devices shall be removed.

26.2.2 Control valves abandoned in place shall have the operating mechanisms removed.

26.2.3 Sprinkler system piping and/or valves abandoned in place shall be uniquely identified to differentiate them from active system piping and valves.

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 This standard provides a range of sprinkler system approaches, design development alternatives, and component options that are all acceptable. Building owners and their designated representatives are advised to carefully evaluate proposed selections for appropriateness and preference.

A.1.2 Since its inception, this document has been developed on the basis of standardized materials, devices, and design practices. However, Section 1.2 and other subsections such as 6.3.6 and 8.4.8 allow the use of materials and devices not specifically designated by this standard, provided such use is within parameters established by a listing organization. In using such materials or devices, it is important that all conditions, requirements, and limitations of the listing be fully understood and accepted and that the installation be in complete accord with such listing requirements.

NFPA 13R

Standard for the

Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height

2007 Edition

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

Chapter 1 Administration

1.1* Scope. This standard shall cover the design and installation of automatic sprinkler systems for protection against fire hazards in residential occupancies up to and including four stories in height.

1.2* Purpose. The purpose of this standard shall be to provide design and installation requirements for a sprinkler system to aid in the detection and control of fires in residential occupancies and thus provide improved protection against injury, life loss, and property damage. A sprinkler system designed and installed in accordance with this standard shall be expected to prevent flashover (total involvement) in the room of fire origin, where sprinklered, and to improve the chance for occupants to escape or be evacuated.

1.3 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued. Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive. In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate. The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.4 Equivalency. Nothing in this standard is intended to restrict new technologies or alternative arrangements, provided that the level of safety prescribed by the standard is not reduced.

1.5 Units.

1.5.1* Metric units of measurement in this standard shall be in accordance with the modernized metric system known as the International System of Units (SI).

1.5.2 The liter and bar units shall be permitted to be used in this standard.

1.5.3 The conversion factors for liter, pascal, and bar shall be in accordance with Table 1.5.3.

Table 1.5.3 Metric Conversions

Name of Unit	Unit Symbol	Conversion Factor
liter	L	1 gal = 3.785 L
pascal	Pa	1 psi = 6894.757 Pa
bar	bar	1 psi = 0.0689 bar
bar	bar	1 bar = 10 ⁵ Pa

1.5.4* Where a value for measurement as specified in this standard is followed by an equivalent value in other units, the first stated value shall be regarded as the requirement.

1.5.5 The equivalent value for a measurement in SI shall be converted by multiplying the value by the conversion factor and then rounding the result to the appropriate number of significant digits.

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 13, *Standard for the Installation of Sprinkler Systems*, 2007 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2007 edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 2003 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2002 edition.

NFPA 101[®], *Life Safety Code*[®], 2006 edition.

NFPA 220, *Standard on Types of Building Construction*, 2006 edition.

NFPA 251, *Standard Methods of Tests of Fire Resistance of Building Construction and Materials*, 2006 edition.

2.3 Other Publications.

2.3.1 ANSI Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

ANSI A17.1, *Safety Code for Elevators and Escalators*, 2004.

ANSI B36.10M, *Welded and Seamless Wrought Steel Pipe*, 1996.

6.9.4 Sprinklers shall be installed in any closet used for heating and air-conditioning equipment.

6.9.5 Sprinklers shall not be required in any porches, balconies, corridors, and stairs that are open and attached.

6.9.6* Sprinklers shall not be required in attics, penthouse equipment rooms, elevator machine rooms, concealed spaces dedicated exclusively to and containing only dwelling unit ventilation equipment, crawl spaces, floor/ceiling spaces, noncombustible elevator shafts where the elevator cars comply with ANSI A17.1, *Safety Code for Elevators and Escalators*, and other concealed spaces that are not used or intended for living purposes or storage and do not contain fuel-fired equipment.

6.9.7 Sprinklers shall not be required in closets on exterior balconies, regardless of size, as long as there are no doors or unprotected penetrations from the closet directly into the dwelling unit.

6.10* Maintenance.

6.10.1 The owner shall be responsible for the condition of a sprinkler system and shall keep the system in normal operating condition.

6.10.2 Sprinkler systems shall be inspected, tested, and maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

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 NFPA 13R is appropriate for use as an option to NFPA 13, *Standard for the Installation of Sprinkler Systems*, only in those residential occupancies, as defined in this standard, up to and including four stories in height. It is the intent of this standard that if NFPA 13R is appropriate for use, that it be used throughout the entire building. It is recognized that an occupancy incidental to the operations of the residential occupancy might exist within that residential occupancy. Such incidental occupancy would be considered part of the predominant (residential) occupancy and subject to the provisions of the predominant (residential) occupancy by 6.1.14.2 of NFPA 101, *Life Safety Code*, and similar provisions in many local building and fire codes. Use of NFPA 13R throughout the entire building in this case is allowed.

Where buildings are greater than four stories in height, or where buildings are of mixed use where residential is not the predominant occupancy, residential portions of such buildings should be protected with residential or quick-response sprinklers in accordance with 8.4.5 of NFPA 13. Other portions of such buildings should be protected in accordance with NFPA 13. Where buildings of mixed use can be totally separated so that the residential portion is considered a separate building under the local code, NFPA 13R can be used in the residential portion while NFPA 13 is used in the rest of the building.

The criteria in this standard are based on full-scale fire tests of rooms containing typical furnishings found in residential living rooms, kitchens, and bedrooms. The furnishings were arranged as typically found in dwelling units in a manner similar to that shown in Figure A.1.1(a), Figure A.1.1(b), and Figure A.1.1(c). Sixty full-scale fire tests were conducted in a two-story dwelling in Los Angeles, California, and 16 tests were conducted in a 14 ft (4.3 m) wide mobile home in Charlotte, North Carolina. Sprinkler systems designed and installed according to this standard are

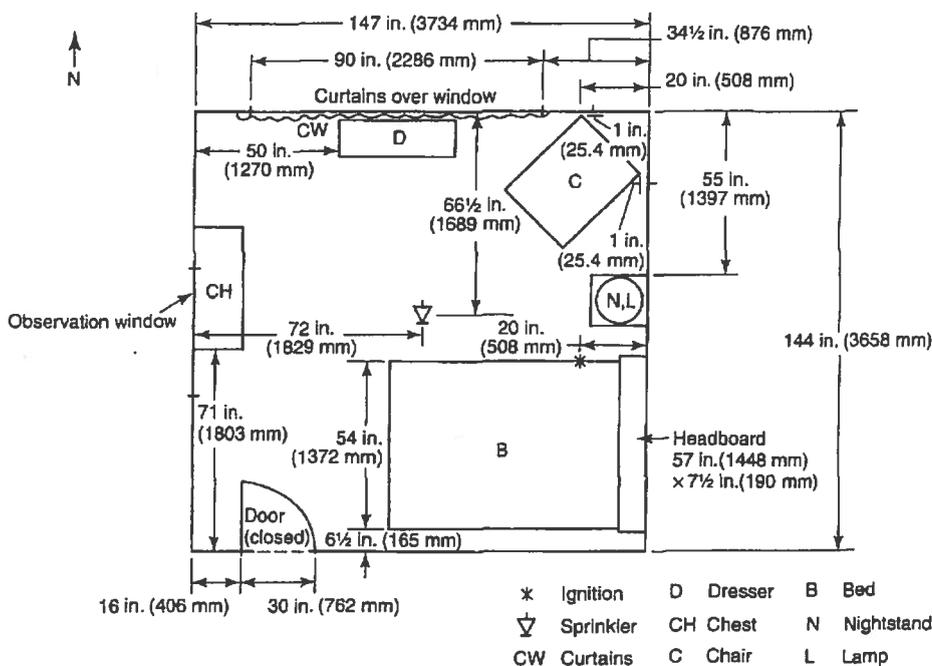


FIGURE A.1.1(a) Bedroom.

NFPA 13D

**Standard for the
Installation of Sprinkler Systems in One- and
Two-Family Dwellings and Manufactured
Homes**

2002 Edition

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

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet between the paragraphs that remain.

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

Chapter 1 Administration

1.1* Scope. This standard shall cover the design and installation of automatic sprinkler systems for protection against the fire hazards in one- and two-family dwellings and manufactured homes.

1.2* Purpose. The purpose of this standard shall be to provide a sprinkler system that aids in the detection and control of residential fires and thus provides improved protection against injury, life loss, and property damage. A sprinkler system designed and installed in accordance with this standard shall be expected to prevent flashover (total involvement) in the room of fire origin, where sprinklered, and to improve the chance for occupants to escape or be evacuated. The layout, calculation, and installation of systems installed in accordance with this standard shall only be performed by people knowledgeable and trained in such systems.

1.3 Retroactivity The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued. Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive. In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate. The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.4 Equivalency. Nothing in this standard is intended to restrict new technologies or alternative arrangements, pro-

vided that the level of safety prescribed by the standard is not reduced.

1.5 Units.

1.5.1* Metric units of measurement in this standard shall be in accordance with the modernized metric system known as the International System of Units (SI).

1.5.2 The liter and bar units shall be permitted to be used in this standard.

1.5.3 The conversion factors for liter, pascal, and bar shall be in accordance with Table 1.5.3.

Table 1.5.3 Metric Conversions

Name of Unit	Unit Symbol	Conversion Factor
liter	L	1 gal = 3.785 L
pascal	Pa	1 psi = 6894.757 Pa
bar	bar	1 psi = 0.0689 bar
bar	bar	1 bar = 10 ⁵ Pa

1.5.4* Where a value for measurement as specified in this standard is followed by an equivalent value in other units, the first stated value shall be regarded as the requirement.

1.5.5 The equivalent value for a measurement in SI shall be converted by multiplying the value by the conversion factor and then rounding the result to the appropriate number of significant digits.

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, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2002 edition.

NFPA 72®, *National Fire Alarm Code*®, 2002 edition.

NFPA 220, *Standard on Types of Building Construction*, 1999 edition.

2.3 Other Publications.

2.3.1 ANSI Publication. American National Standards Institute, Inc., 11 West 42nd Street, 13th floor, New York, NY 10036.

ANSI B36.10M, *Welded and Seamless Wrought Steel Pipe*, 1996.

2.3.2 ASME Publications. American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.

ASME B16.1, *Cast Iron Pipe Flanges and Flanged Fittings*, 1989.

ASME B16.3, *Malleable Iron Threaded Fittings*, 1992.

ASME B16.4, *Gray Iron Threaded Fittings*, 1992.

ASME B16.5, *Pipe Flanges and Flanged Fittings*, 1996.

ASME B16.9, *Factory-Made Wrought Steel Buttwelding Fittings*, 1993.

ASME B16.11, *Forged Fittings, Socket-Welding and Threaded*, 1996.

projections containing interior space, but do not include bay windows.

3.3.6 Pressure.

3.3.6.1 Supply Pressure. The pressure within the supply (e.g., city or private supply water source).

3.3.6.2 System Pressure. The pressure within the system (e.g., above the control valve).

3.3.6.3 System Working Pressure. The maximum anticipated static (nonflowing) or flowing pressure applied to sprinkler system components exclusive of surge pressures.

3.3.7 Pump. A mechanical device that transfers or raises, or transfers and raises, the pressure of a fluid (water).

3.3.8 Sprinkler.

3.3.8.1 Automatic Sprinkler. A fire suppression or control device that operates automatically when its heat-actuated element is heated to its thermal rating or above, allowing water to discharge over a specific area.

3.3.8.2 Residential Sprinkler. A type of fast-response sprinkler that meets the criteria of NFPA 13, *Standard for the Installation of Sprinkler Systems*, that has been specifically investigated for its ability to enhance survivability in the room of fire origin and is listed for use in the protection of dwelling units.

3.3.9 Systems.

3.3.9.1 Antifreeze System. An antifreeze system is an automatic sprinkler system containing an antifreeze solution and connected to a water supply. The antifreeze solution, followed by water, discharges immediately from sprinklers opened by a fire.

3.3.9.2 Dry Pipe Sprinkler System. A sprinkler system employing automatic sprinklers that are attached to a piping system containing air or nitrogen under pressure, the release of which (as from the opening of a sprinkler) permits the water pressure to open a valve known as a dry pipe valve, and the water then flows into the piping system and out the opened sprinkler.

3.3.9.3 Multipurpose Piping System. A piping system within a residential occupancy intended to serve both domestic and fire protection needs.

3.3.9.4 Network System. A type of multipurpose system utilizing a common piping system supplying domestic fixtures and fire sprinklers where each sprinkler is supplied by a minimum of three separate paths.

3.3.9.5 Preaction Sprinkler System. A sprinkler system employing automatic sprinklers that are attached to a piping system that contains air that might or might not be under pressure, with a supplemental detection system installed in the same areas as the sprinklers.

3.3.9.6 Preengineered System. A packaged sprinkler system including all components connected to the water supply and designed to be installed according to pretested limitations.

3.3.9.7 Sprinkler System. For fire protection purposes, an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. The installation includes one or more automatic water supplies. The portion of the sprinkler system aboveground is a network of specially sized or hydraulically designed piping installed in a building, structure, or area, generally overhead,

and to which sprinklers are attached in a systematic pattern. The system is usually activated by heat from a fire and discharges water over the fire area.

3.3.9.8 Wet Pipe Sprinkler System. A sprinkler system employing automatic sprinklers attached to a piping system containing water and connected to a water supply so that water discharges immediately from sprinklers opened by heat from a fire.

3.3.10 Valve.

3.3.10.1 Check Valve. A valve that allows flow in one direction only.

3.3.10.2* Control Valve. A valve employed to control (shut) a supply of water to a sprinkler system.

3.3.11 Waterflow Alarm. A sounding device activated by a waterflow detector or alarm check valve.

3.3.12 Waterflow Detector. An electric signaling indicator or alarm check valve actuated by waterflow in one direction only.

Chapter 4 General Requirements

4.1 Compartments.

4.1.1 A compartment, for the purposes of this standard, shall be a space that is completely enclosed by walls and a ceiling.

4.1.2 A compartment enclosure shall be permitted to have openings in walls, provided the openings have a minimum lintel depth of 8 in. (203 mm) from the ceiling.

4.2 Maintenance.

4.2.1* The installer shall provide to the owner/occupant instructions on inspecting, testing, and maintaining the system.

4.2.2 Operated or damaged sprinklers shall be replaced with sprinklers having the same performance characteristics as the original equipment.

4.2.3 Any sprinklers that have been painted outside of the factory shall be replaced with a new listed sprinkler.

4.2.4* Antifreeze Systems. Before freezing weather each year, the following procedure shall be performed:

- (1) Solution in the entire antifreeze system emptied into convenient containers
- (2) Solution brought to the proper specific gravity by adding concentrated liquid as needed, or a new solution be prepared, in accordance with 8.3.3
- (3) System refilled with the new or remixed solution

4.3* Hydrostatic Tests.

4.3.1 Where a fire department pumper connection is not provided, the system shall be hydrostatically tested for leakage at normal system operating pressure.

4.3.2 Where a fire department pumper connection is provided, the system shall pass a hydrostatic pressure test performed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

4.4 Sprinkler Temperature Ratings.

4.4.1 Sprinklers having a temperature rating of 135°F to 170°F (57°C to 77°C) shall be classified as ordinary temperature-rated sprinklers.

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual X Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC Section 107.13

Proposed Change (including all relevant section numbers, if multiple sections):

Add sections as follows:

5. \$350 the first day of fireworks, pyrotechnics or proximate audience displays conducted in any state-owned building and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 15 days prior to the planned event, the permit fee shall be \$450 per day and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 7 days prior to the planned event, the permit fee shall be \$550 per day and \$150 per day for each consecutive day for identical multi-day events.

5.1 \$100 for the use of permissible fireworks inside any state-owned building.

6. \$250 the first day of fireworks, pyrotechnics or proximate audience displays conducted out-of-doors on any state-owned property and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 15 days prior to the planned event, the permit fee shall be \$450 per day and \$150 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 7 days prior to the planned event, the permit fee shall be \$550 per day and \$150 per day for each consecutive day for identical multi-day events.

6.1 \$100 for the use of permissible fireworks outdoors on any state-owned property.

Supporting Statement (including intent, need, and impact of the proposal):

In accordance with § 27-96.1 of the Code of Virginia and as restated in SFPC Section 3308.2, permissible fireworks may be used on private property with the permission of the property owner and without having to obtain a permit. State colleges and universities are not private property and do not have the benefit of such exception. There have been a few events or theatrical productions recently in state buildings and on state property where permissible fireworks were to be used. While permits were obtained, the amount of the permit fees and staff time invested using the current fee schedule may not have been in proper proportion for what actually took place. This change is to provide that proportion and more reflective of the SFMO time invested. For the events this change is intended to cover, the interest of the SFMO is more toward looking at the venue itself and to ensure its appropriateness and the overall fire safety of the venue, and not the use of these small items that are less dangerous than those used under permit for aerial (1123) and close proximity

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devices (1126).

Basically this provides a reduced fee for permits using permissible fireworks on state property.

Submittal Information

Date Submitted: 6/3/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC Sections 107.6 and 107.14

Proposed Change (including all relevant section numbers, if multiple sections):

107.6 State Fire Marshal: Permits will not be required by the State Fire Marshal except those permits listed in Section 107.13 and the levy of annual compliance inspection fees listed in Section 107.14 of this code.

Exception: Such permits shall not be required for the storage of explosives or blasting agents by the Virginia Department of State Police provided notification to the State Fire Marshal is made annually by the Chief Arson Investigator listing all storage locations within areas where enforcement is provided by the State Fire Marshal's office.

107.14 State annual compliance inspection permit fees. ~~Annual fees for compliance inspections permits issued/performed~~ by the State Fire Marshal's Office ~~for the inspection of buildings~~ shall be as follows:

1. Night clubs

- 1.1. \$350 for occupant load of 100 or less.
- 1.2. \$450 for occupant load of 101 to 200.
- 1.3. \$500 for occupant load of 201 to 300.
- 1.4. \$500 plus \$50 for each 100 occupants where occupant load exceed 300.

2. Private college dormitories with or without assembly areas. If containing assembly areas, such assembly areas are not included in the computation of square footage.

- 2.1. \$150 for 3,500 square feet (325.15 m²) or less.
- 2.2. \$200 for greater than 3,500 square feet (325.15 m²) up to 7,000 square feet (650 m²).
- 2.3. \$250 for greater that 7,000 square feet (650 m²) up to 10,000 square feet (929 m²).
- 2.4. \$250 plus \$50 for each additional 3,000 square feet (278 m²) where square footage exceeds 10,000 (929 m²).

3. Assembly areas that are part of private college dormitories.

- 3.1. \$50 for 10,000 square feet (929 m²) or less provided the assembly area is within or attached to a dormitory building.
- 3.2. \$100 for greater than 10,000 square feet (929 m²) up to 25,000 square feet (2322.5 m²) provided the assembly area is within or attached to a dormitory building, such as gymnasiums, auditoriums or cafeterias.
- 3.3. \$100 for up to 25,000 square feet (2322.5 m²) provided the assembly area is in a separate or separate buildings such as gymnasiums, auditoriums or cafeterias.

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3.4. \$150 for greater than 25,000 square feet (2322.5 m²) for assembly areas within or attached to a dormitory building or in a separate or separate buildings such as gymnasiums, auditoriums or cafeterias.

4. Hospitals.

4.1. \$300 for 1 to 50 beds.

4.2. \$400 for 51 to 100 beds.

4.3. \$500 for 101 to 150 beds.

4.4. \$600 for 151 to 200 beds.

4.5. \$600 plus \$100 for each additional 100 beds where the number of beds exceeds 200.

5. ~~Child day centers, assisted living facilities and adult day care centers~~ Facilities and adult day care centers licensed by the Virginia Department of Social Services based on licensed capacity as follow:

5.1. \$50 for 1 to 8.

5.2. \$75 for 9 to 20.

5.3. \$100 for 21 to 50.

5.4. \$200 for 51 to 100.

5.5. \$400 for 101 or more.

Exception: Annual compliance inspection permits fees for any building or groups of buildings on the same site may not exceed \$2500.

6. Registered complaints.

1st Visit (initial complaint) hourly rate per SFMO staff person - \$0.00

2nd Visit and all subsequent visits hourly rate per SFMO staff person - \$51.00

7. Storage/Retail Display of permissible fireworks.

7.1 Temporary Structures or Stands – 60 day period \$100.00

7.2 Permanent Structure – 60 day period \$190.00

7.3 Permanent Structure – year-round \$240.00

8. Bon Fires (Small & Large) on state owned property.

8.1 For a small bon fire pile with a total fuel area more than 3 feet in diameter and more than 2 feet in height but not more than 9 feet in diameter and not more than 6 feet in height, the permit fee is \$50.00. If an application for a bon fire permit is received by the SFMO less than 15 days prior to the planned event, the permit fee shall be \$100. If an application for bon fire permit is received by the SFMO less than 7 days prior to the planned event, the permit fee shall be \$150.

8.2 For a large bon fire pile with a total fuel area 9 feet or more in height and 6 feet or more in height the permit fee is \$150.00. If an application for a bon fire permit is received by the SFMO less than 15 days prior to the planned event, the permit fee shall be \$300. If an application for bon fire permit is received by the SFMO less than 7 days prior to the planned event, the permit fee shall be \$450.

Supporting Statement (including intent, need, and impact of the proposal):

The change to Section 107.6 is a coordinated change to what is proposed for Section 107.14.

The changes to Section 107.14 is based upon the statutory authority granted in § 27-98 of the Code of Virginia allowing the SFMO charge a fee to recover the actual cost of administering and enforcing the SFPC in jurisdictions for which the office serves as the enforcing authority.

The compliance inspections undertaken for the occupancies listed in Section 107.14, Items 6 and 7 are essentially for the same reasons inspections are performed in the occupancies listed in items 1 through 5; to ensure continued compliance.

Response to complaints results in inspections to ensure all required built-in fire safety features that were required by the USBC at the time of design and construction are properly maintained, including any retrofitting provisions required within the USBC, and that any conditions related to the storage, handling, and use of substances, materials and devices remain in compliance with the provision established in the SFPC.

Whether intentional or not, illegal fireworks are often found at retail outlets, and sometimes *under the counter*. The inspection related to permissible fireworks is a means to ensure illegal fireworks are not mixed into the retail stream and only permissible fireworks are available to the public.

The SFMO has seen an increase in ceremonial bon fires on state property and at some of the state's colleges and universities. The SFMO experience with these bon fires is similar to those of fireworks in terms of the amount of time invested to inspect the site for the appropriateness with greater time and attention given to the larger ones that may involve some level of engineering in the pile's assembly.

Submittal Information

Date Submitted: 6/3/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR TASO (Technical Assistance and Services Office)
Main Street Centre
600 E. Main St., Ste. 300
Richmond, VA 23219

Email Address: tsu@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7140 or (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC Sections 107.6, 107.13 and 107.14

Proposed Change (including all relevant section numbers, if multiple sections):

107.13. State explosives, blasting agents, theatrical flame effects and firework permit fees: Except as modified herein, Applications for firework or pyrotechnic displays shall be submitted to and received by the State Fire Marshal's Office not less than 15 days prior to the planned event. Fees for permits issued by the State Fire Marshal's office for the storage, use, sale or manufacture of explosives or blasting agents, and for the display of fireworks and flame effects on state-owned property shall be as follows:

1. ~~\$125~~150 per year per magazine to store explosives and blasting agents.
2. ~~\$200~~250 per year per city or county to use explosives and blasting agents.
3. ~~\$150~~200 per year to sell explosives and blasting agents.
4. ~~\$200~~250 per year to manufacture explosives, blasting agents and fireworks.
5. \$350 the first day of fireworks, pyrotechnics or proximate audience displays conducted in any state-owned building and ~~\$150~~200 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 15 days prior to the planned event, the permit fee shall be ~~\$450~~per 700 the first day and ~~\$150~~400 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 7 days prior to the planned event, the permit fee shall be ~~\$550~~per 1,050 the first day and ~~\$150~~900 per day for each consecutive day for identical multi-day events.
6. \$250 the first day of fireworks, pyrotechnics or proximate audience displays conducted out-of-doors on any state-owned property and ~~\$150~~200 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 15 days prior to the planned event, the permit fee shall be ~~\$450~~per 500 the first day and ~~\$150~~400 per day for each consecutive day for identical multi-day events. If an application is received by the SFMO less than 7 days prior to the planned event, the permit fee shall be ~~\$550~~per 750 the first day and ~~\$150~~600 per day for each consecutive day for identical multi-day events.
7. \$100 per event for the use of explosives in special operations or emergency conditions.
8. \$300 the first day for flame effects conducted in accordance with Section 308.3.6 indoors of any state-owned building or outdoors on state-owned property and ~~\$150~~200 per day for each consecutive day for identical multi-day events, or, if conducted as part of a firework (pyrotechnic) display, ~~\$100~~150 the first day and ~~\$75~~125 per day for each consecutive day for identical multi-day events. If an application for flame effects is received by the SFMO less than 15 days prior to the planned event, the permit fee shall be ~~\$450~~per 550 the first day and ~~\$150~~200 per day for each consecutive day for identical multi-day events or, if conducted as part of a firework (pyrotechnic) display, \$200 the first day and \$100 per day for each consecutive day for identical multi-day events.. If an application is

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received by the SFMO less than 7 days prior to the planned event, the permit fee shall be ~~\$550~~ per 650 the first day and \$150 per day for each consecutive day for identical multi-day events or, if conducted as part of a firework (pyrotechnic) display, \$300 the first day and \$125 per day for each consecutive day for identical multi-day events.

107.14 State annual inspection permit fees. Annual fees for inspection permits issued by the State Fire Marshal's office for the inspection of buildings shall be as follows:

(Items 1 through 4 remain unchanged.)

5. Child day centers, assisted living facilities and adult day care centers licensed by the Virginia Department of Social Services based on licensed capacity as follows:

5.1. \$50 for 1 to 8.

5.2. \$75 for 9 to 20.

5.3. \$100 for 21 to 50.

5.4. \$200 for 51 to 100.

5.5. ~~\$4300~~ for 101 ~~or more~~ to 150.

5.6. \$400 for 151 to 200.

5.7. \$500 for 201 or more.

Exception: Annual inspection permits for any building or groups of buildings on the same site may not exceed \$2500.

Supporting Statement (including intent, need, and impact of the proposal):

Other than to continue to cover costs associated with administration and enforcement, the increases for Section 107.13, Items 5, 6 and 8 are to strengthen the incentive for submitting applications at least 15 days prior to planned events.

If the questions rises, why the difference in permit fees for outdoor and indoor pyrotechnics, it's because of the greater attention to safety that is demanded of using fireworks indoors and in close proximity to an audience. As a result the need to ensure compliance with the SFPC and referenced standards is heightened which translates to the investment of increased staff time and presence.

Submittal Information

Date Submitted: 6/3/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR TASO (Technical Assistance and Services Office)
Main Street Centre
600 E. Main St., Ste. 300
Richmond, VA 23219

Email Address: tsu@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7140 or (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC Section 107.14

Proposed Change (including all relevant section numbers, if multiple sections):

107.14 State ~~annual~~ compliance inspection permit fees. ~~Annual fees for compliance inspections permits issued performed by the State Fire Marshal's Office for the inspection of buildings shall be as follows:~~

(Items #1 through 3 and 5 remain unchanged.)

4. Hospitals.

- 4.1. \$300 for 1 to 50 beds.
- 4.2. \$400 for 51 to 100 beds.
- 4.3. \$500 for 101 to 150 beds.
- 4.4. \$600 for 151 to 200 beds.
- 4.5. \$600 plus \$100 for each additional 100 beds where the number of beds exceeds 200.

Exception: ~~Annual fees~~ for any building or groups of buildings on the same site may not exceed \$2500 annually.

6. Boarding House (Transient), Group R3 or R5.

- 6.1 Non-proprietor occupied – 1 to 10 guests \$150.00
- 6.2 Proprietor occupied – 1 to 5 guest rooms \$190.00

7. Hotels/Motels

<u>Number of guest rooms</u>	<u>Fee</u>
<u>1 to 25, single story building</u>	<u>\$100.00</u>
<u>1 to 25, multi-story building</u>	<u>\$190.00</u>
<u>26 to 50, single story building</u>	<u>\$150.00</u>
<u>26 to 50, multi-story building</u>	<u>\$240.00</u>
<u>51 to 100</u>	<u>\$290.00</u>
<u>101 to 150</u>	<u>\$380.00</u>
<u>151 to 200</u>	<u>\$480.00</u>
<u>201 or more</u>	<u>\$570.00</u>

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Supporting Statement (including intent, need, and impact of the proposal):

The change to the Exception in Item 4 is solely for the sake of clarity.

The compliance inspections undertaken for the occupancies listed in Items 6 and 7 are essentially for the same reasons inspections are performed in the occupancies listed in the unchanged Items 1, 2, 3 and 5.

Hotels, motels and boarding houses are an important component of the state's tourism industry and the safety of those who temporarily occupy those buildings is just as important to those who occupy health care facilities, day care centers, ALFs, schools, dorms and who seek entertainment within night clubs. The inspections are to ensure all required built-in fire safety features that were required by the USBC at the time of design and construction are properly maintained, including any retrofitting provisions, and that any conditions related to the storage, handling, and use of substances, materials and devices remain in compliance with the provisions established in the SFPC.

Recently, in response to a complaint, the SFMO inspected a motel in Caroline County. The problems found were so extreme and numerous that it was decided that five other adjacent hotels should also be inspected. The problems found included no fire alarm or sprinkler systems inspections and tests records. It was as if the systems had never been touched since installation. Additional problems included damaged fire walls, improper wiring, non-functional emergency lights, and many others.

One of the most serious problem found in all six hotels was, none of the system or room smoke detectors had been tested. In spot testing the detectors, only about 50% functioned at all. Two had fire alarm systems that were out of service. This was readily determined since pull stations were found to have been pulled, but no alarms were sounding.

The inspections altogether involved three inspectors and two managers. One particular motel had not made any progress in obtaining compliance after repeated inspections. Arrest warrants for two owners living outside the area were obtained through the local Commonwealth Attorney's Office and Magistrate's Office. Two additional owners could not be located. Upon the initial inspection, all follow-up inspections and legal actions, the lead inspector alone has spent approximately 20 man-hours for the worst of the 6 hotels, and 65 man-hours on all 6 hotel inspections. Not including the local building official's office, additional hours were invested by the two additional SFMO inspectors and managers.

Proper referral, timeliness of referral, and involvement of the local building official throughout the case involving these 6 hotels was instrumental and invaluable in obtaining compliance.

Another instance this year occurred in an Orange County hotel where numerous fire violations were found including finding propane tanks being stored in a stairwell.

In 2012 in a Nelson County hotel, the fire alarm system was found to be out of service, and the smoke detectors were not working. There were many problems found including, damaged stairs, emergency lights out of service, rooms used for excess storage, and other problems. The owner was summoned to court and through an injunction, was forced to fix the problems found.

Recently, a hotel in Southwest Virginia was found lacking current inspection reports for the sprinkler and fire alarm systems. Fortunately, compliance was gained without any legal action beyond the issuance of a notice of violation.

These recent examples generated through complaints demonstrate the need for pro-active inspections for gaining and maintaining compliance in facilities that are so important to Commonwealth's tourism industry and to the safety of those who occupy the hotels and motels. Past practice has shown that pro-active inspections and the educational opportunities it presents have longer lasting positive effects as opposed to responding to complaints. Past practice and experience has also shown that being proactive in conducting these inspections every year, or even every two years, is, in the end, cheaper for all involved and with a lower time investment by the SFMO. Complaint driven responses produce a larger

time investment for SFMO staff and do not produce the desired long term results of continued compliance and cooperation.

Submittal Information

Date Submitted: 6/3/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Henry Rosenbaum

Representing: Henrico County - Division of Fire

Mailing Address: PO Box 90775, Henrico VA 23273-0775

Email Address: Ros08@co.henrico.va.us

Telephone Number: 804 501-4914

Proposal Information

Code(s) and Section(s): 2012 SFPC - Definitions - Occupancy Classification – Residential Group R

Proposed Change (including all relevant section numbers, if multiple sections):

B. Add the following definition under the term “Occupancy Classification--Residential Group R”:
~~R-5 Detached one and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures. The terms “R-5” and “one and two-family dwelling” where used in this code shall be interchangeable.~~

Replace with:

Residential Group R-5. Residential occupancies in detached one- and two-family dwellings, townhouses and accessory structures within the scope of the International Residential Code, also referred to as the “IRC.” IRC.

Supporting Statement (including intent, need, and cost impact of the proposal):

This definition will match the insertion of “Occupancy Classification – Residential Group R” in the Virginia Statewide Fire Prevention Code (SFPC) 2012 with the Virginia Uniform State Building Code (USBC) 2012.

The ICC fire code and building code do not have a Group R-5 definition, in their occupancy classifications. Virginia has added a Group R-5 in past codes. There has always been a difference in the wording between the SFPC and the USBC. The following are from 2012 Virginia base documents.

SFPC

B. Add the following definition under the term “Occupancy Classification--Residential Group R”:
R-5 Detached one and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures. The terms “R-5” and “one and two-family dwelling” where used in this code shall be interchangeable.

USBC

I. Add Section 310.7 to the IBC to read:

310.7 Residential Group R-5. Residential occupancies in detached one- and two-family dwellings, townhouses and accessory structures within the scope of the International Residential Code, also referred to as the “IRC.” IRC.

AS _____ AM _____ Disapprove _____ Carry over _____

There is precisely a difference in the wording and interpretation between the SFPC and the USBC codes. The intent of this code change is to bring consistency between the Virginia SFPC and the Virginia USBC in 2012.

Submittal Information

Date Submitted: July 1, 2013

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Robby Dawson

Representing: Fire Services Board Code Committee

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: dawsonj@chesterfield.gov

Telephone Number: 804-748-1426

Proposal Information

Code(s) and Section(s): SFPC Section 108.3

Proposed Change (including all relevant section numbers, if multiple sections):

108.3 Conditions of a permit. An operational permit shall constitute permission to maintain, store or handle materials; or to conduct processes in accordance with the SFPC, and shall not be construed as authority to omit or amend any of the provisions of this code. ~~The building official shall issue permits to install equipment utilized in connection with such activities; or to install or modify any fire protection system or equipment or any other construction, equipment installation or modification in accordance with the provisions of this code where a permit is required by Section 108.5. Such permission shall not be construed as authority to omit or amend any of the provisions of this code.~~

Note: The building official shall issue permits to install equipment utilized in connection with such activities; or to install or modify any fire protection system or equipment or any other construction, equipment installation or modification in accordance with the provisions of this code where a permit is required by Section 108.5. Such permission shall not be construed as authority to omit or amend any of the provisions of this code.

Supporting Statement (including intent, need, and impact of the proposal):

The language and authority on who issues a permit to install or modify fire protection systems, equipment, and other building components already resides in the USBC and is clearly stated in SFPC Section 102.6 which renders the language proposed for deletion as repetitive. At best, if it were to be retained in the SFPC, it would be more appropriate for this language to be in the form of an informational note to whoever uses the SFPC.

In addition, the 2nd sentence does not relate to the 1st sentence when asking the question, what is meant by "such activities"? Not does it make sense within the 2nd sentence itself. It appears the sentence is incomplete.

Submittal Information

Date Submitted: June 3, 2013

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR TASO (Technical Assistance and Services Office)
Main Street Centre
600 E. Main St., Ste. 300
Richmond, VA 23219

Email Address: tsu@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7140 or (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Robby Dawson

Representing: Fire Services Board Code Committee

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: dawsonj@chesterfield.gov

Telephone Number: 804-717-6838

Proposal Information

Code(s) and Section(s): SFPC Section 403.3.1 and 403.2

Proposed Change (including all relevant section numbers, if multiple sections):

403.3.1 Training. Training for crowd managers shall be approved.

403.2 Duties. The duties of crowd managers shall include, but not be limited to:

1. Conduct an inspection of the area of responsibility and identify and address any egress barriers.
2. Conduct an inspection of the area of responsibility to identify and mitigate any fire hazards.
3. Verify compliance with all permit conditions, including those governing pyrotechnics and other special effects.
4. Direct and assist the event attendees in evacuation during an emergency.
5. Assist emergency response personnel where requested.
6. Other duties required by the fire code official.
7. Other duties as specified in the fire safety plan.

Supporting Statement (including intent, need, and impact of the proposal):

The code requires "trained crowd managers", but doesn't provide any guidance or describe what that training should include. The basic training outlined by this new provision gives guidance to the public and users of the SFPC with what type of basic training is required to ensure the safety of the patrons in the areas where these managers are required.

This does not require any additional staffing in these venues, only that the staff that are there are able to identify and respond to hazards and risks associated with large gatherings.

This has been an ongoing issue for enforcement personnel and businesses as well. This change is intended to address that void. This is the same change heard at the ICC CAH recently held in Dallas and was approved as submitted on a 13-1 vote.

Submittal Information

Code Change - F403.3.1, FSBCC.docx

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Proponent Information

(Check one): Individual Government Entity Company

Name: DHCD Placeholder Representing: _____

Mailing Address: _____

Email Address: _____ Telephone Number: _____

Proposal Information Revised August 27, 2013 SFPC

Proposed Change (including all relevant section numbers, if multiple sections): SFPC IFC 403.3

IFC 403.3 Crowd Managers: Trained crowd managers shall be provided for facilities or events where more than 1,000 persons congregate. The minimum number of crowd managers shall be established at a ratio of one crowd manager to every 250 persons **over 1,000**. Rest remain the same.

Exception: For A-2 nightclubs a trained crowd manager shall be provided for each 250 persons.

Supporting statement

Crowd managers are currently required when the occupancy load is above 1,000. Some interpret that when the occupancy load is 1001 or greater that you then need 5 crowd managers and then one for each 250 thereafter. Revisions to the 2015 IFC will make that the case with no more 1,000 exception other than for churches. The consequence of such a change will mean large assemblages such as classrooms would need crowd managers or a reception after the wedding or restaurants over 250 occupants or even malls unless the fire officials approves a modification. Does an B office building need crowd managers if there are 1500 employees? The present language say facilities where persons congregate? The code change preserves the 1,000 exception and clearly states crowd managers are necessary only after 1001 and you don't say 5 are needed at 1001 but one and then one for each 250 thereafter. If the intent is for assemblies that seems to be the case in IFC 403.1 then "facilities" seems to be not the best descriptor for when crowd managers need to be provided. Also, it might be okay to lower the crowd managers to only the highest risk A occupancies like A-2 nightclubs where it might be appropriate to have one CM for each 250 persons.

Submittal Information

Date Submitted: _____

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR State Building Codes Office
600 East Main Street,

Email Address: vernon.hodge@dhcd.virginia.gov

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Joel S. Baker

Representing: County of Roanoke

Mailing Address: 5204 Bernard Drive, Roanoke, VA 24018

Email Address: jbaker@roanokecountyva.gov

Telephone Number: 540-776-7300

Proposal Information

Code(s) and Section(s): 503.1, Exception 1

Proposed Change (including all relevant section numbers, if multiple sections):

Modify Exception 1.

In lieu of the requirements of this section and Sections 503.2 and 503.3, fire apparatus access roads shall be permitted to be provided, constructed and maintained in accordance with written policy and standards that establish fire apparatus access road requirements and such requirements shall be identified to the owner or his agent prior to the building official's approval of the building permit.

Supporting Statement (including intent, need, and cost impact of the proposal):

Would permit a locality that has developed local private street construction standards to also include design and construction standards for fire apparatus access roads when such standards are utilized.

When a locality chooses to develop private street and road standards, they should also be permitted to include the design of fire apparatus access roads as part of that standard. The current Section 503 allows a locality to make an exception for requiring access roads initially through a local written policy, but does not appear to permit a locality to also develop the design standards. This would give the locality that ability in order to address specific local conditions.

This change would not increase and has the potential to decrease construction costs.

Submittal Information

Date Submitted: 02/20/2013

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street

Email Address: Vernon.hodge@dhcd.virginia.gov

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Robby Dawson

Representing: Fire Services Board Code Committee

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: dawsonj@chesterfield.gov

Telephone Number: 804-748-1426

Proposal Information

Code(s) and Section(s): SFPC – listed sections for deletion of existing building references

Proposed Change (including all relevant section numbers, if multiple sections):

Change Section 607.1 to read:

~~607.1 Emergency Operation.~~ Existing elevators with a travel distance of 25 feet (7620 mm) or more shall comply with the requirements in Chapter 11. ~~New elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1 of Section 506.3 and the Virginia Maintenance Code (13VAC5-63-450).~~

Change Section 704.1 to read:

~~704.1 Enclosure.~~ Interior vertical shafts including, but not limited to, *stairways*, elevator hoistways, service and utility shafts, that connect two or more stories of a building shall be enclosed or protected as required in Chapter 11. New floor openings in existing buildings shall comply with the *International Building Code*.

Change Section 903.6 to read:

~~903.6 Where required in existing buildings and structures.~~ An automatic sprinkler system shall be provided in existing buildings and structures where required in Chapter 11 in accordance with Section 102.7 of this code.

Delete Section 905.11:

~~905.11 Existing buildings.~~ Where required in Chapter 11, existing structures shall be equipped with standpipes installed in accordance with Section 905.

Change Section 907.1 to read:

~~907.1 General.~~ This section covers the application, installation, performance and maintenance of fire alarm systems and their components in new and existing buildings and structures. The requirements of Section 907.2 are applicable to new buildings and structures. ~~The requirements of Section 907.9 are applicable to existing buildings and structures.~~

Delete Section 907.9:

~~907.9 Where required in existing buildings and structures.~~ An approved fire alarm system shall be provided in existing buildings and structures where required in Chapter 11.

Change Section 1029.4 to read:

[B] 1029.4 Operational constraints. *Emergency escape and rescue openings* shall be operational from the inside of the room without the use of keys or tools. Bars, grilles, grates or similar devices are permitted to be placed over *emergency escape and rescue openings* provided the minimum net clear opening size complies with Section 1029.2 and such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the

Code Change - F607.1, FSBCC.doc

AS _____ AM _____ Disapprove _____ Carry over _____

escape and rescue opening. ~~Where such bars, grilles, grates or similar devices are installed in existing buildings, and where smoke alarms shall be~~ installed in accordance with Section 907.2.11 and approved by the building official regardless of the valuation of the *alteration*.

Change title page to read:
Chapters ~~1211~~ through 19
Reserved

Supporting Statement (including intent, need, and impact of the proposal):

Along with the continued deletion of Chapter 11 for construction requirements for existing buildings out of the SFPC, this change is to delete or change those other sections within the body of the SFPC that still make reference to a chapter that's deleted or provide for an obvious conflict with the USBC.

The change to Section 1029.4 is to ensure bars, grilles, grates and other such barriers are not installed without some other compensating measure for ensuring safety and egress.

Submittal Information

Date Submitted: 12/7/12

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR TASO (Technical Assistance and Services Office)
Main Street Centre
600 E. Main St., Ste. 300
Richmond, VA 23219

Email Address: tsu@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7140 or (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Robby Dawson

Representing: Fire Services Board Code Committee

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: dawsonj@chesterfield.gov

Telephone Number: 804-717-6838

Proposal Information

Code(s) and Section(s): Modified 609.3.3.3; New 609.3.3.3.1

Proposed Change (including all relevant section numbers, if multiple sections):

Add new text as follows:

609.3.3.3 Records. Records for inspections shall state the individual and company performing the inspection, a description of the inspection and when the inspection took place. Records for cleanings shall state the individual and company performing the cleaning and when the cleaning took place. Such records shall be completed after each inspection or cleaning, and maintained on the premises for a minimum of three years and be copied to the *fire code official* upon request.

609.3.3.3.1 Tags. Where a commercial kitchen hood or duct system is cleaned, a tag containing the service provider name, address, telephone number and date of service shall be provided in a conspicuous location. Prior tags shall be covered or removed.

Exception: Where records required by Section 609.3.3.3 are maintained on the premises.

2012 Code change to Section 609.3.3.3.1 on hood inspection tag

AS _____ AM _____ Disapprove _____ Carry over _____

Supporting Statement (including intent, need, and cost impact of the proposal):

The new language requires a tag or similar posting of when the last cleaning was completed. This is presently being done by a number of cleaning contractors and has proven to be beneficial while conducting inspections in the field for determining cleaning effectiveness.

The proposed text clarifies necessary marking requirements to visually confirm serviceability of commercial kitchen hood and ducting systems. The text is consistent with the requirements set forth in ANSI/IKECA C-10, which is proposed for adoption by a separate code change.

This is a replication of ICC/IFC Code Change F93-13 that was recommended for approval at the Dallas CAH with a 14-0 committee vote, with the addition of an exception that allows the business owner to maintain other written reports or documentation on site as previously required. This would allow small businesses who maintain their records locally to continue with their present practice and require larger chain operators to have some form of documentation of the cleaning of the hood in order to show the inspector when the hood was cleaned. Many larger chain operators maintain records centrally and do not have these available at the business location.

Submittal Information

Date Submitted: 6/3/2013

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: DHCD Staff

Representing: _____

Proposal Information

Code(s) and Section(s): SFPC – IFC Section 703.1

Proposed Change (including all relevant section numbers, if multiple sections):

Change IFC Section 703.1 as shown:

~~703.1 Maintenance. The required fire-resistance rating of fire-resistance-rated construction (including walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems) shall be maintained. Such elements shall be visually inspected by the owner annually and properly repaired, restored or replaced when damaged, altered, breached or penetrated. Where concealed, such elements shall not be required to be visually inspected by the owner unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space. Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason shall be protected with approved methods capable of resisting the passage of smoke and fire. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of approved construction meeting the fire protection requirements for the assembly.~~

Supporting Statement (including intent, need, and cost impact of the proposal):

Because most all buildings, sprinklered or unsprinklered, have fire-resistant components and assemblies this new provision in the IFC would mean that all existing buildings shall be visually inspected. Both the SFPC and the USBC VMC already require owners to maintain their buildings. Do all buildings have to have annual inspections? Will owners know what is to be inspected? Will owners have to prepare and keep a report - where and for how long? What kind of enforcement will occur if an annual visual inspection is not done and the periodic SFPC or USBC VMC inspection finds damaged walls or ceilings? At the very least there should be more specifics identified so there is some uniformity in application and enforcement.

Submittal Information

Date Submitted: _____

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)
600 East Main Street
Suite 300
Richmond, VA 23219

Email Address: Vernon.hodge@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7150

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): SFPC Section 902.3 and 906.4

Proposed Change (including all relevant section numbers, if multiple sections):

Add new definition to Section 202 to read as follows:

Fire Extinguisher Service Technician. A person who is experienced and trained and has available the appropriate servicing manual(s), the proper type of tools, recharge materials, lubricants, and manufacturer's recommended replacement parts or parts specifically listed for use in fire extinguishers.

Add the following to the list of definitions in Section 902.1:

Fire Extinguisher Service Technician.

Delete Section 906.2.1 in its entirety without substitution.

~~**906.2.1 Certification of service personnel for portable fire extinguishers.** Service personnel providing or conducting maintenance on portable fire extinguishers shall possess a valid certificate issued by an approved governmental agency, or other approved organization for the type of work performed.~~

Change Sections 906.3 and 906.4 to read as follows and renumber subsequent sections.

906.3 Certification of portable fire extinguisher service personnel. Effective nine (9) months after the effective date of this edition of the SFPC, the maintenance, servicing, and recharging of portable fire extinguishers shall be performed by trained and certified personnel, or shall be performed by personnel under the direct on-site supervision of a trained and certified person.

906.3.1 Certification of service personnel. Certification as a Fire Extinguisher Service Technician shall be obtained from the SFMO. The SFMO shall process all applications for certification as a fire extinguisher service technician and issue a certificate to an applicant upon:

1. Providing proof of having completed any fire extinguisher manufacturer's fire extinguisher service equipment certification program, and
2. Providing proof that the applicant has:
 - a. An existing and valid certification or license to perform service on fire extinguishers issued by any other state or federal government entity or;

Code Change - F906.2.1, SFMO.docx

AS _____ AM _____ Disapprove _____ Carry over _____

b. Successfully completed the ICC/NAFED Fire Extinguisher Technician Certification program.

906.3.2 Fee for certification. The fee for obtaining or renewing a certificate as a fire extinguisher service technician from the SFMO shall be \$90 and shall accompany the application to obtain a certificate.

906.3.2.1 Fee for replacement certificate. A written request for a replacement certificate shall be accompanied the payment of an administrative fee in the amount of twenty dollars (\$20.00) made payable to the Treasurer of Virginia. Verbal requests shall not be accepted.

906.3.3 Expiration and renewal of a certification. A certificate as a fire extinguisher service technician shall be valid for three years from the date of issuance, but no earlier than January 1, 201x, unless renewed for another three year period. It will be the applicant's responsibility to provide a change of address notice to the SFMO and to renew a certificate in a timely manner. A renewed three year certificate will be issued to an applicant upon:

1. Providing proof to the SFMO the applicant is in possession of an existing and valid certification or license to perform service on fire extinguishers issued by any other state or federal government entity with an expiration date set at a minimum of two years beyond the date the application is received by the SFMO or;
2. Providing proof of continued maintenance of the ICC/NAFED Fire Extinguisher Technician Certification.

Failure to renew a certificate in a timely manner will be sufficient cause for the applicant to apply for a certificate in accordance with Section 906.3.1 in the same manner as for a new certificate.

906.3.4 Denial, suspension or revocation of a certificate. If issuance or renewal of a certificate is denied, or upon the filing of a complaint against the applicant or certificate holder for non-performance, or performance in violation of the SFPC and the referenced NFPA 10 standard, the State Fire Marshal may convene a 3-member panel to hear the particulars of the complaint or denial. The 3-member panel will be comprised of the following persons:

1. A Virginia Certified Fire Official excluding any person certified as a fire extinguisher service technician or is on the staff of the SFMO.
2. A Virginia certified Fire Extinguisher Service Technician who is not associated in any way with the person against whom a complaint is lodged and whose work or employer is geographically remote, as much as practically possible, from the person to whom a complaint is lodged.
3. A member of the general public who does not have a vested financial interest in the servicing of portable fire extinguishers.

Upon the State Fire Marshal convening such panel, the hearing is to commence within 60 calendar days of the filing of the complaint or denial. The 3-member panel is to hear the complaint and render a written recommendation to the State Fire Marshal for certificate issuance, no action, revocation, or suspension of a certificate for a period not to exceed 6 months.

Notwithstanding the discretionary decision and action to convene such panel, the State Fire Marshal reserves the authority to choose an action that may be contrary to the panel's recommendation. The written decision of the State Fire Marshal is to be delivered to the party within 14 days of the hearing's conclusion. If the certificate is denied, revoked or suspended by the SFMO, in accordance with SFPC Section 112.9 the party may file an appeal with the State Technical Review Board (TRB). The party's appeal to TRB must be filed within 14 calendar days of the receipt of the State Fire Marshal's written decision to deny, revoke, or suspend.

The denial, revocation or suspension of a license is independent of any criminal proceedings that may

be initiated by any state or local authority.

906.3.4.1 Replacement of revoked certificate. Any person whose certificate as a Fire Extinguisher Service Technician was revoked upon cause may apply for certification as a Fire Extinguisher Service Technician six months from the date of the revocation and upon compliance with Section 906.3.1. All elements of Section 906.3.1 are required to be obtained and dated after the date of revocation.

906.3.4.2 Return of suspended certificate. Any certificate that was suspended upon cause will be reinstated at the end of the suspension period without change to its expiration date.

906.4 Tags or Labels. In addition to the requirements of NFPA 10 as referenced in Section 906.2, tags or labels intended for recording maintenance or recharging shall bear the certificate number and signature of the certified fire extinguisher service technician who performed the service or who provided direct, on-site supervision of non-certified persons who performed the maintenance or recharging work.

Supporting Statement (including intent, need, and impact of the proposal):

The Virginia Statewide Fire Prevention Code (VSFPC) references the 2010 Edition of NFPA Standard #10 for the selection, installation and maintenance of portable fire extinguishers. As paraphrased in IFC Section 906.2.1, it requires all *“persons performing maintenance and recharging of extinguishers to be certified”* and that *“certification require that a person pass a test administered by an organization acceptable to the AHJ.”*

The standard expresses the minimum requirements that apply to the selection, installation, inspection, maintenance, and testing of portable fire extinguishers which are intended as a first line of defense to cope with fires of limited size. The selection and installation of extinguishers is independent of whether or not a building is protected by automatic sprinklers or any other built-in fire protection systems or equipment.

The National Association of Fire Equipment Distributors (NAFED) has had a long-standing certification program but has recently joined with the International Code Council (ICC) to produce a nationally recognized examination and certification program. The ICC/NAFED certification can be used as proof the individual has demonstrated the minimum knowledge and competency needed to be a “Certified Person” as defined in the reference standard.

The ICC/NAFED exam and certification is not redundant to a training and certification program that may be required by a particular manufacturer who supplies portable fire extinguisher parts. If a service technician wishes to service a particular brand of portable fire extinguisher, the manufacturer may still maintain and require their specific certification program as a condition of supplying brand parts. It must be clearly stated and understood, the ICC/NAFED exam and certification is **not brand specific** but tests the person’s knowledge of the controlling NFPA standard on the selection, placement, maintenance and testing of portable fire extinguishers regardless of the brand or manufacturer.

As an accommodation, an applicant may have a certification or license issued by another governmental entity to perform the work. Towards obtaining the SFMO certificate, this other governmental certification or license can be offered or used as an alternative to undergoing the ICC/NAFED examination process.

To date in Virginia, a company or individual does not have to demonstrate knowledge or competence in the regulating codes and standards in order to conduct a business for the servicing of portable fire extinguishers. Because of that, many owners of portable fire extinguishers and local fire officials have expressed concerns about the potential for fraudulent practices and, short of criminal charges, have little or no civil recourse for challenging the credentials, knowledge and competency of those suspected of fraudulent practices. Having a state program to certify service personnel as proposed will have a two-fold benefit. The first is to provide comfort and assurance to fire officials and owners of fire extinguishers that service personnel by demonstration do possess the necessary knowledge and competency for the servicing and maintenance of extinguishers and second, short of criminal proceedings, to provide an administrative enforcement

mechanism to resolve or intervene in alleged violations of the SFPC as they may relate to a service technician's competency and ability to perform the needed service.

This proposed change describes a basic process for service personnel to obtain or renew a certificate to perform extinguisher maintenance and recharging of portable fire extinguishers. **This certification would NOT be applicable to those who perform the routine monthly check or "inspection" as defined and outlined in NFPA 10.**

This change also provides an internal process available at the State Fire Marshal's discretion that's intended to be used as a means to assist or advise the State Fire Marshal in a determination to take no action, or to deny, revoke or suspend a person's certificate based on allegations that the servicing of fire extinguishers was not performed in compliance with the requirements as set forth in the VSFPC and its referenced standard. If the State Fire Marshal takes an adverse action against a certificate holder, whether that action is taken with or without the assistance of a convened panel, the individual against whom the action was taken retains the option of filing an appeal because, the proposed process would not supplant, subvert or avoid criminal proceedings, such as for fraudulent practices, the issuance of a notice of violation, a summons, or the duty, power or authority of the State Technical Review Board as established and provided for in §§ 36-108 through 36-117 of the Code of Virginia.

Submittal Information

Date Submitted: 6/3/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR TASO (Technical Assistance and Services Office)
The Jackson Center
501 N. 2nd Street
Richmond, VA 23219-1321

Email Address: taso@dhcd.virginia.gov
Fax Number: (804) 371-7092
Phone Numbers: (804) 371-7140 or (804) 371-7150



VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Robby Dawson

Representing: Fire Services Board Code Committee

Mailing Address: _____

Email Address: dawsonj@chesterfield.gov

Telephone Number: 804-717-6838

Proposal Information

Code(s) and Section(s): SFPC 5706.6.2.1 and 6111.2.1

Proposed Change (including all relevant section numbers, if multiple sections):

5706.6.2.1 Parking near residential, educational and institutional occupancies and other high-risk areas. Tank vehicles shall not be left unattended at any time on residential streets, or within 500 feet (152 m) of a ~~residential area, apartment or hotel complex, educational facility, hospital or care facility building~~ regularly occupied in whole or in part as a habitation for people, a place of religious worship, schoolhouse, railroad station, store or other structure where people are accustomed to assemble except when parked in accordance with Section 5706.6.2.3. Tank vehicles shall not be left unattended at any other place that would, in the opinion of the fire chief, pose an extreme life hazard.

6111.2.1 Near residential, educational and institutional occupancies and other high-risk areas. LP-gas tank vehicles shall not be left unattended at any time on residential streets or within 500 feet (152 m) of a ~~residential area, apartment or hotel complex, educational facility, hospital or care facility building~~ regularly occupied in whole or in part as a habitation for people, a place of religious worship, schoolhouse, railroad station, store or other structure where people are accustomed to assemble except when parked in accordance with Section 6111.2.2. Tank vehicles shall not be left unattended at any other place that would, in the opinion of the *fire code official*, pose an extreme life hazard.

Supporting Statement (including intent, need, and impact of the proposal):

This is a work in progress. Code change is being submitted to meet the July 1st deadline for submissions and to create an opportunity for further discussions.

Creates uniformity among regulations for hazardous materials separation. The new text is derived from the definition of "inhabited buildings" in chapter 2, which currently applies to explosive materials. The change eliminates the undefined term "residential areas", which has been a source of confusion particularly in the absence of local zoning regulations or designations.

Code Change - F5706.6.2.1, FSBCC.docx

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Jim Tidwell

Representing: Fire Equipment Manufacturers' Association

Mailing Address: 11712 Wind Creek Ct, Aledo, Tx 76008

Email Address: jimtidwell@tccfire.com

Telephone Number: 817.715.8881

Proposal Information

Code(s) and Section(s): VSFPC and USBC, Section 906.1 (both codes)

Proposed Change (including all relevant section numbers, if multiple sections):

Change Item 1 of Section 906.1 of the of the VSFPC and USBC to read:

1. In Group A, B, E, F, H, I, M, R-1, R-4, and S occupancies.

Exceptions:

~~1. In Group A, B and E occupancies equipped throughout with quick response sprinklers, portable fire extinguishers shall be required only in locations specified in Items 2 through 6.~~

2. In Group I-3 occupancies, portable fire extinguishers shall be permitted to be located at staff locations and the access to such extinguishers shall be permitted to be locked.

Supporting Statement (including intent, need, and cost impact of the proposal):

The International Code Council changed the exceptions in the 2012 IBC to read as follows:

906.1 Where required. Portable fire extinguishers shall be installed in the following locations.

1. In Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

Exception: In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each *dwelling unit* is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C.

Our proposal is to keep the ICC base language and keep Virginia's exclusion for R-2 occupancies and Virginia's Exception 2, which provides for the ability to lock extinguisher cabinets in Group I-3 occupancies. The effect of the change is to delete the exception for properties equipped with quick response sprinklers, conforming to the change made to the 2012 IFC and IBC. This proposal brings the Virginia code into closer conformance with the ICC codes. The reasons for eliminating the exception that reduces the number of fire extinguishers in certain occupancies with quick response sprinklers are as follows:

Fire sprinklers and portable fire extinguishers are intended to be effective on different types and sizes of fires. Portable fire extinguishers are to be used on incipient fires, while sprinklers don't activate until the fire has progressed well beyond the incipient phase. According to the NFPA

AS _____ AM _____ Disapprove _____ Carry over _____

report on the U. S. Experience with Sprinklers and Other Automatic Fire Extinguishing Equipment, (Dr. John Hall, NFPA, February, 2010), in reported fires in sprinklered buildings, most fires never grew large enough to activate the sprinkler system. Specifically, in **65 percent of reported fires in sprinklered buildings, reported fires were too small to activate operational equipment.**

This study only considered fires reported to the fire department, and only fires in sprinklered buildings. So, in these cases, the fire was substantial enough to call the fire department, and the fire was in a sprinklered building. There is only one good answer for this statistic – someone extinguished the fire before the sprinklers activated. So, in 65 percent of the fires in sprinklered buildings, someone is putting out the fire before the sprinklers can activate. Does it make sense, then, to remove fire extinguishers from sprinklered buildings?

In many buildings, sprinklers are necessary; they are the best automatic protection available in many cases. But it's always best to avoid having a fire, and if one does occur, to extinguish the fire as soon as possible. Most times, in occupied buildings, that's before the sprinklers activate. Again, there is only one conclusion that can be drawn from these data from NFPA – people are controlling fires before the sprinklers activate in 65 percent of the cases, and portable fire extinguishers are an important and cost effective piece of the fire protection scheme in any community.

In a survey report by the Consumer Product Safety Commission, it was reported that **more than 95 percent of residential fires are never reported to the fire department.** Based upon this report, there were 7,430,000 fires in residential occupancies, 7,176,000 of which went unreported to a fire department. According to the survey, **371,500 residential fires were extinguished using portable fire extinguishers in the U. S. during the year in question.**

The International Code Council voted overwhelmingly to delete the exception outlined in the first exception that was included in the Virginia Code. The reasons given for their action included:

- Recognition that fire extinguishers add to the overall level of safety in any building, including A, B, and E occupancies.
- Based on the number of jurisdictions that delete the exception, the code needs to change in order to be consistent with actual practice.
- There is no reasonable correlation between sprinklers and fire extinguishers that justified modification of the requirement for fire extinguishers
- One committee member stated that there was a “gross misunderstanding of what sprinklers do – that people look for fire extinguishers, and it's much better to do a little early than a whole lot later.
- People use fire extinguishers to keep small fires small

From a recent (2011) study by the Worcester Polytechnic Institute and the University of Eastern Kentucky:

“the data collected strongly suggests that the ordinary person can operate a fire extinguisher and utilize proper technique to effectively extinguish a fire. Overall, 98% of the 276 participants were able to discharge extinguishing agent onto a fire on their first trial; 100% of the participants were successful on their second trial.”

This clearly shows that people have the ability to use a portable fire extinguisher effectively without any training.

We all realize that if the fire is out of control and beyond the incipient stage, people should evacuate the building; however, when a fire is still in its earliest stages, there is no reason not to put it out instead of allowing it to grow to a point that it activates the sprinkler system. Logic,

reason, and recent studies clearly show that human nature is to attempt to extinguish a fire if possible. At one of the IFC code hearings on the subject, a former fire marshal testified: “when you see a bug, you don’t call Orkin – you step on it; when you see an incipient fire, you don’t flee the building – you put it out”.

Much has been said about the benefits of people simply leaving the building when a fire occurs. The question, however, isn’t whether most people will leave or not – every study available shows that, when faced with a small fire, most people will try to intervene in that fire and put it out. Why else would over 90 percent of the fires in this country go unreported (CPSC)? Why else would the majority of **reported** fires in sprinklered buildings never activate the sprinklers because they don’t grow large enough (Dr. John Hall, NFPA). It’s clear that human nature is to attempt to extinguish a fire if it’s in its incipient stage. Fire extinguishers are intended for that specific purpose. So, the question isn’t whether people should leave or not; rather, the question is whether you want people to use makeshift means to try to put the fire out, or do you want them to have available a tool that is designed, engineered, and manufactured for that specific purpose? Omitting the requirement for fire extinguishers in these occupancies is placing the building occupants at risk. It’s that simple.

The State of Texas Fire Marshal compiled statistics on reported fires in state owned buildings. Of the fires that occurred between fiscal 2008 and 2010, 40 percent were extinguished using portable fire extinguishers. This report is available on the State Fire Marshal website.

A survey conducted by the European Fire Equipment Union in 2000 identified that in 80 percent of the cases a portable fire extinguisher successfully extinguished the fire and in 75 percent of those cases, the fire service was not required to attend. (Ghosh, 2008)

From a New Zealand survey conducted over an eight month time frame, there were reports of 395 extinguishers used. The Fire Service interpreted the data collected, and determined that in 90 percent of the known incidents where fire extinguishers are used, the Fire Service is not called. **In approximately 83 percent of the cases, portable fire extinguishers are totally effective.**

The Cost of portable fire extinguishers is negligible when considering the benefits and when comparing them with other safety equipment. While many factors will determine the actual cost for a building, the life cycle cost of portable extinguishers is typically **less than four cents per square foot annually, or less than a third of a cent per foot per month.** Compared with other safety systems, it’s easy to see that portable extinguishers are probably the least costly option available. Because of insurance requirements, corporate policies, and federal regulations, many, if not most, businesses choose to install portable extinguishers. By adopting the 2012 IFC language, Virginia will be on a level playing field with the rest of the country, and will avoid the cost to tenants and owners of retrofitting existing buildings with portable fire extinguishers.

Submittal Information

Date Submitted: 7/1/2013

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): USBC Section 906

Proposed Change (including all relevant section numbers, if multiple sections):

Delete USBC Section 906 in its entirety without substitution.

Supporting Statement (including intent, need, and cost impact of the proposal):

The SFPC has already got the requirements in place and are duplicated in the USBC.

Portable fire extinguishers are not a system, per se, such as is a sprinkler system, an alarm system, standpipes or hood suppression systems. Portable fire extinguishers are an appliance that can be made available to building occupants, or to those involved in a hazardous operation or process where or when there's a risk of a fire starting. It is during a fire's incipient stage that a building occupant or operator can decide for themselves, after notification of the fire department, whether or not to employ any available portable fire extinguisher with the intent to extinguish or retard the fire's progress pending arrival of fire suppression forces.

Portable fire extinguishers are not construction. Their presence, or lack of presence, does not affect the manner of construction, or materials to be used in the erection, alteration, repair, or use of a building or structure. The presence or absence of portable fire extinguishers does not add or subtract from the credit a building is given when establishing height or area of a building, its group classification, or construction type.

Submittal Information

Date Submitted: 7/1/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Please submit the proposal to:

DHCD DBFR SBCO (State Building Codes Office)

Code Change - CB906.1, SFMO.docx

AS _____ AM _____ Disapprove _____ Carry over _____

VIRGINIA DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF BUILDING AND FIRE REGULATION

Code Change Form for the 2012 Code Change Cycle

Code Change Number: _____

Proponent Information

(Check one): Individual Government Entity Company

Name: Ed Altizer, State Fire Marshal

Representing: State Fire Marshal's Office

Mailing Address: 1005 Technology Park Drive, Glen Allen, VA 23059

Email Address: ed.altizer@vdfp.virginia.gov

Telephone Number: 804-371-0220

Proposal Information

Code(s) and Section(s): International Wildland-Urban Interface Code (IWUIC)

Proposed Change (including all relevant section numbers, if multiple sections):
Adoption of the ICC model IWUIC, 2012 edition in its entirety.

Supporting Statement (including intent, need, and impact of the proposal):
While areas west of the Mississippi River garner a lot of attention when wildland fires occur, it is on the east side of the Mississippi River that more fires occur consuming more acreage, damaging more homes, injuring more people, and has a higher total dollar loss than the west of the Mississippi River. This is according to recent periods as reported by the Virginia Department of Forestry (VDOF) which revealed that in 2008, by example, saw a 130 percent increase in acres burned across the state as the number of fires decreased 12.4 percent. The agency logged 1,322 fires that burned 25,704 acres. Records show 1,509 fires burned 11,200 acres during 2007. Sixteen homes were damaged in 2008 alone. Virginia saw the worst fire day in memory that year on Sunday, Feb. 10, 2008. High winds across the state whipped up 354 fires that burned more than 16,000 acres.
In January 2009 the VDOF had reported not less than 810 fires covering 6,847 acres with 32 structures damaged.
With the construction of housing to meet the demand of an increased population, with the movement of population to forested and rural areas, it's only prudent to use the IWUIC model code to mitigate the risk of a structure's exposure to wildland fires and the spread of fire from structures to wildland fuels itself.

Submittal Information

Date Submitted: 6/25/13 by GAD for SFMO

The proposal may be submitted by email as an attachment, by fax, by mail, or by hand delivery.

Code Change - FWUIC, SFMO.docx

AS _____ AM _____ Disapprove _____ Carry over _____

TAB 4



Laura Woody, P.E.
9208 Lyndonway Drive
Henrico, VA 23229

September 30, 2013

Mr. Anthony Clatterbuck, Chairman, Board of Housing and Community Development
Main Street Centre
600 E. Main Street
Richmond, VA 23219

RE: Support of Fire Protection Related Proposals in the 2012 USBC and SFPC

Dear Mr. Clatterbuck:

I am asking for your support of several fire protection related code changes to the 2012 USBC and SFPC.

As a licensed professional fire protection engineer, I understand how critical automatic sprinkler systems are to saving lives and protecting property. The old saying, "Fire Sprinklers Save Lives", cannot be over-emphasized.

Attendees at the recent meeting of the Central Virginia Chapter of the Society of Fire Protection Engineers also support the code changes. The mission of the Society of Fire Protection Engineers, an international organization, is to *advance the science and practice of fire protection engineering*. I am VP of the local chapter and am writing on behalf of our chapter members who reviewed and expressed support for the proposed changes at our September 23, 2013 meeting.

We support the following and urge you to do the same:

- **Change to USBC 903.2.3.** This reinstates the IBC threshold of sprinklering schools of 12,000 sq. ft., instead of the higher state mandate of 20,000 sq. ft. Fire sprinklers save lives and property. Our children and our schools are the most important investment we have in our communities.

- **Change to USBC Section 903.2.8** . This code change addresses the fallacy currently in the code that allows someone to not sprinker an R (Residential) Use group building by saying that the water supply is insufficient. If there is enough water for domestic use, there is enough water to support an NFPA 13-R residential sprinkler system. New technologies in recent years have advanced so that less water is needed for a residential sprinkler system. Most fire deaths occur in residential locations. Sprinklers save lives and property.
- **Changes to SFPC and USBC Section 202**. This code change drops the confusing wording of “main use” in the Nightclub definition, which currently allows some owners to intentionally misuse the definition of “main use” and avoid sprinklers in nightclubs. This code change also decreases to 100 the occupant load threshold where sprinklers are required. Fire death history for nightclubs is well known. We should never forget the tragedy of the Station Nightclub fire in Rhode Island several years ago which resulted in 100 deaths. We do not want to see this happen in Virginia. Studies have shown that if the Station Nightclub had been sprinklered, there would likely have been no loss of life.
- **Change to SFPE 5001.3**. This change will provide an alternative to comply with the NFPA 45 Standard, *Fire Protection for Laboratories Using Chemicals*, in the USBC Section 202, Section 307.1, and new section 428. NFPA 45 allows a more practical method of analysis than the current code method. NFPA allows greater use of upper floors by not limiting the number of laboratories, but by analyzing the amount of combustibles and flammable liquids. Adopting this code change will provide building officials the ability to use the nationally recognized NFPA standard, which is designed to allow the safe use of new high rise research labs as well as existing high rise labs built before the “control area” concept which is used in the current code.

Please join us in supporting these changes to improve fire protection and fire safety in Virginia.

Thank you.

Sincerely,

Laura Woody

Laura Woody, P.E.

Firestone, Janice (DHCD)

From: Dean, Glenn (VDFF)
Sent: Friday, September 27, 2013 1:12 PM
To: Rodgers, Emory (DHCD); Hodge, Vernon (DHCD)
Subject: FW: proposed SFPC changes

Mr. Palmer asked that I forward this. He received a message that it was not deliverable to the "TASO" address.

Glenn A. Dean, CFM
State Fire Marshal's Office
804-371-0220

From: Hamilton Palmer [<mailto:hpalmer@hgp.biz>]
Sent: Friday, September 27, 2013 12:59 PM
To: taso@dhcd.virginia.gov
Cc: Dean, Glenn (VDFF)
Subject: proposed SFPC changes

To DHCD DBFR TASO via email
Re: proposed code changes

I am a strong proponent of persons inspecting portable fire extinguishers being competent to do so. Many years ago, we hired a fire protection services firm to inspect our portable ABC fire extinguishers. The inspector observed the pressure of each and signed off as inspector. We paid him our \$5/extinguisher. I then called Kidde, the manufacturer and asked about training for inspectors for their extinguishers. They indicated to me at the time that they had no such training. I asked about maintenance and they instructed me in the propellant and active contents and how to maintain same. They indicated that their ABC portable extinguishers should be inspected monthly and maintained annually by verification of proper pressure and that the propellant and solid ingredients were not caked and could move about freely by turning the extinguisher upside down and feeling the weight move from the top to the bottom. They also indicated that you should either re-charge the extinguisher every 6 to 8 years or get a new extinguisher.

What I would like to add to this proposed code change:

- 1. For local regulated/certified fire officials, fire chiefs, fire marshals, fire inspectors, when doing routine inspections, to educate those persons who were expected to operate the portable fire extinguisher in how to operate same in case of a fire and the simple instructions in how to inspect and maintain the FA in accordance with the manufactures instructions.***
- 2. To allow for building owners, business owners, and others required to inspect and maintain their portable fire extinguishers be exempt from being licensed.***

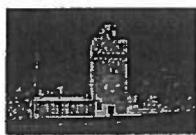
The question asked me by a local fire marshal was if I wanted to take responsibility for inspecting and maintaining my extinguishers. My answer was yes. Not everyone might want to do that but I think they should have the option.

I was a fireman on a crash crew in the USAF and was trained on re-charging portable fire extinguishers to include hydrostatic testing and recharging different types of extinguishers. Today this is much easier with these ABC extinguishers and it is generally not worth the time, trouble, and expense to recharge same – just purchase a new one every 6 or 8 years.

Please consider allowing owners the option to inspect and maintain extinguishers they are responsible for.

Thank you for your help,

Hamilton Palmer



Hamilton Palmer

HGP, Inc.
(540) 371-5171 Work:
(540) 903-2773
hpalmer@hgp.biz
Purina Tower, Suite ...
401 Charles Street
Fredericksburg, VA ...
<http://www.hgp.biz>



Environmental Health and Safety
675 Research Center Drive (0423)
Blacksburg, Virginia 24061
540/231-5985 Fax: 540/231-3944
E-mail: adamsz@vt.edu
www.ehss.vt.edu

September 17, 2013

Claude O. Hutton, P.E., MBA, CBO, CFO
Fire Marshal Manager
State Fire Marshal's Office - Western & S.W. Region
VA. Department of Fire Programs
945 H. North Main Street, Marion VA 24354

Dear Claude:

I am writing in support of the State Fire Marshall's Office's efforts to incorporate NFPA 45 into the VCC and SFPC as an alternative means of compliance with the requirements for the handling, storage and use of hazardous materials. As you are aware, many of our existing research buildings were built prior to the introduction of the control area concept; as such, it is very difficult to determine what quantities of chemicals are reasonable and prudent from a code perspective, and application of the current code requirements in these older buildings would significantly impact our research programs. NFPA 45 would provide a consistent framework by which Virginia Tech could manage chemicals used in research in many of these older buildings. Also, use of NFPA 45 in new construction would provide greater latitude by which research could be performed in multi story buildings by allowing chemicals to be managed by their density in lieu of strict quantity limits.

We appreciate the work you have done developing proposed code changes that would provide universities within the Commonwealth of Virginia a tool that would facilitate our compliance efforts.

Sincerely,

Zachary R. Adams, PE, CSP, CIH
Assistant Director

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
An equal opportunity, affirmative action institution

August 19, 2013

Ron Reynolds, MPA, MPH, CBO, CFO
Deputy, State Fire Marshal's Office
1005 Technology Park Drive
Glen Allen, VA 23059
Office 804-612-7268
Fax 804-371-3367

Re: NFPA 45 Code Change Proposals for Laboratories - 2012 Building and Fire Codes

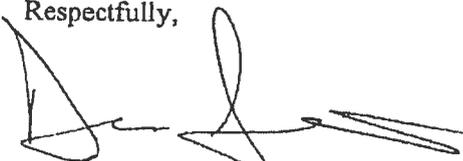
Mr. Reynolds,

The incorporation of NFPA 45 Standard on Fire Protection for Laboratories Using Chemicals as an alternative, or exception, to the VCC requirements for the handling, storage, and use of hazardous materials is strongly desired by George Mason University due to the age of our buildings and activities conducted therein. Many of our buildings were constructed prior to the development of the control area concept and are therefore not designed to incorporate multiple control areas, especially in buildings with three or more stories.

At George Mason University we conduct routine inspections of laboratories and enforce, to the extent possible, the storage of hazardous chemicals in accordance with the Virginia Statewide Fire Prevention Code. In rare cases laboratories may exceed MAQ due to the construction date of campus buildings and the institutions focus on research and laboratory instruction. University laboratories that do or have the potential to exceed MAQ are sprinklered and provided flammable storage cabinets. In our professional assessment the adoption of NFPA 45 will continue to maintain a high standard of safety that can mitigate fires to the same extent that the current code attempts to achieve while allowing flexibility for unique activities such as research and teaching in university settings.

We support the State Fire Marshalls Office's request to incorporate NFPA 45 into the VCC on the grounds that it will be mutually beneficially for all parties concerned and allow a regulated, safe, and practical alternative to the burden of the current regulatory requirement. If I can be of any further assistance with regard to this matter please feel free to contact me at your convenience.

Respectfully,



David Farris, MBA, CHMM
Director Emergency Management and Fire Safety

From: Dillman, Robert P [mailto:dillman@wm.edu]
Sent: Tuesday, August 06, 2013 3:55 PM
To: 'Mays, Delphine (daa3x)'; gdean@dhcd.state.va.us; Gall, Elaine (ebg5x); Gerald Drumheller (gerald@virginia.edu); hinson@vt.edu; Allen, Ralph (roa2s); Reynolds, Ron (VDFF)
Cc: Dillman, Robert P; Rudloff, David W
Subject: RE: NFPA 45 Code Change Proposal Meeting

I received a call from Gerald Drumheller about this issue. I support incorporating the portions of NFPA 45 into the Code that would give Fire Marshals, Building Officials and EH&S folks more latitude with respect to quantities of flammables and combustibles.

Bob Dillman

(William & Mary Building Official)

UVA Bullets Supporting NFPA 45

NFPA 45 provides a mechanism to control behavior and regulate chemicals in a manner that allows for quantities/density of chemicals needed for research methodology while maintaining a safe environment.

NFPA 45 looks at density of chemicals while allowing quantity levels needed in current (today's) research environment.

Several of our facilities were built prior to the development and implementation of the control area concept. The current fire code, if applied to existing facilities, would preclude and eliminate (shut down) research in many facilities that have always been utilized for research.

NFPA 45 was created specifically for laboratories by professionals. NFPA 45 was designed to achieve comprehensive laboratory fire prevention and protection to occupants and emergency personnel. NFPA 45 allows for the safe use of chemicals while not serving as an impediment to research.

University has a firm commitment to training and safe lab practices. Lab Safety Group coupled with the Fire Safety group performs inspections and lab visitations coupled with educational programs for lab personnel.

UVA has developed a "Sign Database" that tracks and indicates the type and amount of chemicals that are in the labs. Each lab has signage that indicates the classification of the lab, hazards, etc. This is a great tool for emergency response crews if they are called for an incident in a lab. UVA works closely with the Charlottesville Fire Department to insure they are educated to the fire risks in laboratories, coordinate emergency responses and guidelines, offer technical expertise during incidents, etc.

Gerald Drumheller

UVA Fire Marshal and Training Coordinator

University of Virginia

Office of Environmental Health & Safety

PO Box 400322

Charlottesville Va 22904-4322

Ph – 434.982.4914 Fax – 434-243-1735

E-mail: Gerald@virginia.edu

NFPA 45 CODE CHANGE PROPOSALS – USBC & VSFPC

Supporting Statements Overview

- NFPA is a nationally recognized laboratory safety standard.
- Adding NFPA 45 in the USBC gives laboratories a reliable alternative to secure the safety of laboratories in new construction allowing for greater use of upper level floors by not limiting the number of laboratories, but by limiting the amount of combustible and flammable liquids on a density and maximum quantity basis
- Adding NFPA 45 in the VSFPC gives laboratories a reliable means to secure the safety of laboratories in buildings built before the building codes addressed the “control area” concept.
- NFPA 45 allows for greater use of upper level floors by not limiting the number of laboratories, but by limiting the amount of combustible and flammable liquids on a per square footage basis.
- These proposals should result in lower costs to owners of research laboratories in new and in existing buildings. They would enable owners to more fully utilize their existing buildings, especially on the upper floors while limiting the hazard by limiting the density of the hazardous storage.
- NFPA 45 breaks down laboratories into four levels of “Fire Hazard Classes”: A, B, C, or D. At higher level floors, the fire separation requirements become greater if the Fire Hazard Class increases
- The concept allows the firefighter or inspector to quickly evaluate the level of hazard in each laboratory
- NFPA addresses laboratories which have a very controlled environment, staff trained and experienced in use and handling chemicals to a greater extent than the typical industrial environment.
- Hazards in laboratories are generally spread out physically and often are subdivided with work areas, partitions, or walls, not open like a typical industrial setting.
- FOR EXAMPLE:
 - A lab with an “A” Fire Hazard Classification could not be greater than 10,000 sq. ft., with a two hour separation on floors 1-3 only, and would not be allowed on higher floors. The maximum quantity of Class I liquids for use and storage would be 20 (twenty) gallons per 100 sq. ft.
 - A lab with a “D” classification could be any size, of any number, on any floor, and would not require any fire separation. The maximum gallons in use and storage of Class I liquids would be 2 (two) gallons per 100 sq. ft.

NFPA 45 CODE CHANGE PROPOSALS – USBC & VSFPC

Some Lab Unit Key Design Criteria

- **If I choose the alternative of NFPA 45 for my laboratory, what happens to Control Areas in USBC?** The “Control Area” concept in the USBC would not apply. A similar but yet different approach with the concept of “Laboratory Unit” is used by NFPA 45. The higher the density of flammable or combustible liquids per Lab Unit, the more fire separation rating is required and allowable number of stories is decreased. The requirements are summarized in Tables 5.1.1 and 10.1.1 (b) (*see next 2 pages*). *Pay special attention to the footnotes which modifies densities and quantities.*
- **How are Laboratory Unit Fire Hazard Class determined (i.e., Class A, B, C, or D?)** Once you determine your density (i.e., gal/100 sq ft) and your max quantity stored (i.e., gal) per Lab Unit of your flammable or combustible liquid “in use” and/or “in use and storage”, you can go to Table 10.1.1 (b) and determine the Laboratory Unit Fire Hazard (Class A, B, C, or D) based on the density and max quantity stored per Laboratory Unit.
 - Educational Lab Units ($\leq 12^{\text{th}}$ grade) & Instructional Lab Units ($>12^{\text{th}}$ grade & <graduate level) are defined in NFPA 45 and are “subsets” of Class C & D. You can have other Labs in Class C & D if the density falls in that range.
- **What are some ways that NFPA 45 uses to address the hazards?**
 - All new laboratories are required to be sprinklered
 - All laboratory units are required to be provided with fire protection appropriate to the fire hazard
 - Higher densities that are in the Lab Unit A or B range do not allow a Lab Unit over 10,000 square foot
 - As density increases, fire separation (hourly rating) increases from 0 to 1 to 2 hours
 - As density increases, permitted stories above grade is limited
 - As number of stories increases, density and max quantity allowed for the Lab Unit Hazard Class is decreased
- **Many design requirements/standards referenced by NFPA 45 are referenced & information extracted from them in IBC, IFC, and IMC. Ref Stds include:**
 - NFPA 13, Standard for the Installation of Sprinkler Systems, 2010 edition.
 - NFPA 30, Flammable and Combustible Liquids Code, 2008 edition.
 - NFPA 55, Compressed Gases and Cryogenic Fluids Code, 2010 edition.
 - NFPA 58, Liquefied Petroleum Gas Code, 2011 edition.
 - NFPA 69, Standard on Explosion Prevention Systems, 2008 edition.
 - NFPA 70[®], National Electrical Code[®], 2011 edition.
 - NFPA 72[®], National Fire Alarm and Signaling Code, 2010 edition.
 - NFPA 80, Standard for Fire Doors and Other Opening Protectives, 2010 edition.
 - NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems, 2009 edition.
 - NFPA 91, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids, 2010 edition.
 - NFPA 101[®], Life Safety Code[®], 2009 edition.
 - NFPA 495, Explosive Materials Code, 2010 edition.
 - NFPA 496, Standard for Purged and Pressurized Enclosures for Electrical Equipment, 2008 edition.
 - NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials, 2008 edition.
 - ANSI/AIHA Z9.5, Laboratory Ventilation, 2003.

NFPA 45 CODE CHANGE PROPOSALS – USBC & VSFPC

Table 5.1.1 Separation Requirements and Height Allowances for Laboratory Units

Laboratory Unit ^a	Area of Lab Unit	Fire Separation ^b	Permitted Stories Above Grade
A	≤929 m ² (≤10,000 ft ²)	2 hours	1-3 ^c
	>929 m ² (>10,000 ft ²)	Not permitted ^d	
B	≤929 m ² (≤10,000 ft ²)	1 hour	1-3 ^c
	≤929 m ² (≤10,000 ft ²)	2 hours	4-6 ^c
	>929 m ² (>10,000 ft ²)	Not permitted ^d	
C	Any size	Not required	1-3
	Any size	1 hour	4-6
	Any size	2 hours	Over 6
D	Any size	Not required	No limit

^aRefer to Table 10.1.1 for laboratory unit classification.

^bSeparation in this table refers to separation from laboratory unit(s) to non-laboratory areas and/or separations from laboratory unit(s) of equal or lower hazard classification.

^cNot allowed in structures below grade.

^dLabs of this classification and size are not permitted.

NFPA 45 CODE CHANGE PROPOSALS – USBC & VSFPC

Table 10.1.1(b) Maximum Quantities of Flammable and Combustible Liquids in Laboratory Units Outside of Inside Liquid Storage Areas (U.S. Customary Units)

Laboratory Unit Fire Hazard Class	Flammable and Combustible Liquid Class ^a	Quantities in Use ^a		Quantities in Use and Storage ^a	
		Maximum Quantity ^b per 100 ft ² of Laboratory Unit ^c	Maximum Quantity ^b per Laboratory Unit	Maximum Quantity ^b per 100 ft ² of Laboratory Unit ^c	Maximum Quantity ^b per Laboratory Unit
		gal	gal	gal	gal
A (high fire hazard)	I, II, and IIIA	10	480	20	480
		20	800	40	1600
B ^d (moderate fire hazard)	I, II, and IIIA	5	300	10	480
		10	400	20	800
C ^e (low fire hazard)	I, II, and IIIA	2	150	4	300
		4	200	8	400
D ^e (minimal fire hazard)	I, II, and IIIA	1	75	2	150
		1	75	2	150

Note: For maximum container sizes, see Table 10.1.2.

^aThe maximum amount in use in open systems is limited to 10 percent of the quantities listed.

^bSee 4.2.2 for additional requirements for educational and instructional laboratories.

^cThe quantities per 100 ft² do not imply the quantities must be within that 100 ft² area; the quantities per 100 ft² are for calculation purposes to determine the total quantity allowed per laboratory work area and the total amount overall in the laboratory unit.

^dReduce quantities by 50 percent for B laboratory units located above the 3rd floor.

^eReduce quantities by 25 percent for C and D laboratory units located on the 4th–6th floors of a building and reduce quantities by 50 percent for C and D laboratory units located above the 6th floor.

[F] 414.1.2.1 Aerosols. Level 2 and 3 aerosol products shall be stored and displayed in accordance with the *International Fire Code*. See Section 311.2 and the *International Fire Code* for occupancy group requirements.

[F] 414.1.3 Information required. A report shall be submitted to the *building official* identifying the maximum expected quantities of hazardous materials to be stored, used in a closed system and used in an *open system*, and subdivided to separately address hazardous material classification categories based on Tables 307.1(1) and 307.1(2). The methods of protection from such hazards, including but not limited to *control areas*, fire protection systems and Group H occupancies shall be indicated in the report and on the *construction documents*. The opinion and report shall be prepared by a qualified person, firm or corporation approved by the *building official* and provided without charge to the enforcing agency.

For buildings and structures with an occupancy in Group H, separate floor plans shall be submitted identifying the locations of anticipated contents and processes so as to reflect the nature of each occupied portion of every building and structure.

[F] 414.2 Control areas. *Control areas* shall comply with Sections 414.2.1 through 414.2.5 and the *International Fire Code*.

414.2.1 Construction requirements. *Control areas* shall be separated from each other by *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 712, or both.

[F] 414.2.2 Percentage of maximum allowable quantities. The percentage of maximum allowable quantities of hazardous materials per *control area* permitted at each floor level within a building shall be in accordance with Table 414.2.2.

[F] 414.2.3 Number. The maximum number of *control areas* within a building shall be in accordance with Table 414.2.2.

414.2.4 Fire-resistance-rating requirements. The required *fire-resistance rating* for *fire barriers* shall be in

accordance with Table 414.2.2. The floor assembly of the *control area* and the construction supporting the floor of the *control area* shall have a minimum 2-hour *fire-resistance rating*.

Exception: The floor assembly of the *control area* and the construction supporting the floor of the *control area* are allowed to be 1-hour fire-resistance rated in buildings of Types IIA, IIIA and VA construction, provided that both of the following conditions exist:

1. The building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1; and
2. The building is three *stories* or less above *grade plane*.

[F] 414.2.5 Hazardous material in Group M display and storage areas and in Group S storage areas. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials permitted within a single *control area* of a Group M display and storage area, a Group S storage area or an outdoor *control area* is permitted to exceed the maximum allowable quantities per *control area* specified in Tables 307.1(1) and 307.1(2) without classifying the building or use as a Group H occupancy, provided that the materials are displayed and stored in accordance with the *International Fire Code* and quantities do not exceed the maximum allowable specified in Table 414.2.5(1).

In Group M occupancy wholesale and retail sales uses, indoor storage of flammable and combustible liquids shall not exceed the maximum allowable quantities per *control area* as indicated in Table 414.2.5(2), provided that the materials are displayed and stored in accordance with the *International Fire Code*.

The maximum quantity of aerosol products in Group M occupancy retail display areas, storage areas adjacent to retail display areas and retail storage areas shall be in accordance with the *International Fire Code*.

[F] TABLE 414.2.2
DESIGN AND NUMBER OF CONTROL AREAS

FLOOR LEVEL		PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA ^a	NUMBER OF CONTROL AREAS PER FLOOR	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOURS ^b
Above grade plane	Higher than 9	5	1	2
	7-9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	3	1
	1	100	4	1
Below grade plane	1	75	3	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed

^a Percentages shall be of the maximum allowable quantity per control area shown in Tables 307.1(1) and 307.1(2), with all increases allowed in the notes to those tables.

^b Fire barriers shall include walls and floors as necessary to provide separation from other portions of the building.

Plastic products
 Printing or publishing
 Recreational vehicles
 Refuse incineration
 Shoes
 Soaps and detergents
 Textiles
 Tobacco
 Trailers
 Upholstering
 Wood; distillation
 Woodworking (cabinet)

306.3 Factory Industrial F-2 Low-hazard Occupancy. Factory industrial uses that involve the fabrication or manufacturing of noncombustible materials which during finishing, packing or processing do not involve a significant fire hazard shall be classified as F-2 occupancies and shall include, but not be limited to, the following:

Beverages; up to and including 16-percent alcohol content
 Brick and masonry
 Ceramic products
 Foundries
 Glass products
 Gypsum
 Ice
 Metal products (fabrication and assembly)

**SECTION 307
 HIGH-HAZARD GROUP H**

[F] 307.1 High-hazard Group H. High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in *control areas* complying with Section 414, based on the maximum allowable quantity limits for control areas set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the *International Fire Code*. Hazardous materials stored, or used on top of roofs or canopies shall be classified as outdoor storage or use and shall comply with the *International Fire Code*.

Exceptions: The following shall not be classified as Group H, but shall be classified as the occupancy that they most nearly resemble.

1. Buildings and structures occupied for the application of flammable finishes, provided that such buildings or areas conform to the requirements of Section 416 and the *International Fire Code*.

2. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the *International Fire Code*.
3. Closed piping system containing flammable or combustible liquids or gases utilized for the operation of machinery or equipment.
4. Cleaning establishments that utilize combustible liquid solvents having a flash point of 140°F (60°C) or higher in closed systems employing equipment listed by an approved testing agency, provided that this occupancy is separated from all other areas of the building by 1-hour *fire barriers* constructed in accordance with Section 707 or 1-hour *horizontal assemblies* constructed in accordance with Section 712, or both.
5. Cleaning establishments that utilize a liquid solvent having a flash point at or above 200°F (93°C).
6. Liquor stores and distributors without bulk storage.
7. Refrigeration systems.
8. The storage or utilization of materials for agricultural purposes on the premises.
9. Stationary batteries utilized for facility emergency power, uninterrupted power supply or telecommunication facilities, provided that the batteries are provided with safety venting caps and ventilation is provided in accordance with the *International Mechanical Code*.
10. Corrosives shall not include personal or household products in their original packaging used in retail display or commonly used building materials.
11. Buildings and structures occupied for aerosol storage shall be classified as Group S-1, provided that such buildings conform to the requirements of the *International Fire Code*.
12. Display and storage of nonflammable solid and nonflammable or noncombustible liquid hazardous materials in quantities not exceeding the maximum allowable quantity per *control area* in Group M or S occupancies complying with Section 414.2.5.
13. The storage of black powder, smokeless propellant and small arms primers in Groups M, R-3 and R-5 and special industrial explosive devices in Groups B, F, M and S, provided such storage conforms to the quantity limits and requirements prescribed in the *International Fire Code*, as amended in Section 307.9.

USE AND OCCUPANCY CLASSIFICATION

[F] TABLE 307.1(1)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD^{a, l, m, n, p}

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^b			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b		
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)
Combustible liquid ^{c, i}	II III/A III/B	H-2 or H-3 H-2 or H-3 N/A	N/A	120 ^{d, e} 330 ^{d, e} 13,200 ^{f, r}	N/A	N/A	N/A	N/A	30 ^d 80 ^d 3,300 ^f	N/A	N/A
Combustible fiber	Loose Baled ^o	H-3	(100) (1,000)	N/A	N/A	N/A	(100) (1,000)	N/A	N/A	(20) (200)	N/A
Consumer fireworks (Class C, Common)	1.4G	H-3	125 ^{d, e, i}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cryogenics, flammable	N/A	H-2	N/A	45 ^d	N/A	N/A	N/A	45 ^d	10 ^d	N/A	N/A
Cryogenics, inert	N/A	N/A	N/A	N/A	NL	NL	N/A	N/A	N/A	N/A	N/A
Cryogenics, oxidizing	N/A	H-3	N/A	45 ^d	N/A	N/A	N/A	45 ^d	10 ^d	N/A	N/A
Explosives	Division 1.1	H-1	1 ^{c, e}	(1) ^{c, e}	N/A	N/A	0.25 ^f	(0.25) ^f	(0.25) ^f	N/A	(0.25) ^f
	Division 1.2	H-1	1 ^{c, e}	(1) ^{c, e}	N/A	N/A	0.25 ^f	(0.25) ^f	0.25 ^f	N/A	(0.25) ^f
	Division 1.3	H-1 or H-2	5 ^{c, e}	(5) ^{c, e}	N/A	N/A	1 ^f	(1) ^f	1 ^f	N/A	(1) ^f
	Division 1.4	H-3	50 ^{c, e}	(50) ^{c, e}	N/A	N/A	50 ^f	(50) ^f	N/A	N/A	N/A
	Division 1.4G	H-3	125 ^{d, e, i}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Division 1.5	H-1	1 ^{c, e}	(1) ^{c, e}	N/A	N/A	0.25 ^f	(0.25) ^f	0.25 ^f	(0.25) ^f	N/A
Division 1.6	H-1	1 ^{d, e, f}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flammable gas	Gaseous Liquefied	H-2	N/A	N/A	1,000 ^{d, e} N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flammable liquid ^f	1A 1B and 1C	H-2 or H-3	N/A	30 ^{d, e} 120 ^{d, e}	N/A	N/A	N/A	N/A	10 ^d 30 ^d	N/A	N/A
	N/A	H-2 or H-3	N/A	120 ^{d, e, h}	N/A	N/A	N/A	120 ^{d, h}	30 ^{d, h}	N/A	N/A
Flammable solid	N/A	H-3	125 ^{d, e}	N/A	N/A	N/A	125 ^d	N/A	N/A	25 ^d	N/A
Inert gas	Gaseous Liquefied	N/A	N/A	N/A	NL	NL	N/A	N/A	N/A	N/A	N/A
	UD	H-1	1 ^{c, e}	(1) ^{c, e}	N/A	N/A	0.25 ^f	(0.25) ^f	0.25 ^f	N/A	(0.25) ^f
	I	H-2	5 ^{d, e}	(5) ^{d, e}	N/A	N/A	1 ^d	(1) ^d	1 ^d	N/A	(1) ^d
	II	H-3	50 ^{d, e}	(50) ^{d, e}	N/A	N/A	50 ^d	(50) ^d	10 ^d	N/A	(10) ^d
	III	H-3	125 ^{d, e}	(125) ^{d, e}	N/A	N/A	125 ^d	(125) ^d	25 ^d	N/A	(25) ^d
Organic peroxide	IV	N/A	NL	NL	N/A	N/A	NL	NL	NL	N/A	NL
	V	N/A	NL	NL	N/A	N/A	NL	NL	NL	N/A	NL
	4	H-1	1 ^{c, e}	(1) ^{c, e}	N/A	N/A	0.25 ^f	(0.25) ^f	0.25 ^f	N/A	(0.25) ^f
	3 ^k	H-2 or H-3	10 ^{d, e}	(10) ^{d, e}	N/A	N/A	2 ^d	(2) ^d	2 ^d	N/A	(2) ^d
Oxidizer	2	H-3	250 ^{d, e}	(250) ^{d, e}	N/A	N/A	250 ^d	(250) ^d	50 ^d	N/A	(50) ^d
	1	N/A	4,000 ^{f, r}	(4,000) ^{f, r}	N/A	N/A	4,000 ^f	(4,000) ^f	1,000 ^f	N/A	(1,000) ^f

(continued)

F. TABLE 414.2.1.1. MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^a			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^c		
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)
Oxidizing gas	Gaseous	H-3	N/A	N/A	1,500 ^d	N/A	N/A	N/A	N/A	1,500 ^d	N/A
		Liquefied	N/A	(150) ^d	N/A	N/A	(150) ^d	N/A	N/A	N/A	N/A
Pyrophoric material	N/A	H-2	4 ^e	(4) ^e	50 ^e	1 ^e	(1) ^e	10 ^e	0	0	0
		H-1	1 ^e	(1) ^e	10 ^e	0.25 ^e	(0.25) ^e	2 ^e	0.25 ^e	10.25 ^e	
		H-1 or H-2	3 ^e	(3) ^e	50 ^e	1 ^e	(1) ^e	10 ^e	1 ^e	(1) ^e	
		2	(2) ^e	(50) ^e	50 ^e	50 ^e	(50) ^e	250 ^e	10 ^e	(10) ^e	
Unstable (reactive)	1	N/A	NL	NL	NL	NL	NL	NL	NL	NL	
		3	5 ^f	(5) ^f	N/A	5 ^f	(5) ^f	N/A	1 ^f	(1) ^f	
		2	50 ^f	(50) ^f	N/A	50 ^f	(50) ^f	N/A	10 ^f	(10) ^f	
Water reactive	1	N/A	NL	NL	N/A	NL	N/A	NL	NL	N/A	
		3	50 ^g	(50) ^g	N/A	50 ^g	(50) ^g	N/A	10 ^g	(10) ^g	

For SI: 1 cubic foot = 0.028 m³; 1 pound = 0.454 kg; 1 gallon = 3.785 L.

NL = Not Limited; N/A = Not Applicable; UD = Unclassified Detonable

a. For use of *control areas*, see Section 414.2.

b. The aggregate quantity in use and storage shall not exceed the quantity listed for storage

c. The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited providing the liquids are packaged in individual containers not exceeding 1.3 gallons. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, consumer or industrial products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied cumulatively.

e. Maximum allowable quantities shall be increased 100 percent when stored in *approved* storage cabinets, day boxes, gas cabinets or exhausted enclosures or in *listed* safety cans in accordance with Section 2703.9.10 of the *International Fire Code*. Where Note d also applies, the increase for both notes shall be applied cumulatively.

f. The permitted quantities shall not be limited in a building equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

g. Permitted only in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

h. Containing not more than the maximum allowable quantity per *control area* of Class IA, IB or IC flammable liquids.

i. The maximum allowable quantity shall not apply to fuel oil storage complying with Section 603.3.2 of the *International Fire Code*.

j. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

k. A maximum quantity of 200 pounds of solid or 20 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment. Storage containers and the manner of storage shall be approved.

l. Net weight of the pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks, including packaging, shall be used.

m. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 2703.1.2 of the *International Fire Code*.

n. For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.5.1, see Tables 414.2.5.1 and 414.2.5.2.

o. Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.

p. The following shall not be included in determining the maximum allowable quantities:

1. Liquid or gaseous fuel in fuel tanks on vehicles.

2. Liquid or gaseous fuel in fuel tanks on motorized equipment operated in accordance with this code.

3. Gaseous fuels in piping systems and fixed appliances regulated by the *International Fuel Gas Code*.

4. Liquid fuels in piping systems and fixed appliances regulated by the *International Mechanical Code*.

USE AND OCCUPANCY CLASSIFICATION

[F] TABLE 307.1(2)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIAL POSING A HEALTH HAZARD^{a, b, c, i}

MATERIAL	STORAGE ^d			USE-CLOSED SYSTEMS ^d			USE-OPEN SYSTEMS ^d	
	Solid pounds (cubic feet)	Liquid gallons (pounds) ^{a, f}	Gas (cubic feet at NTP) ^e	Solid pounds ^e	Liquid gallons (pounds) ^e	Gas (cubic feet at NTP) ^e	Solid pounds ^e	Liquid gallons (pounds) ^e
Corrosive	5,000	500	Gaseous 810 ^f Liquefied (150) ^h	5,000	500	Gaseous 810 ^f Liquefied (150) ^h	1,000	100
Highly toxic	10	(10) ^h	Gaseous 20 ^e Liquefied (4) ^{e, h}	10	(10) ⁱ	Gaseous 20 ^e Liquefied (4) ^{e, h}	3	(3) ⁱ
Toxic	500	(500) ^h	Gaseous 810 ^f Liquefied (150) ^{f, h}	500	(500) ⁱ	Gaseous 810 ^f Liquefied (150) ^{f, h}	125	(125)

For SI: 1 cubic foot = 0.028 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

- For use of control areas, see Section 414.2.
- In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, consumer or industrial products, and cosmetics, containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.
- For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.5, see Tables 414.2.5(1) and 414.2.5(2).
- The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
- Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note f also applies, the increase for both notes shall be applied cumulatively.
- Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the *International Fire Code*. Where Note e also applies, the increase for both notes shall be applied cumulatively.
- Allowed only when stored in approved exhausted gas cabinets or exhausted enclosures as specified in the *International Fire Code*.
- Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.
- For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 2703.1.2 of the *International Fire Code*.

307.1.1 Hazardous materials. Hazardous materials in any quantity shall conform to the requirements of this code, including Section 414, and the *International Fire Code*.

[F] **307.2 Definitions.** The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

AEROSOL. A product that is dispensed from an aerosol container by a propellant.

Aerosol products shall be classified by means of the calculation of their chemical heats of combustion and shall be designated Level 1, 2 or 3.

Level 1 aerosol products. Those with a total chemical heat of combustion that is less than or equal to 8,600 British thermal units per pound (Btu/lb) (20 kJ/g).

Level 2 aerosol products. Those with a total chemical heat of combustion that is greater than 8,600 Btu/lb (20 kJ/g), but less than or equal to 13,000 Btu/lb (30 kJ/g).

Level 3 aerosol products. Those with a total chemical heat of combustion that is greater than 13,000 Btu/lb (30 kJ/g).

AEROSOL CONTAINER. A metal can or a glass or plastic bottle designed to dispense an aerosol. Metal cans shall be limited to a maximum size of 33.8 fluid ounces (1000 ml). Glass or plastic bottles shall be limited to a maximum size of 4 fluid ounces (118 ml).

BALED COTTON. A natural seed fiber wrapped in and secured with industry accepted materials, usually consisting of burlap, woven polypropylene, polyethylene or cotton or sheet polyethylene, and secured with steel, synthetic or wire bands or

wire; also includes linters (lint removed from the cottonseed) and motes (residual materials from the ginning process).

BALED COTTON, DENSELY PACKED. Cotton made into banded bales with a packing density of at least 22 pounds per cubic foot (360 kg/m³), and dimensions complying with the following: a length of 55 inches (1397 ± 20 mm), a width of 21 inches (533.4 ± 20 mm) and a height of 27.6 to 35.4 inches (701 to 899 mm).

BARRICADE. A structure that consists of a combination of walls, floor and roof, which is designed to withstand the rapid release of energy in an explosion and which is fully confined, partially vented or fully vented; or other effective method of shielding from explosive materials by a natural or artificial barrier.

Artificial barricade. An artificial mound or revetment a minimum thickness of 3 feet (914 mm).

Natural barricade. Natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures that require protection cannot be seen from the magazine or building containing explosives when the trees are bare of leaves.

BOILING POINT. The temperature at which the vapor pressure of a liquid equals the atmospheric pressure of 14.7 pounds per square inch (psi) (101 kPa) gage or 760 mm of mercury. Where an accurate boiling point is unavailable for the material in question, or for mixtures which do not have a constant boiling point, for the purposes of this classification, the 20-percent evaporated point of a distillation performed in accordance with ASTM D 86 shall be used as the boiling point of the liquid.

2013 NATIONAL FIRE CODES

NFPA 45

Fire Protection for Laboratories Using Chemicals 2011 Edition

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NFPA® 45

Standard on

Fire Protection for Laboratories Using Chemicals

2011 Edition

This edition of NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*, was prepared by the Technical Committee on Laboratories Using Chemicals and acted on by NFPA at its June Association Technical Meeting held June 7–10, 2010, in Las Vegas, NV. It was issued by the Standards Council on August 5, 2010, with an effective date of August 25, 2010, and supersedes all previous editions.

This edition of NFPA 45 was approved as an American National Standard on August 25, 2010.

Origin and Development of NFPA 45

The first edition of NFPA 45 was developed by the Technical Committee on Chemistry Laboratories. It was tentatively adopted at the 1974 NFPA Annual Meeting and was officially adopted at the 1975 NFPA Fall Meeting. The committee wishes to acknowledge that NFPA 45 is due in large part to the leadership and efforts of the late Russell H. Scott, who served as chairman of the committee during the planning and drafting stages of the first edition of NFPA 45. After the document had been in use for two years, the technical committee began an exhaustive review of the text; amendments were adopted for the 1982, 1986, and 1991 editions.

The 1996 edition of NFPA 45 included clarification on the scope and application of the standard as it applied to various types of educational, industrial, and medical laboratory facilities. Clarification of objectives was made to ensure a fire is contained to the room of origin. The requirements for maximum quantities of flammable and combustible liquids, construction, and fire protection in laboratory units were separated into two tables, one for sprinklered laboratory units and the other for nonsprinklered laboratory units. In addition, the committee revised the fire hazard classifications to recognize that clinical laboratories were using this standard as directed by NFPA 99, *Standard for Health Care Facilities*, and to identify that NFPA 101®, *Life Safety Code*®, no longer addresses laboratory occupancies.

The 2000 edition of NFPA 45 included modified laboratory separation requirements, and nonsprinklered laboratories of Class A or B and Class C [over 929 m² (10,000 ft²)] were prohibited. Expanded requirements and advisory information for compressed and liquefied gases were added. Additional changes included modified laboratory ventilating systems and hood requirements. Average face velocity is used to determine the safe operating levels for hood exhaust systems. Changes were made to address the current industry trend in the utilization of VAV (Variable Air Volume) laboratory ventilation systems, which provide clear requirements for the containment of contaminants within the hood. The language was clarified regarding multiple or manifold exhaust ducts within buildings.

The 2004 edition of NFPA 45 included a new requirement that all new laboratories must be protected with automatic extinguishing systems. Pressurized liquid dispensing containers not previously recognized but indirectly prohibited because of quantity restrictions were defined, addressed, and regulated. Clarification of the scope was provided for labs containing the minimum quantity of either flammable and combustible liquids or gas that would qualify the lab for coverage under NFPA 45. Clarification was also made that the minimum quantity of gas does not include low-pressure utility gas in accordance with NFPA 54, *National Fuel Gas Code*. The 2004 edition included expanded advisory material on biological safety cabinets and recognition of listed Class II, Type B2 biological safety cabinets in lieu of chemical fume hoods under certain circumstances. All flammable and combustible liquids requirements were consolidated into one chapter. Requirements were incorporated to limit hazchem storage spill scenarios to less than 20 L (5 gal). Expanded requirements and advisory information were created for compressed and liquefied gases. Maximum quantity requirements were clarified for outside cylinder storage.

The 2011 edition of NFPA 45 includes major modifications to Chapters 4, 5, 9, 10, and 11 to modify the design, construction, and operational requirements for laboratories located in buildings over 1 story in height. Height restrictions were added for Class A and B laboratory units. The fire resistance rating of laboratory units, height restrictions, and quantities of hazardous materials were modified for laboratory units depending upon the height of the building containing the laboratories. Laboratories located in health care facilities previously covered by NFPA 99 were added to NFPA 45. Hazardous materials in storage or use in a laboratory work area that could present an explosion hazard were quantified. Requirements for the management of time-sensitive chemicals were clarified.

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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 documents for the prevention of loss of life and damage to property from fire and explosion in chemical laboratories.

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2011 Edition

NFPA 45
Standard on
Fire Protection for Laboratories Using
Chemicals
2011 Edition

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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.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (*) between the paragraphs that remain.

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 G. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. 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 G.

Chapter 1 Administration

1.1 Scope.

1.1.1 This standard shall apply to laboratory buildings, laboratory units, and laboratory work areas whether located above or below grade in which chemicals, as defined, are handled or stored.

1.1.2 This standard shall not apply to the following:

- (1)*Laboratories for which the following conditions apply:
 - (a) Laboratory units that contain less than or equal to 4 L (1 gal) of flammable or combustible liquid
 - (b) Laboratory units that contain less than 2.2 standard m³ (75 scf) of flammable gas, not including piped-in low-pressure utility gas installed in accordance with NFPA 54, *National Fuel Gas Code*
- (2)*Laboratories that are pilot plants
- (3) Laboratories that handle only chemicals with a hazard rating of 0 or 1, as defined by NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, for all of the following: health, flammability, and instability

- (4) Laboratories that are primarily manufacturing plants
- (5) Incidental testing facilities
- (6) Physical, electronic, instrument, laser, or similar laboratories that use chemicals only for incidental purposes, such as cleaning
- (7)*Hazards associated with radioactive materials, as covered by NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*
- (8) Laboratories that work only with explosive material, as covered by NFPA 495, *Explosive Materials Code*

1.1.3 This standard contains requirements, but not all-inclusive requirements, for handling and storage of chemicals where laboratory-scale operations are conducted and shall not cover the following:

- (1) The special fire protection required when handling explosive materials (See NFPA 495, *Explosive Materials Code*.)
- (2) The special fire protection required when handling radioactive materials

1.2 Purpose.

1.2.1 The purpose of this standard shall be to provide basic requirements for the protection of life and property through prevention and control of fires and explosions involving the use of chemicals in laboratory-scale operations.

1.2.2 This standard is designed to control hazards and protect personnel from the toxic, corrosive, or other harmful effects of chemicals to which personnel might be exposed as a result of fire or explosion.

1.2.3 The goal of this standard shall be to achieve a comprehensive laboratory fire prevention and protection program to prevent injury or death to occupants and emergency response personnel.

1.2.4 The objectives of this standard shall be as follows:

- (1) Limit injury to the occupants at the point of fire origin
- (2) Limit injury to emergency response personnel
- (3) Limit property loss to a maximum of a single laboratory unit

1.2.5 It is not the objective of this standard to address financial losses such as business interruption or property loss when the loss of a laboratory unit is unacceptable.

1.3* Application.

1.3.1 The provisions of this document shall be considered necessary to provide a reasonable level of protection from loss of life and property from fire and explosion. They reflect situations and the state of the art prevalent at the time the standard was issued.

1.3.2 When interface with existing NFPA or other consensus codes and standards occurs, reference shall be made to the appropriate source in the text.

1.3.3 Due to the special nature of laboratories using chemicals, this standard modifies and supplements existing codes and standards so as to apply more specifically to buildings or portions of buildings devoted to laboratory-scale operations.

1.3.4 Where a construction or protection requirement of a governmental agency having jurisdiction is more stringent than a requirement in this standard, the more stringent requirement shall apply.

1.4 **Retroactivity.** The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of

protection from the hazards addressed in this standard at the time the standard was issued.

1.4.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.4.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.4.3 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.5 **Equivalency.** Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.5.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

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 10, *Standard for Portable Fire Extinguishers*, 2010 edition.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2010 edition.

NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*, 2008 edition.

NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, 2009 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2010 edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 2010 edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2007 edition.

NFPA 17, *Standard for Dry Chemical Extinguishing Systems*, 2009 edition.

NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*, 2009 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2011 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2008 edition.

NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, 2011 edition.

NFPA 51, *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes*, 2007 edition.

NFPA 54, *National Fuel Gas Code*, 2009 edition.

NFPA 55, *Compressed Gases and Cryogenic Fluids Code*, 2010 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2011 edition.

NFPA 69, *Standard on Explosion Prevention Systems*, 2008 edition.

NFPA 70[®], *National Electrical Code*[®], 2011 edition.

NFPA 72[®], *National Fire Alarm and Signaling Code*, 2010 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, 2010 edition.

NFPA 86, *Standard for Ovens and Furnaces*, 2011 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 2009 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids*, 2010 edition.

NFPA 101[®], *Life Safety Code*[®], 2009 edition.

NFPA 495, *Explosive Materials Code*, 2010 edition.

NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment*, 2008 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 2007 edition.

NFPA 750, *Standard on Water Mist Fire Protection Systems*, 2010 edition.

NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*, 2008 edition.

NFPA 1962, *Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose*, 2008 edition.

NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, 2008 edition.

2.3 Other Publications.

2.3.1 **AIHA Publications.** American Industrial Hygiene Association, 2700 Prosperity Avenue, Suite 250, Fairfax, VA 22031-4319.

ANSI/AIHA Z9.5, *Laboratory Ventilation*, 2003.

2.3.2 **ANSI Publications.** American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

ANSI Z535.1, *Safety Color Code*, 2006.

ANSI Z535.2, *Environmental and Facility Safety Signs*, 2007.

ANSI Z535.3, *Criteria for Safety Symbols*, 2007.

ANSI Z535.4, *Product Safety Signs and Labels*, 2007.

2.3.3 **ASME Publications.** American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.

ASME Boiler and Pressure Vessel Code, Section VIII, 2007.

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

ASTM D 5, *Standard Test Method of Penetration of Bituminous Materials*, 2006.

ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, 2010.

2.3.5 **NSF Publications.** NSF International, P.O. Box 130140, 789 N. Dixboro Road, Ann Arbor, MI 48113-0140.

NSF/ANSI 49, *Class II (Laminar Flow) Biosafety Cabinetry*, 2007.

2.3.6 UL Publications. Underwriters Laboratories, Inc. 333 Pfingsten Road, Northbrook, IL 60062-2096.

ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, 2008.

UL 1275, *Standard for Flammable Liquid Cabinets*, 2005.

2.3.7 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 54, *National Fuel Gas Code*, 2009 edition.

NFPA 99, *Standard for Health Care Facilities*, 2005 edition.

NFPA 101[®], *Life Safety Code*[®], 2009 edition.

NFPA 5000[®], *Building Construction and Safety Code*[®], 2009 edition.

Chapter 3 Definitions

3.1 Definitions. 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* Approved. Acceptable to the authority having jurisdiction.

3.2.2* 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.

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.5 Shall. Indicates a mandatory requirement.

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

3.2.7 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 Apparatus. Furniture, chemical fume hoods, centrifuges, refrigerators, and commercial or made-on-site equipment used in a laboratory.

3.3.2 Auxiliary Air. Supply or supplemental air delivered near the outside face of a chemical fume hood to reduce room air consumption.

3.3.3 Baffle. An object placed in an appliance to change the direction of or to retard the flow of air, air-gas mixtures, or flue gases. [54, 2009]

3.3.4* Biological Safety Cabinet. A ventilated cabinet for personnel, product, and environmental protection having an open front with inward airflow for personnel protection, downward HEPA-filtered laminar airflow for product protection, and HEPA-filtered exhausted air for environmental protection.

3.3.5 Business Occupancy. See 3.3.45.1.

3.3.6 Bypass. An airflow-compensating opening that maintains a relatively constant volume exhaust through a chemical fume hood regardless of sash position, serving to limit the maximum face velocity as the sash is lowered.

3.3.7 Canopy Hood. A suspended ventilating device used only to exhaust heat, water vapor, odors, and other nonhazardous materials. This is not a chemical fume hood and generally is not effective for exhausting toxic or flammable materials.

3.3.8* Chemical. A substance with one or more of the following hazard ratings as defined in NFPA 704, *Standard System of the Identification of the Hazards of Materials for Emergency Response*: Health — 2, 3, or 4; Flammability — 2, 3, or 4; Instability — 2, 3, or 4. (See also Section B.2.)

3.3.9* Chemical Fume Hood. A ventilated enclosure designed to contain and exhaust fumes, gases, vapors, mists, and particulate matter generated within the hood interior.

3.3.10 Combustible Liquid. A liquid that has a closed-cup flash point at or above 37.8°C (100°F).

3.3.11 Compressed Gas Cylinder. Any portable pressure vessel of 45.4 kg (100 lb) water capacity or less designed to contain a gas or liquid that is authorized for use at gauge pressures over 276 kPa (40 psi) at 21°C (70°F) by the U.S. Department of Transportation (DOT) or Transport Canada (T.C.).

3.3.12* Cryogenic Fluid. Substance that exists only in the vapor phase above -73°C (-99°F) at one atmosphere pressure and that is handled, stored, and used in the liquid state at temperatures at or below -73°C (-99°F) while at any pressure.

3.3.13 Deflector Vane. An airfoil-shaped vane along the bottom of the hood face that directs incoming air across the work surface to the lower baffle opening. The opening between the work surface and the deflector vane is open even with the sash fully closed.

3.3.14 Educational Laboratory Unit. A laboratory unit that is used for educational purposes through the twelfth grade by six or more persons for four or more hours per day or more than 12 hours per week.

3.3.15 Educational Occupancy. See 3.3.45.2.

3.3.16 Exit Access Corridor. A corridor used as exit access that leads to an exit that is separated from other parts of the building by walls.

3.3.17 Explosive Material. Any explosive, blasting agent, emulsion explosive, water gel, or detonator.

3.3.18* Face (of hood). The hood opening or the plane of the inside surface of the sash.

3.3.19 Face Velocity. The rate of flow or velocity of air moving into the chemical fume hood entrance or face, as measured at the plane of the chemical fume hood face.

3.3.20 Fire Separation. A horizontal or vertical fire resistance-rated assembly of materials that have protected openings and are designed to restrict the spread of fire.

3.3.21 Flammable Gas. Any substance that exists in the gaseous state at normal atmospheric temperature and pressure and is capable of being ignited and burned when mixed with the proper proportions of air, oxygen, or other oxidizers. [99, 2005]

3.3.22 Flammable Liquid. A liquid that has a closed-cup flash point that is below 37.8°C (100°F) and a maximum vapor pressure of 2068 mm Hg (absolute pressure of 40 psi) at 37.8°C (100°F).

3.3.23* Flammable Solid. A solid, other than a blasting agent or explosive, that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or that can be ignited readily and when ignited, burns so vigorously and persistently as to create a serious hazard.

3.3.24 Flash Point. The minimum temperature at which a liquid or a solid emits vapor sufficient to form an ignitable mixture with air near the surface of the liquid or the solid.

3.3.25* Health Care Facilities. Buildings or portions of buildings in which medical, dental, psychiatric, nursing, obstetrical, or surgical care is provided. [99, 2005]

3.3.26 Health Care Occupancy. See 3.3.45.3.

3.3.27 Hood Interior. The volume enclosed by the side, back, and top enclosure panels, the work surface, the access opening (called the face), the sash or sashes, and the exhaust plenum, including the baffle system for airflow distribution.

3.3.28 Incidental Testing Facility. An area within a production facility set aside for the purpose of conducting in-process control tests that are related to the production process.

3.3.29 Industrial Occupancy. See 3.3.45.4.

3.3.30* Inside Liquid Storage Area. A room or building used for the storage of liquids in containers or portable tanks, separated from other types of occupancies.

3.3.31 Instructional Laboratory Unit. A laboratory unit used for education past the 12th grade and before post-college graduate-level instruction for the purposes of instruction of six or more persons for four or more hours per day or more than 12 hours per week. Experiments and tests conducted in instructional laboratory units are under the direct supervision of an instructor. Laboratory units used for graduate or post-graduate research are not to be considered instructional laboratory units.

3.3.32 Laboratory. A facility where the containers used for reactions, transfers, and other handling of chemicals are designed to be easily and safely manipulated by one person. A laboratory is a workplace where chemicals are used or synthesized on a nonproduction basis.

3.3.33 Laboratory Building. A structure consisting wholly or principally of one or more laboratory units.

3.3.34 Laboratory Equipment. See 3.3.1, Apparatus.

3.3.35 Laboratory Scale. Work with chemicals in which the containers used for reactions, transfers, and other handling of chemicals are designed to be easily and safely manipulated by one person.

3.3.36 Laboratory Unit. An enclosed space used for experiments or tests. A laboratory unit can include offices, lavatories, and other incidental contiguous rooms maintained for or used by laboratory personnel, and corridors within the unit. It can contain one or more separate laboratory work areas. It can be an entire building. A laboratory unit is classified as A, B, C, or D in accordance with Section 4.2. (See also Annex D.)

3.3.37 Laboratory Unit Separation. All walls, partitions, floors, and ceilings, including openings in them, that separate a laboratory unit from adjoining areas.

3.3.38* Laboratory Work Area. A room or space for testing, analysis, research, instruction, or similar activities that involve the use of chemicals.

3.3.39 Laminar Flow Cabinet. A ventilated, partially enclosed cabinet primarily intended to provide filtered airflow over the work surface by use of laminar airflow methods.

3.3.40 Lecture Bottle. A small compressed gas cylinder up to a size of approximately 5 cm × 33 cm (2 in. × 13 in.).

3.3.41 Liquefied Gas Cylinder. A compressed gas cylinder used for liquefied gas.

3.3.42 Liquid. A material that has a fluidity greater than that of 300 penetration asphalt when tested in accordance with ASTM D 5, *Standard Test Method of Penetration of Bituminous Materials*. Unless otherwise specified, the term *liquid* includes both flammable and combustible liquids.

3.3.43 Maximum Allowable Working Pressure. The maximum gauge pressure permissible at the top of completed equipment, a container, or a vessel in its operating position for a design temperature.

3.3.44 Non-Laboratory Area. Any space within a building not included in a laboratory unit. (See also 3.3.36.)

3.3.45 Occupancy.

3.3.45.1 Business Occupancy. An occupancy used for the transaction of business other than mercantile. [5000, 2009]

3.3.45.2* Educational Occupancy. An occupancy used for educational purposes through the 12th grade by six or more persons for 4 or more hours per day or more than 12 hours per week.

3.3.45.3 Health Care Occupancy. An occupancy used for purposes of medical or other treatment or care of four or more persons where such occupants are mostly incapable of self-preservation due to age, physical or mental disability, or because of security measures not under the occupants' control. [5000, 2009]

3.3.45.4* Industrial Occupancy. An occupancy in which products are manufactured or in which processing, assembling, mixing, packaging, finishing, decorating, or repair operations are conducted. [5000, 2009]

3.3.46 Open Plan Building. A building having rooms, spaces, and corridors delineated by tables, chairs, desks, bookcases, counters, low-height partitions, floor patterns, or any similar finishes or furnishings.

3.3.47 Organic Peroxide. Any organic compound having a double oxygen or peroxy (-O-O-) group in its chemical structure.

3.3.48* Oxidizer. Any material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials.

3.3.49 Pilot Plant. An experimental assembly of equipment for exploring process variables or for producing semicommercial quantities of materials.

3.3.50 Pressurized Liquid Dispensing Container (PLDC). DOT, United Nations- (UN-), or ASME-approved containers which are designed for the pressure dispensing of liquids at the specified maximum allowable working pressure of the container.

3.3.51 Pyrophoric Gas. A gas that will spontaneously ignite in air at or below a temperature of 54.4°C (130°F).

3.3.52 Qualified Person. A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems relating to a particular subject matter, work, or project.

3.3.53 Reactive Material. A material that, by itself, is readily capable of detonation, explosive decomposition, or explosive reaction at normal or elevated temperatures and pressures. (See B.2.5 for definitions of Instability 2, 3, or 4.)

3.3.54 Refrigerating Equipment. Any mechanically operated equipment used for storing materials below normal ambient temperature, including refrigerators, freezers, and similar equipment. (See I.2.2.2 and A.12.2.2.2.)

3.3.55 Safety Can. A listed container, of not more than 18.9 L (5 gal) capacity, having a spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure.

3.3.56 Sash. A movable panel or panels set in the hood entrance. (See C.5.1.)

3.3.57* Storage Cabinet. A cabinet for the storage of flammable and combustible liquids constructed in accordance with Section 9.5 of NFPA 30, *Flammable and Combustible Liquids Code*.

3.3.58 Street Floor. A story or floor level accessible from the street or from outside the building at ground level, with the floor level at the main entrance located not more than three risers above or below ground level, and arranged and utilized to qualify as the main floor. [101, 2009]

3.3.59* Unattended Laboratory Operation. A laboratory procedure or operation at which there is no person present who is knowledgeable regarding the operation and emergency shut-down procedures.

Chapter 4 Laboratory Unit Hazard Classification

4.1 General.

4.1.1 This chapter shall classify laboratory units based on the amount of flammable and combustible liquids in use within the unit.

4.1.2 This chapter also shall define the existence of an explosion hazard in a laboratory unit or in a laboratory work area.

4.1.3 This chapter shall further define limitations on instructional laboratory units.

4.2 Laboratory Unit Fire Hazard Classification.

4.2.1* Classifications.

4.2.1.1 Laboratory units shall be classified as Class A (high fire hazard), Class B (moderate fire hazard), Class C (low fire hazard), or Class D (minimal fire hazard), according to the quantities of flammable and combustible liquids specified in Table 10.1.1(a) and Table 10.1.1(b).

4.2.2 Additional Requirements for Educational and Instructional Laboratory Units.

4.2.2.1 Instructional laboratory units shall be classified as Class C or Class D laboratory units.

4.2.2.2 Educational laboratory units shall be classified as Class D or shall be limited to 50 percent of the flammable and combustible liquids quantity for Class C laboratory units presented in Table 10.1.1(a) and Table 10.1.1(b).

4.3 Laboratory Work Area and Laboratory Unit Explosion Hazard Classification.

4.3.1* A laboratory work area shall be considered to contain an explosion hazard if an explosion of quantities or concentrations of materials could result in serious or fatal injuries to personnel within that laboratory work area. Such quantities or concentrations include, but are not limited to, the following (see Annex C):

- (1) Storage of greater than 0.45 kg (1 lb) of materials with instability hazard rating of 4 (see B.2.5)
- (2) Use or formation of greater than 0.11 kg (0.25 lb) of materials with an instability hazard rating of 4 (see B.2.5)
- (3)* Presence of highly exothermic reactions in glass or open reaction vessels involving more than 10 g (0.35 oz) of materials such as polymerizations, oxidations, nitrations, peroxidations, hydrogenations, or organo-metallic reactions
- (4) Use or formation in glass or open reaction vessels involving more than 10 g (0.35 oz) of materials whose chemical structures indicate a potential hazard, but whose properties have not been established, such as salts of alkenes, triple bonds, epoxy radicals, nitro and nitroso compounds, and peroxides
- (5) Presence of high-pressure reactions (see Figure C.4.5)
- (6) Other explosion hazards as determined by a qualified person

4.3.2 A laboratory unit shall not be considered to contain an explosion hazard unless a laboratory work area within that unit contains an explosion hazard great enough to cause major property damage or serious injury outside that laboratory work area.

Chapter 5 Laboratory Unit Design and Construction

5.1 Laboratory Unit Enclosure.

5.1.1 The required construction of laboratory units shall be in accordance with Table 5.1.1.

5.1.2 The construction requirements shall be the minimum permitted and shall not exclude the use of construction of greater fire resistance.

Table 5.1.1 Separation Requirements and Height Allowances for Laboratory Units

Laboratory Unit ^a	Area of Lab Unit	Fire Separation ^b	Permitted Stories Above Grade
A	≤929 m ² (≤10,000 ft ²)	2 hours	1-3 ^c
	>929 m ² (>10,000 ft ²)	Not permitted ^d	
B	≤929 m ² (≤10,000 ft ²)	1 hour	1-3 ^c
	≤929 m ² (≤10,000 ft ²)	2 hours	4-6 ^c
	>929 m ² (>10,000 ft ²)	Not permitted ^d	
C	Any size	Not required	1-3
	Any size	1 hour	4-6
	Any size	2 hours	Over 6
D	Any size	Not required	No limit

^aRefer to Table 10.1.1 for laboratory unit classification.

^bSeparation in this table refers to separation from laboratory unit(s) to non-laboratory areas and/or separations from laboratory unit(s) of equal or lower hazard classification.

^cNot allowed in structures below grade.

^dLabs of this classification and size are not permitted.

5.1.3 Regardless of the construction and fire protection requirements for laboratory units that are specified in Table 5.1.1, laboratory units in educational occupancies shall be separated from non-laboratory areas by 1-hour construction.

5.1.4 Table 5.1.1 shall pertain to laboratory units protected by automatic sprinkler systems in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*. Where water will create a serious fire or personnel hazard, a suitable nonwater automatic extinguishing system shall be permitted to be an acceptable substitute for sprinklers.

5.1.5 Penetrations through fire-rated floor/ceiling, floor, and wall assemblies shall be protected in accordance with NFPA 101, *Life Safety Code*.

5.1.6 Floors shall be sealed to prevent liquid leakage to lower floors.

5.1.7 Floor openings, floor penetrations, and floor firestop systems shall be sealed or curbed to prevent liquid leakage to lower floors.

5.1.8 Door assemblies in required 1-hour-rated fire separations shall be ¾-hour rated. Door assemblies in required 2-hour-rated fire separations shall be 1½-hour rated.

5.1.9 Window assemblies shall be permitted in fire-rated wall assemblies having a required fire resistance rating of 1 hour or less.

5.1.9.1 Window assemblies shall be of an approved type and shall have a fire protection rating in accordance with NFPA 101, *Life Safety Code*.

5.1.9.2 Fire window assemblies shall be installed in accordance with NFPA 80, *Standard for Fire Doors and Other Opening Protectives*.

5.1.10* Openings in fire-rated floor/ceiling and wall assemblies for air-handling ductwork or air movement shall be protected in accordance with NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*.

5.2 Maximum Area of Laboratory Units. The maximum area of a laboratory unit shall be determined by the fire hazard classification and the construction of the laboratory unit, as shown in Table 5.1.1.

5.3 Requirements for Life Safety. Life safety features for laboratory buildings, laboratory units, and laboratory work areas shall comply with NFPA 101, *Life Safety Code*, unless otherwise modified by other provisions of this standard.

5.3.1 Class A, B, and C laboratory units shall be classified as industrial occupancies in accordance with NFPA 101, *Life Safety Code*.

5.3.2 Educational laboratory units shall be classified as educational occupancies in accordance with NFPA 101, *Life Safety Code*.

5.3.3 Instructional laboratory units and Class D laboratories shall be classified as business occupancies in accordance with NFPA 101, *Life Safety Code*.

5.3.4 Life safety requirements for instructional laboratory units for past the 12th grade, and for Class D laboratories located in facilities classified as business occupancies, shall be in accordance with the requirements for business occupancies of NFPA 101, *Life Safety Code*.

5.4 Means of Access to an Exit.

5.4.1* A second means of access to an exit shall be provided from a laboratory work area if any of the following situations exist:

- (1) A laboratory work area contains an explosion hazard located so that an incident would block escape from or access to the laboratory work area.
- (2) A laboratory work area within a Class A laboratory unit exceeds 46.5 m² (500 ft²).
- (3) A laboratory work area within a Class B, Class C, or Class D laboratory unit exceeds 93 m² (1000 ft²).
- (4) A hood in a laboratory work area is located adjacent to the primary means of exit access.
- (5) A compressed gas cylinder larger than lecture bottle size [approximately 5 cm × 33 cm (2 in. × 13 in.)] is located such that it could prevent safe egress in the event of accidental release of cylinder contents.
- (6) A cryogenic container is located such that it could prevent safe egress in the event of accidental release of container contents.

5.4.2 The required exit access doors of all laboratory work areas within Class A or Class B laboratory units shall swing in the direction of exit travel.

5.4.3* The required exit access doors of all laboratory work areas within Class C or Class D laboratory units shall be permitted to swing against the direction of exit travel or shall be permitted to be a horizontal sliding door complying with NFPA 101, *Life Safety Code*.

5.4.4 Emergency lighting facilities shall be provided for any laboratory work area requiring a second means of access to an exit, in accordance with 5.4.1.

5.4.5 Emergency lighting in laboratory work areas and exits shall be installed in accordance with Section 7.9, Emergency Lighting, of NFPA 101, *Life Safety Code*.

5.5* **Furniture, Casework, and Equipment.** Furniture, casework, and equipment in laboratory units shall be arranged so that means of access to an exit can be reached easily from any point.

5.6 **Electrical Installation.** All electrical installations, including wiring and appurtenances, apparatus, lighting, signal systems, alarm systems, remote control systems, or parts thereof, shall comply with NFPA 70, *National Electrical Code*.

5.6.1 Electrical receptacles, switches, and controls shall be located so as not to be subject to liquid spills.

5.6.2 Laboratory work areas, laboratory units, and chemical fume hood interiors shall be considered as unclassified electrically with respect to Article 500 of NFPA 70, *National Electrical Code*.

Exception: Under some conditions of hazard, it could be necessary to classify a laboratory work area, or a part thereof, as a hazardous location, for the purpose of designating the electrical installations. [See 10.5.5 (electric motors) and 12.2.2.2 (refrigerators).]

Chapter 6 Fire Protection

6.1 General.

6.1.1 All laboratory units shall be provided with fire protection appropriate to the fire hazard, as follows:

- (1) Portable fire extinguishers (see Section 6.4)
- (2) Fire alarm systems (see Section 6.5)
- (3) Evacuation and emergency plans (see 6.6.3)

6.1.2 In addition to the fire protection specified in 6.1.1, laboratory units under some conditions shall be provided with automatic extinguishing systems (see Section 6.2) and inside standpipe and hose systems (see Section 6.3).

6.2 Automatic Fire Extinguishing Systems.

6.2.1 Automatic Sprinkler Systems.

6.2.1.1 Automatic sprinkler system protection shall be required for all new laboratories in accordance with the following:

- (1) Automatic sprinkler system protection for Class A and Class B laboratories shall be in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, for ordinary hazard (Group 2) occupancies.
- (2) Automatic sprinkler system protection for Class C and Class D laboratories shall be in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, for ordinary hazard (Group 1) occupancies.

6.2.1.2 Fire sprinklers in laboratory units shall be the quick-response (QR) sprinkler type installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

6.2.1.3 Automatic sprinkler systems shall be regularly inspected, tested, and maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

6.2.2 **Other Automatic Extinguishing Systems.** Where required or used in place of automatic sprinkler systems, specific hazard extinguishing systems and nonwater automatic extinguishing systems shall be designed, installed, and maintained in accordance with the following standards, as applicable:

- (1) NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*
- (2) NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*
- (3) NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*
- (4) NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*
- (5) NFPA 17, *Standard for Dry Chemical Extinguishing Systems*
- (6) NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*
- (7) NFPA 69, *Standard on Explosion Prevention Systems*
- (8) NFPA 750, *Standard on Water Mist Fire Protection Systems*
- (9) NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*

6.2.3* **Discharge.** The discharge of an automatic fire-extinguishing system shall activate an audible fire alarm system on the premises.

6.3 Standpipe and Hose Systems.

6.3.1* In all laboratory buildings that are two or more stories above or below the grade level (level of exit discharge), standpipes shall be installed in accordance with NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*.

6.3.2 Standpipe systems shall be regularly inspected, tested, and maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

6.3.3 Hose lines shall be of an approved type and shall be tested and maintained in accordance with NFPA 1962, *Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose*.

6.4 Portable Fire Extinguishers.

6.4.1 Portable fire extinguishers shall be installed, located, and maintained in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*.

6.4.2 For purposes of sizing and placement of fire extinguishers for Class B fires (see Table 6.3.1.1 of NFPA 10, *Standard for Portable Fire Extinguishers*), Class A laboratory units shall be rated as extra (high) hazard, and Class B, Class C, and Class D laboratory units shall be rated as ordinary (moderate) hazard.

6.5 Fire Alarm Systems.

6.5.1 Fire alarm systems, where provided, shall be installed and maintained in accordance with NFPA 72, *National Fire Alarm and Signaling Code*.

6.5.2 Class A and Class B laboratory units shall have a manual fire alarm system installed and maintained in accordance with NFPA 72, *National Fire Alarm and Signaling Code*.

6.5.3 The fire alarm system, where provided, shall be designed so that all personnel endangered by the fire condition or a contingent condition shall be alerted.

6.5.4 The fire alarm system shall alert local emergency responders or the public fire department.

6.6 Fire Prevention.

6.6.1 Fire Prevention Procedures.

6.6.1.1 Fire prevention procedures shall be established.

6.6.1.2 Certain critical areas shall require special consideration, including, but not limited to, the following:

- (1) Handling and storage of chemicals, flammable and combustible liquids, and gases
- (2) Open flame and spark-producing equipment work permit system
- (3) Arrangements and use of portable electrical cords
- (4) Smoking area controls

6.6.2* **Maintenance Procedures.** Maintenance procedures shall be established.

6.6.3* **Emergency Plans.**

6.6.3.1 Plans for laboratory emergencies shall be developed, which shall include the following:

- (1) Alarm activation
- (2) Evacuation and building re-entry procedures
- (3) Shutdown procedures or applicable emergency operations for equipment, processes, ventilation devices, and enclosures
- (4) Fire-fighting operations
- (5)*Non-fire hazards
- (6) Information as required by the AHJ to allow the emergency responders to develop response tactics

6.6.3.2* Procedures for extinguishing clothing fires shall be established.

Chapter 7 Explosion Hazard Protection

7.1 General.

7.1.1 When a laboratory work area or a laboratory unit is considered to contain an explosion hazard, as defined in 4.3.1 and 4.3.2, appropriate protection shall be provided for the occupants of the laboratory work area, the laboratory unit, adjoining laboratory units, and non-laboratory areas. (See Annex C for further information.)

7.1.2 Protection shall be provided by one or more of the following:

- (1) Limiting amounts of flammable or reactive chemicals or chemicals with unknown characteristics used in or exposed by experiments
- (2) Special preventive or protective measures for the reactions, equipment, or materials themselves (e.g., high-speed fire detection with deluge sprinklers, explosion-resistant equipment or enclosures, explosion suppression, and explosion venting directed to a safe location)
- (3) Explosion-resistant walls or barricades around the laboratory work area containing the explosion hazard (see Section 7.2)
- (4) Remote control of equipment to minimize personnel exposure
- (5) Sufficient deflagration venting in outside walls to maintain the integrity of the walls separating the hazardous laboratory work area or laboratory unit from adjoining areas
- (6) Conducting experiments in a detached or isolated building, or outdoors

7.2 **Explosion-Resistant Construction.** When explosion-resistant construction is used, adequately designed explosion resistance shall be achieved by the use of one of the following methods:

- (1) Reinforced concrete walls
- (2) Reinforced and fully grouted concrete block walls
- (3) Steel walls

- (4) Steel plate walls with energy-absorbing linings
- (5) Barricades, such as those used for explosives operations, constructed of reinforced concrete, sand-filled/wood-sandwich walls, wood-lined steel plate, or earthen or rock berms
- (6) Specifically engineered construction assemblies

7.3 **Explosion Venting.** When explosion venting is used, it shall be designed as follows:

- (1) So that fragments will not strike other occupied buildings or emergency response staging areas
- (2) So that fragments will not strike critical equipment (e.g., production, storage, utility services, and fire protection)
- (3)*So that fragments will be intercepted by blast mats, energy-absorbing barrier walls, or earthen berms

7.4 **Unauthorized Access.** Properly posted doors, gates, fences, or other barriers shall be provided to prevent unauthorized access to the following:

- (1) Laboratory work areas containing an explosion hazard
- (2) Laboratory units containing an explosion hazard
- (3) The space between explosion vents and fragment barriers

7.5 **Inspection and Maintenance.**

7.5.1 Inspection of all protective construction devices and systems shall be conducted at least annually.

7.5.2 Required maintenance shall be done to assure integrity and operability.

7.5.3* Explosion shields and special explosion-containing hoods shall be inspected prior to each use for deterioration, especially transparent shields and sight panels in special explosion-containing hoods.

Chapter 8 Laboratory Ventilating Systems and Hood Requirements

8.1* General.

8.1.1 This chapter shall apply to laboratory exhaust systems, including chemical fume hoods, special local exhaust devices, and other systems for exhausting air from laboratory work areas in which flammable gases, vapors, or particulate matter are released.

8.1.2 This chapter shall apply to laboratory air supply systems and shall provide requirements for identification, inspection, and maintenance of laboratory ventilation systems and hoods.

8.2 Basic Requirements.

8.2.1* Laboratory ventilation systems shall be designed to ensure that fire hazards and risks are minimized.

8.2.2* Laboratory units and laboratory hoods in which chemicals are present shall be continuously ventilated under normal operating conditions.

8.2.3* Chemical fume hoods shall not be relied upon to provide explosion (blast) protection unless specifically designed to do so. (See also C.5.4 and C.5.5 for further information on explosion-resistant hoods and shields.)

8.2.4 Chemical fume hoods using perchloric acid shall be in accordance with Section 8.11.

8.2.5 Exhaust and supply systems shall be designed to prevent a pressure differential that would impede egress or ingress when either system fails or during a fire or emergency scenario. This design includes reduced operational modes or shutdown of either the supply or the exhaust ventilation system.

8.2.6 The release of chemical vapors into the laboratory shall be controlled by enclosure(s) or captured to prevent any flammable and/or combustible concentrations of vapors from reaching any source of ignition.

8.3 Supply Systems.

8.3.1 Laboratory ventilation systems shall be designed to ensure that chemical fumes, vapors, or gases originating from the laboratory shall not be recirculated.

8.3.2* The location and configuration of fresh air intakes shall be chosen so as to avoid drawing in chemicals or products of combustion coming either from the laboratory building itself or from other structures and devices.

8.3.3 The air pressure in the laboratory work areas shall be negative with respect to corridors and non-laboratory areas of the laboratory unit except in the following instances:

- (1) Where operations such as those requiring clean rooms preclude a negative pressure relative to surrounding areas, alternate means shall be provided to prevent escape of the atmosphere in the laboratory work area or unit to the surrounding spaces.
- (2) The desired static pressure level with respect to corridors and non-laboratory areas shall be permitted to undergo momentary variations as the ventilation system components respond to door openings, changes in chemical fume hood sash positions, and other activities that can for a short term affect the static pressure level and its negative relationship.
- (3) Laboratory work areas located within a designated electrically classified hazardous area with a positive air pressure system as described in NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment*, in accordance with Chapter 7, Pressurized Control Rooms shall be permitted to be positive with respect to adjacent corridors.

8.3.4* The location of air supply diffusion devices shall be chosen so as to avoid air currents that would adversely affect the performance of chemical fume hoods, exhaust systems, and fire detection or fire-extinguishing systems. (See Sections 6.2, and 6.5, and 8.9.1.)

8.4 Exhaust Air Discharge.

8.4.1* Air exhausted from chemical fume hoods and other special local exhaust systems shall not be recirculated. (See also 8.3.1.)

8.4.2* Energy Conservation Devices.

8.4.2.1 If energy conservation devices are used, they shall be designed in accordance with 8.3.1 and 8.3.2.

8.4.2.2 Devices that could result in recirculation of exhaust air or exhausted contaminants shall not be used unless designed in accordance with Section 4:10.1, "Nonlaboratory Air," and Section 4:10.2, "General Room Exhaust," of ANSI/AIHA Z9.5, *Laboratory Ventilation*.

8.4.3 Air exhausted from laboratory work areas shall not pass unducted through other areas.

8.4.4* Air from laboratory units and laboratory work areas in which chemicals are present shall be continuously discharged

through duct systems maintained at a negative pressure relative to the pressure of normally occupied areas of the building.

8.4.5 Positive pressure portions of the lab hood exhaust systems (e.g., fans, coils, flexible connections, and ductwork) located within the laboratory building shall be sealed airtight or located in a continuously mechanically ventilated room.

8.4.6 Chemical fume hood face velocities and exhaust volumes shall be sufficient to contain contaminants generated within the hood and exhaust them outside of the laboratory building.

8.4.7* The hood shall provide containment of the possible hazards and protection for personnel at all times when chemicals are present in the hood.

8.4.8 Special local exhaust systems, such as snorkels or "elephant trunks," shall have sufficient capture velocities to entrain the chemical being released.

8.4.9* Canopy hoods shall not be used in lieu of chemical fume hoods.

8.4.10 Only Class II, Type B2 biological safety cabinets listed by the National Sanitation Foundation as meeting NSF/ANSI 49, *Class II (Laminar Flow) Biosafety Cabinetry*, shall be permitted to be used in lieu of chemical fume hoods, as determined by a qualified person.

8.4.11 Laminar flow cabinets shall not be used in lieu of chemical fume hoods.

8.4.12* Air exhausted from chemical fume hoods and special exhaust systems shall be discharged above the roof at a location, height, and velocity sufficient to prevent re-entry of chemicals and to prevent exposures to personnel.

8.5 Duct Construction for Hoods and Local Exhaust Systems.

8.5.1* Ducts from chemical fume hoods and from local exhaust systems shall be constructed entirely of noncombustible materials except in the following cases:

- (1) Flexible ducts of combustible construction shall be permitted to be used for special local exhaust systems within a laboratory work area. (See 8.5.2.)
- (2) Combustible ducts shall be permitted to be used if enclosed in a shaft of noncombustible or limited-combustible construction where they pass through non-laboratory areas or through laboratory units other than the one they serve. (See 8.5.2.)
- (3) Combustible ducts shall be permitted to be used if all areas through which they pass are protected with an approved automatic fire-extinguishing system, as described in Chapter 6. (See 8.5.2.)

8.5.2 Combustible ducts or duct linings shall have a flame spread index of 25 or less when tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*. Test specimens shall be of the minimum thickness used in the construction of the duct or duct lining.

8.5.3 Linings and coatings containing such fill as fiberglass, mineral wool, foam, or other similar material that could accumulate chemical deposits shall not be permitted within laboratory exhaust systems.

8.5.4 Duct systems for perchloric acid hoods shall be constructed in accordance with Section 8.11.

8.5.5 Ducts shall be of adequate strength and rigidity to meet the conditions of service and installation requirements and shall be protected against mechanical damage.

8.5.6 Materials used for vibration isolation connectors shall comply with 8.5.2.

8.5.7 Flexible connectors containing pockets in which conveyed material can collect shall not be used in any concealed space or where strong oxidizing chemicals (e.g., perchloric acid) are used.

8.5.8 Controls and dampers, where required for balancing or control of the exhaust system, shall be of a type that, in the event of failure, will fail open to ensure continuous draft. (See 8.10.3 through 8.10.5.)

8.5.9 Hand holes, where installed for damper, sprinkler, or fusible link inspection or resetting and for residue clean-out purposes, shall be equipped with tight-fitting covers provided with substantial fasteners.

8.5.10 Manifolding of Chemical Fume Hood and Ducts.

8.5.10.1 Exhaust ducts from each laboratory unit shall be separately ducted to a point outside the building, to a mechanical room, or to a shaft. (See 5.1.5 and 8.10.3.)

8.5.10.2 Connection to a common chemical fume hood exhaust duct system shall be permitted to occur within a building only in any of the following locations:

- (1) Mechanical room protected in accordance with Table 5.1.1
- (2) Shaft protected in accordance with the chapter for protection of vertical openings of NFPA 101, *Life Safety Code*
- (3) A point outside the building

8.5.10.3 Exhaust ducts from chemical fume hoods and other exhaust systems within the same laboratory unit shall be permitted to be combined within that laboratory unit. (See 8.4.1.)

8.6 Duct Velocities. Duct velocities of laboratory exhaust systems shall be high enough to minimize the deposition of liquids or condensable solids in the exhaust systems during normal operations in the chemical fume hood.

8.7 Exhausters (Fans), Controls, Velocities, and Discharge.

8.7.1 Fans shall be selected to meet requirements for fire, explosion, and corrosion.

8.7.2 Fans conveying both corrosive and flammable or combustible materials shall be permitted to be lined with or constructed of corrosion-resistant materials having a flame spread index of 25 or less when tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*.

8.7.3 Fans shall be located and arranged so as to afford ready access for repairs, cleaning, inspection, and maintenance.

8.7.4* Where flammable gases, flammable vapors, or combustible dusts are passed through the fans, the rotating element shall be of nonferrous or spark-resistant construction; alternatively, the casing shall be constructed of or lined with such material.

8.7.4.1 Where there is the possibility of solid material passing through the fan that would produce a spark, both the rotating element and the casing shall be constructed of such material.

8.7.4.2 Nonferrous or spark-resistant materials shall have a flame spread index of 25 or less when tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*.

8.7.5 Motors and their controls shall be located outside the location where flammable or combustible vapors or combustible dusts are generated or conveyed, unless specifically approved for that location and use.

8.7.6* Fans shall be marked with an arrow or other means to indicate direction of rotation and with the location of chemical fume hoods and exhaust systems served.

8.8 Chemical Fume Hood Construction. (See also 8.2.2 and Section 8.11.)

8.8.1 Chemical Fume Hood Interiors.

8.8.1.1* Materials of construction used for the interiors of new chemical fume hoods or for the modification of the interiors of existing chemical fume hoods shall have a flame spread index of 25 or less when tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, unless the interior of the hood is provided with automatic fire protection in accordance with 8.10.2.

8.8.1.2* Baffles shall be constructed so that they are unable to be adjusted to materially restrict the volume of air exhausted through the chemical fume hood.

8.8.1.3* Chemical fume hoods shall be provided with a means of preventing overflow of a spill of 2 L (0.5 gal) of liquid.

8.8.2* Chemical Fume Hood Sash Glazing. The sash, if provided, shall be glazed with material that will provide protection to the operator against the hazards associated with the use of the hood. (See also Annex C.)

8.8.3* Chemical Fume Hood Sash Closure.

8.8.3.1 Chemical fume hood sashes shall be kept closed whenever possible.

8.8.3.2 When a fume hood is unattended, its sash shall remain fully closed.

8.8.4* Electrical Devices.

8.8.4.1 In installations where services and controls are within the hood, additional electrical disconnects shall be located within 15 m (50 ft) of the hood and shall be accessible and clearly marked.

8.8.4.2 If electrical receptacles are located external to the hood, no additional electrical disconnect shall be required. (See 5.6.1.)

8.8.5 Other Hood Services.

8.8.5.1 For new installations or modifications of existing installations, controls for chemical fume hood services (gas, air, water, etc.) shall be located external to the hood and within easy reach.

8.8.5.2 In existing installations where service controls are within the hood, additional shutoffs shall be located within 15 m (50 ft) of the hood and shall be accessible and clearly marked.

8.8.6 Auxiliary Air. For auxiliary air hoods, auxiliary air shall be introduced exterior to the hood face in such a manner that the airflow does not compromise the protection provided by the hood and so that an imbalance of auxiliary air to exhaust air will not pressurize the hood interior.

8.8.7 Measuring Device for Hood Airflow. A measuring device for hood airflow shall be provided on each chemical fume hood.

8.8.7.1 The measuring device for hood airflow shall be a permanently installed device.

8.8.7.2 The measuring device for hood airflow shall provide constant indication to the hood user of adequate or inadequate hood airflow.

8.9 Chemical Fume Hood Location.

8.9.1* Chemical fume hoods shall be located in areas of minimum air turbulence.

8.9.2 Chemical fume hoods shall not be located adjacent to a single means of access to an exit or to high-traffic areas.

8.9.3* Work stations not directly related to the chemical fume hood activity shall not be located directly in front of chemical fume hood openings.

8.10 Chemical Fume Hood Fire Protection.

8.10.1* Automatic fire protection systems shall not be required in chemical fume hoods or exhaust systems except in the following cases:

- (1) Existing hoods having interiors with a flame spread index greater than 25 in which flammable liquids are handled.
- (2) If a hazard assessment shows that an automatic extinguishing system is required for the chemical fume hood, then the applicable automatic fire protection system standard shall be followed.

8.10.2 Automatic fire protection systems, where provided, shall comply with the following standards, as applicable:

- (1) NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*
- (2) NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*
- (3) NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*
- (4) NFPA 13, *Standard for the Installation of Sprinkler Systems*
- (5) NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*
- (6) NFPA 17, *Standard for Dry Chemical Extinguishing Systems*
- (7) NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*
- (8) NFPA 69, *Standard on Explosion Prevention Systems*
- (9)*NFPA 750, *Standard on Water Mist Fire Protection Systems*
- (10) NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*

8.10.2.1 The fire extinguishing system shall be suitable to extinguish fires within the chemical fume hood under the anticipated conditions of use.

8.10.3 The design and installation of ducts from chemical fume hoods shall be in accordance with NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids*, except that specific requirements in NFPA 45 shall take precedence.

8.10.3.1* Automatic fire dampers shall not be used in chemical fume hood exhaust systems.

8.10.4 Fire detection and alarm systems shall not be interlocked to automatically shut down chemical fume hood exhaust fans.

8.10.5 Proper door operation for egress shall be maintained when the supply system shuts down and the lab exhaust system operates, creating a pressure differential.

8.10.6 Chemical fume hoods equipped with control systems that vary the hood exhaust airflow as the sash opening varies and/or in conjunction with whether the laboratory room is in use (occupied or unoccupied) shall be equipped with a user-accessible means to attain maximum exhaust hood airflow regardless of sash position when necessary or desirable to ensure containment and removal of a potential hazard within the hood.

8.10.7* Chemical fume hoods shall be installed in a manner that prevents fire or smoke from a fire in the chemical fume hood from spreading into the voids above the ceiling.

8.11 Perchloric Acid Hoods.

8.11.1* Perchloric acid heated above ambient temperatures shall only be used in a chemical fume hood specifically designed for its use and identified as follows:

FOR PERCHLORIC ACID OPERATIONS

Exception: Hoods not specifically designed for use with perchloric acid shall be permitted to be used where the vapors are trapped and scrubbed before they are released into the hood. (See also 12.1.2.5.)

8.11.2 Perchloric acid hoods and exhaust ductwork shall be constructed of materials that are acid resistant, nonreactive, and impervious to perchloric acid.

8.11.3 The exhaust fan shall be acid resistant and spark resistant.

8.11.4 The exhaust fan motor shall not be located within the ductwork.

8.11.5 Drive belts shall be conductive and shall not be located within the ductwork.

8.11.6 Ductwork for perchloric acid hoods and exhaust systems shall take the shortest and straightest path to the outside of the building and shall not be manifolded with other exhaust systems.

8.11.6.1 Horizontal runs shall be as short as possible, with no sharp turns or bends.

8.11.6.2 The ductwork shall provide a positive drainage slope back into the hood.

8.11.6.3 Ductwork shall consist of sealed sections.

8.11.6.4 Flexible connectors shall not be used.

8.11.7 Sealants, gaskets, and lubricants used with perchloric acid hoods, ductwork, and exhaust systems shall be acid resistant and nonreactive with perchloric acid.

8.11.8* A water spray system shall be provided for washing down the hood interior behind the baffle and the entire exhaust system.

8.11.8.1 The hood work surface shall be watertight with a minimum depression of 13 mm (½ in.) at the front and sides.

8.11.8.2 An integral trough shall be provided at the rear of the hood to collect washdown water.

8.11.9 The hood baffle shall be removable for inspection and cleaning.

8.11.10* If a chemical fume hood or exhaust system was used for perchloric acid heated above ambient temperature, test

shall be conducted for explosive perchlorates before any inspection, cleaning, maintenance, or any other work is done on any part of the exhaust system or hood interior.

8.11.11 Prior to using a perchloric acid hood for any purpose, the hood shall be water-washed and shall be tested according to 8.11.9 to ensure residual perchlorates are not present.

8.12 Identification of Chemical Fume Hood Systems.

8.12.1* Special-use chemical fume hoods and special-use local exhaust systems shall be identified to indicate their intended use.

8.12.2 A sign containing the following information from the last inspection shall be affixed to each hood, or a properly maintained log of all hoods providing the following information shall be maintained:

- (1) Inspection interval
- (2) Last inspection date
- (3) Average face velocity
- (4) Location of fan that serves hood
- (5) Inspector's name

8.13 Inspection, Testing, and Maintenance.

8.13.1* When installed or modified and at least annually thereafter, chemical fume hoods, chemical fume hood exhaust systems, and laboratory special exhaust systems shall be inspected and tested as applicable, as follows:

- (1) Visual inspection of the physical condition of the hood interior, sash, and ductwork (*see 7.5.3*)
- (2) Measuring device for hood airflow
- (3) Low airflow and loss-of-airflow alarms at each alarm location
- (4) Face velocity
- (5) Verification of inward airflow over the entire hood face
- (6) Changes in work area conditions that might affect hood performance

8.13.2 Deficiencies in hood performance shall be corrected, or one of the following shall apply:

- (1) The activity within the hood shall be restricted to the capability of the hood.
- (2) The hood shall not be used.

8.13.3 Chemical fume hood face velocity profile or hood exhaust air quantity shall be checked after any adjustment to the ventilation system balance.

8.13.4 Detectors and Alarms.

8.13.4.1 Air system flow detectors, if installed, shall be inspected and tested annually.

8.13.4.2 Where potentially corrosive or obstructive conditions exist, the inspection and test frequency shall be increased.

8.13.5 Fans and Motors.

8.13.5.1* Air supply and exhaust fans, motors, and components shall be inspected at least annually.

8.13.5.2 Where airflow detectors are not provided or airflow-rate tests are not made, fan belts shall be inspected quarterly; double sheaves and belts shall be permitted to be inspected semi-annually.

8.13.5.3 Frayed or broken belts shall be replaced promptly.

8.13.6 Fixed fire-extinguishing systems protecting filters shall be inspected quarterly for accumulation of deposits on nozzles and cleaned as necessary.

Chapter 9 Chemical Storage, Handling, and Waste Disposal

9.1* Ordering Procedures.

9.1.1 When a chemical is ordered, steps shall be taken to determine its hazards and to transmit that information to those who will receive, store, use, or dispose of the chemical.

9.1.2 Restrictions imposed by governmental regulations and in-house rules shall be followed.

9.2 Handling and Storage.

9.2.1 Facilities.

9.2.1.1 Chemicals shall not be brought into a laboratory work area unless the design, construction, and fire protection of receiving and storage facilities are commensurate with the quantities and hazards of chemicals involved.

9.2.1.2 Safe storage facilities shall be provided for materials that have unique physical or hazardous properties, such as temperature sensitivity, water reactivity, or explosibility. (*See A.9.1 for sources of additional information.*)

9.2.1.3 Hazardous chemicals shall be stored and handled in such a manner as to limit a spill scenario to less than 20 L (5 gal).

9.2.2 Handling.

9.2.2.1* Receiving, transporting, unpacking, and dispensing of chemicals and other hazardous materials shall be carried out by trained personnel in such locations and in such a manner as to minimize hazards from flammable, reactive, or toxic materials.

9.2.2.2* Materials of construction for ducts, piping, and vessels shall be compatible with materials to be transferred or handled.

9.2.2.3 Before a chemical material is used, the user shall determine that information and facilities are available for safe disposal of hazardous materials and waste products.

9.2.2.4 Class I liquids shall not be transferred from one vessel to another in any exit access corridor.

9.2.2.5 Pressurized liquid dispensing containers containing chemicals shall be in accordance with Section 10.4.

9.2.2.6 Chemical quantities outside of storage shall be maintained at the lowest possible level necessary for the work performed.

9.2.2.7 Handling and storage of chemicals shall conform to the manufacturers' recommendations and material safety data sheet (MSDS).

9.2.3 Storage.

9.2.3.1* Chemical inventories in each laboratory unit shall be maintained within the maximum allowable quantities specified in the applicable fire prevention code or building code except as modified in Chapter 10 for buildings with more than three stories.

9.2.3.1.1 Maximum allowable quantities shall be reduced by 50 percent for Class B laboratory units located above the third floor.

9.2.3.1.2 Maximum allowable quantities shall be reduced by 25 percent for Class C and Class D laboratory units located on the fourth through sixth floors of a building.

9.2.3.1.3 Maximum allowable quantities shall be reduced by 50 percent for Class C and Class D laboratory units located above the sixth floor.

9.2.3.2* Incompatible materials shall be segregated to prevent accidental contact with one another.

9.2.3.3 Class I flammable liquids and Class II combustible liquids that are not in use inside of laboratory units shall be stored in safety cans; in approved storage cabinets constructed in accordance with NFPA 30, *Flammable and Combustible Liquids Code*, and ANSI/UL 1275, *Standard for Flammable Liquid Cabinets*; or in an inside liquid storage area.

9.2.3.4* Containers of materials that might become hazardous (i.e., time sensitive) during prolonged storage shall be dated when first opened, and properly managed.

9.2.3.4.1* Proper management shall consist of the following elements:

- (1) Defining those materials present that are time sensitive
- (2) Defining each time-sensitive material's inspection frequency
- (3) Defining proper or approved inspection methodologies to determine the relative hazard of the time-sensitive material
- (4) Defining pass/fail criteria for inspection results

9.2.3.4.2 Time-sensitive materials that pass inspection shall be permitted to be redated and retained for an additional defined inspection period.

9.2.3.4.3 All other material shall be safely discarded.

9.2.3.5* Storage cabinets used in laboratories shall not be required to be vented for fire protection purposes.

9.2.3.6 Laboratory storage facilities shall be inspected to ensure compliance with the provisions of Chapter 9.

9.2.3.7 Storage of chemicals in the fume hood shall be prohibited.

9.3 Waste Handling and Disposal.

9.3.1 Waste chemicals shall be handled and stored according to the requirements in Section 9.2.

9.3.2 Waste chemicals shall not be combined or mixed with other waste chemicals unless they have been evaluated for compatibility by a qualified person.

9.3.3 Chemical waste containers shall be labeled with the hazards of the waste chemicals.

9.3.4 Liquid waste containers stored in laboratory work areas shall not exceed 20 L (5 gal).

9.3.5 Waste quantities shall be subject to the maximum container sizes and type in accordance with Table 10.1.2.

9.3.6 Waste quantities shall be subject to the maximum allowable quantity for the laboratory unit.

Chapter 10 Flammable and Combustible Liquids

10.1 Quantity Limitations.

10.1.1 The density and total amount of flammable and combustible liquids in use in laboratory work areas and in the laboratory unit outside of flammable liquid storage rooms shall not exceed the quantities presented in Table 10.1.1(a) and Table 10.1.1(b) for the respective class of laboratory.

10.1.2* Container types and maximum capacities for flammable and combustible liquids shall comply with Table 10.1.2 except as follows:

- (1) Glass containers as large as 4 L (1 gal) shall be permitted to be used if all the following conditions are present:
 - (a) Excessive corrosion or degradation of a metal or an approved plastic container would result.
 - (b) The glass container size allowed in Table 10.1.2 is not available.
 - (c) The glass containers are required for purity purposes.
- (2) Containers of not more than 227 L (60 gal) capacity shall be permitted in a separate area inside the building if the inside area meets the requirements of NFPA 30, *Flammable and Combustible Liquids Code*.
- (3) In educational and instructional laboratory work areas, containers for Class I or Class II liquids shall not exceed the following capacity:
 - (a) Safety cans of 8 L (2.1 gal)
 - (b) Other containers of 4 L (1 gal)

10.2 Supply Piping. Supply piping for flammable and combustible liquid supply systems shall comply with NFPA 30, *Flammable and Combustible Liquids Code*.

10.3 Liquid Dispensing.

10.3.1* Dispensing of Class I liquids to or from containers less than or equal to 20 L (5 gal) in capacity shall be performed in one of the following locations:

- (1) In a chemical fume hood
- (2) In an area provided with ventilation adequate to prevent accumulations of flammable vapor/air mixtures from exceeding 25 percent of the lower flammable limit
- (3) Inside liquid storage areas specifically designed and protected for dispensing Class I flammable liquids that meet the requirements of NFPA 30, *Flammable and Combustible Liquids Code*

10.3.2* Except for pressurized liquid dispensing containers meeting the requirements of Section 10.4, dispensing of Class I liquids to or from containers greater than 20 L (5 gal) shall be performed in one of the following locations:

- (1) In a separate area outside the building
- (2) Inside liquid storage areas specifically designed and protected for dispensing Class I flammable liquids that meet the requirements of NFPA 30, *Flammable and Combustible Liquids Code*

10.3.3* Class I liquids shall not be transferred between conductive containers of greater than 4 L (1 gal) capacity unless the containers are electrically interconnected by direct bonding or by indirect bonding through a common grounding system.

10.3.4 When dispensing Class I liquids involves nonconductive containers larger than 4 L (1 gal), which can be difficult to bond or ground, special dispensing procedures commensu-

Table 10.1.1(a) Maximum Quantities of Flammable and Combustible Liquids in Laboratory Units Outside of Inside Liquid Storage Areas (Metric)

Laboratory Unit Fire Hazard Class	Flammable and Combustible Liquid Class ^a	Quantities in Use ^a		Quantities in Use and Storage ^a	
		Maximum Quantity ^b per 9.3 m ² of Laboratory Unit ^c	Maximum Quantity ^b per Laboratory Unit	Maximum Quantity ^b per 9.3 m ² of Laboratory Unit ^c	Maximum Quantity ^b per Laboratory Unit
		L	L	L	L
A (high fire hazard)	I I, II, and IIIA	38	1820	76	1820
		76	3028	150	6060
B ^d (moderate fire hazard)	I I, II, and IIIA	20	1136	38	1820
		38	1515	76	3028
C ^e (low fire hazard)	I I, II, and IIIA	7.5	570	15	1136
		15	757	30	1515
D ^e (minimal fire hazard)	I I, II, and IIIA	4	284	7.5	570
		4	284	7.5	570

Note: For maximum container sizes, see Table 10.1.2.

^aThe maximum amount in use in open systems is limited to 10 percent of the quantities listed.

^bSee 4.2.2 for additional requirements for educational and instructional laboratories.

^cThe quantities per 9.3 m² do not imply the quantities must be within that 9.3 m² area; the quantities per 9.3 m² are for calculation purposes to determine the total quantity allowed per laboratory work area and the total amount overall in the laboratory unit.

^dReduce quantities by 50 percent for B laboratory units located above the 3rd floor.

^eReduce quantities by 25 percent for C and D laboratory units located on the 4th-6th floors of a building and reduce quantities by 50 percent for C and D laboratory units located above the 6th floor.

rate with the electrical characteristics of the liquid shall be developed and implemented.

10.4 Pressurized Liquid Dispensing Containers (PLDC).

10.4.1 Pressurized liquid dispensing containers used for flammable and combustible liquids shall be listed or labeled for their intended use by a nationally recognized testing laboratory.

10.4.2 Nonmetallic containers larger than 4 L (1 gal) shall not be used.

10.4.3* Relief devices shall discharge to a safe location, in accordance with the manufacturer's recommendation.

10.4.4 The piping/hose between the container and the use point shall be rated for the pressure, compatible with the materials being transferred, and not subject to mechanical damage.

10.4.5 Prior to pressurizing the system, all fittings and connections shall be secure and leak free.

10.4.6* A readily accessible means to stop the flow of liquid from the container shall be provided.

10.4.7 Containers shall be pressurized only with nitrogen or inert gas; air shall not be used.

10.4.8 A means to prevent backflow into the gas supply system shall be provided.

10.5 Equipment.

10.5.1 Storage cabinets used for the storage of flammable and combustible liquids shall be constructed in accordance with NFPA 30, *Flammable and Combustible Liquids Code*.

10.5.2 Flammable liquids stored in refrigerated equipment shall be stored in closed containers. (See 12.2.2.)

10.5.3* Laboratory heating equipment such as ovens, furnaces, environmental chambers, and other heated enclosures shall not be used to heat, store, or test flammable or combustible liquids or aerosols containing flammable gases unless the equipment is designed or modified to prevent internal explosion.

10.5.4 Baths handling flammable liquids or combustible liquids heated to their flash points shall be placed in a chemical fume hood or shall be vented to a safe location to control vapors.

10.5.5 Electric motors shall be suitable for Class I, Division 2 locations when flammable and combustible liquids or flammable gas concentrations can produce hazardous concentrations of flammable mixtures.

Exception: Electric motors shall be exempt from this requirement if they are located in chemical fume hoods or provided with special local ventilation that will prevent flammable concentrations of gases or vapors from reaching the motor.

Table 10.1.1(b) Maximum Quantities of Flammable and Combustible Liquids in Laboratory Units Outside of Inside Liquid Storage Areas (U.S. Customary Units)

Laboratory Unit Fire Hazard Class	Flammable and Combustible Liquid Class ^a	Quantities in Use ^a		Quantities in Use and Storage ^a	
		Maximum Quantity ^b per 100 ft ² of Laboratory Unit ^c	Maximum Quantity ^b per Laboratory Unit	Maximum Quantity ^b per 100 ft ² of Laboratory Unit ^c	Maximum Quantity ^b per Laboratory Unit
		gal	gal	gal	gal
A (high fire hazard)	I	10	480	20	480
	I, II, and IIIA	20	800	40	1600
B ^d (moderate fire hazard)	I	5	300	10	480
	I, II, and IIIA	10	400	20	800
C ^e (low fire hazard)	I	2	150	4	300
	I, II, and IIIA	4	200	8	400
D ^e (minimal fire hazard)	I	1	75	2	150
	I, II, and IIIA	1	75	2	150

Note: For maximum container sizes, see Table 10.1.2.

^aThe maximum amount in use in open systems is limited to 10 percent of the quantities listed.

^bSee 4.2.2 for additional requirements for educational and instructional laboratories.

^cThe quantities per 100 ft² do not imply the quantities must be within that 100 ft² area; the quantities per 100 ft² are for calculation purposes to determine the total quantity allowed per laboratory work area and the total amount overall in the laboratory unit.

^dReduce quantities by 50 percent for B laboratory units located above the 3rd floor.

^eReduce quantities by 25 percent for C and D laboratory units located on the 4th–6th floors of a building and reduce quantities by 50 percent for C and D laboratory units located above the 6th floor.

Table 10.1.2 Maximum Allowable Container Capacity

Container Type	Flammable Liquids ^a			Combustible Liquids ^a	
	IA	IB	IC	II	IIIA
Glass	500 mL (1 pt) ^b	1 L (1 qt) ^b	4 L (1 gal)	4 L (1 gal)	20 L (5 gal)
Metal (other than DOT drums) or approved plastic	4 L (1 gal)	20 L (5 gal) ^c	20 L (5 gal) ^c	20 L (5 gal) ^c	20 L (5 gal)
Safety cans	10 L (2.6 gal) ^c	20 L (5 gal) ^c	20 L (5 gal) ^c	20 L (5 gal) ^c	20 L (5 gal)
Metal container (DOT specification)	4 L (1 gal)	20 L (5 gal) ^c	20 L (5 gal) ^c	227 L (60 gal) ^c	227 L (60 gal)
Polyethylene (DOT Specification 34, UN 1H1, or as authorized by DOT special permit)	4 L (1 gal)	20 L (5 gal) ^c	20 L (5 gal) ^c	227 L (60 gal) ^c	227 L (60 gal)
Pressurized liquid dispensing container	20 L (5 gal)	227 L (60 gal)	227 L (60 gal)	227 L (60 gal)	227 L (60 gal)

Note: This table is based on Table 6.2.3 of NFPA 30, *Flammable and Combustible Liquids Code*, except for allowable quantities of flammable liquids in metal (DOT specification) drums and pressurized liquid dispensing containers.

^aSee B.1 for definitions of the various classes of flammable and combustible liquids.

^bSee 10.1.2(1) and A.10.1.2.

^cSee 10.1.2(3).

Chapter 11 Compressed and Liquefied Gases

11.1 Compressed and Liquefied Gases in Cylinders.

11.1.1 Cylinders shall be handled only by trained personnel. (See Annex E and Annex F.)

11.1.2* Cylinders, except nominal 0.5 kg (1 lb) propane cylinders made for consumer use, that are not necessary for current laboratory requirements shall be stored outside the laboratory unit in accordance with NFPA 55, *Compressed Gases and Cryogenic Fluids Code*.

11.1.3* Any compressed gas cylinder or container used at gauge pressures over 103 kPa (15 psi) shall be fabricated to the specifications of or authorized for use by the U.S. DOT, T.C., or Section VIII of the ASME *Boiler and Pressure Vessel Code*.

11.1.3.1 The container shall be marked to show the authorization code and its working pressure at 21°C (70°F).

11.1.3.2 Vessels whose physical size, operating pressure, or both, are outside the scope of the referenced code(s) shall be constructed in accordance with the philosophy and guidance of the ASME *Boiler and Pressure Vessel Code* and shall not require marking.

11.1.4 Special Ventilation Requirements for Gas Cylinders.

11.1.4.1 This section shall not apply to gases that have a health rating of 3, as rated in NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, if they are rated as such by virtue of it being a cryogenic, with no other health hazards.

11.1.4.2 Lecture bottle-sized cylinders of the following gases located in laboratory units shall be kept in a continuously mechanically ventilated hood or other continuously mechanically ventilated enclosure:

- (1) All gases that have health hazard ratings of 3 or 4
- (2) All gases that have a health hazard rating of 2 without physiological warning properties
- (3) Pyrophoric gases

11.1.4.3 Cylinders of all gases that are greater than lecture bottle size and have health hazard ratings of 3 or 4 and cylinders of gases that have a health hazard rating of 2 without physiological warning properties that are located in laboratory units shall meet both the following conditions:

- (1) Storage in approved continuously mechanically ventilated gas cabinets
- (2) Compliance with NFPA 55, *Compressed Gases and Cryogenic Fluids Code*

11.1.4.4 Cylinders of pyrophoric gases that are greater than lecture bottle size that are located in laboratory units shall be kept in approved continuously mechanically ventilated, sprinklered gas cabinets.

11.1.5 Cylinder Safety.

11.1.5.1 Cylinders shall be secured from tipping over by holders designed for such service.

11.1.5.2 Cylinders in the laboratory shall be equipped with a pressure regulator designed for the specific gas and marked for its maximum cylinder pressure.

11.5.2.1 The regulator system shall be equipped with two gauges, either on the regulator or remote from the regulator,

installed so as to show both the cylinder pressure and the outlet pressure.

11.1.5.2.2 Where the source cylinder is outside of the laboratory, a station regulator and gauge shall be installed at the point of use to show outlet pressure.

11.1.5.3 Cylinders shall have a manual shutoff valve. A quick connect shall not be used in place of a shutoff valve.

11.1.6 Cylinders in Use.

11.1.6.1 Cylinders, when in use, shall be connected to gas delivery systems designed by a qualified person.

11.1.6.2 Cylinders shall be attached to an instrument for use by means of a regulator.

11.1.6.3 A compressed gas cylinder shall be considered to be "in use" if it is in compliance with one of the following:

- (1) Connected through a regulator to deliver gas to a laboratory operation
- (2) Connected to a manifold being used to deliver gas to a laboratory operation
- (3) A single cylinder secured alongside the cylinder described in 11.1.6.3(1) as the reserve cylinder for the cylinder described in 11.1.6.3(1)

11.1.6.4 Cylinders not "in use" shall not be stored in the laboratory unit.

11.1.6.5 The quantity of compressed and liquefied gases in Class A, Class B, and Class C laboratory units shall be in accordance with the amounts listed in Table 6.3.1 of NFPA 55, *Compressed Gases and Cryogenic Fluids Code*.

11.1.6.6 The number of lecture bottle cylinders in Class A, Class B, and Class C laboratory units shall be limited to 25.

11.1.6.7 The quantity of compressed and liquefied gases in Class D laboratory units shall be limited to 50 percent of the amounts listed in Table 6.3.1 of NFPA 55, *Compressed Gases and Cryogenic Fluids Code*.

11.1.6.8 In instructional laboratory work areas, the quantity of compressed and liquefied gases shall be limited to 10 percent of the amounts listed in Table 6.3.1 of NFPA 55, *Compressed Gases and Cryogenic Fluids Code*, or 10 lecture bottle-sized cylinders.

11.1.6.9 In educational laboratory work areas, the quantity of compressed and liquefied gases shall be limited as follows:

- (1) The maximum quantity of flammable gas shall not exceed 2.8 m³ (100 ft³).
- (2) The maximum quantity of oxidizing gas shall not exceed 2.8 m³ (100 ft³).
- (3) A maximum of two 0.5 kg (1 lb) liquefied flammable gas cylinders shall be permitted.
- (4) Health hazard 3 and 4 gases shall not be permitted

11.2 Storage and Piping Systems.

11.2.1* The method of storage and piping systems for compressed and liquefied gases shall comply with the applicable requirements of NFPA standards, including the following:

- (1) NFPA 51, *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes*
- (2) NFPA 54, *National Fuel Gas Code*
- (3) NFPA 55, *Compressed Gases and Cryogenic Fluids Code*
- (4) NFPA 58, *Liquefied Petroleum Gas Code*

11.2.2 Systems for other compressed gases and for cryogenic materials shall comply with the manufacturer's design and specifications.

11.2.3* Each point of use shall have an accessible manual shutoff valve.

11.2.3.1 The manual shutoff valve at the point of use shall be located away from the potential hazards and be located within 1.8 m (6 ft) of the point of use.

11.2.3.2 Where the cylinder valve is located within immediate reach, a separate point-of-use shutoff valve shall not be required.

11.2.3.3 Line regulators that have their source away from the point of use shall have a manual shutoff valve.

11.2.3.4 An emergency gas shutoff device in an accessible location at the exit shall be provided in addition to the manual point-of-use valve in each educational and instructional laboratory space that has a piped gas-dispensing valve.

11.2.4 Each and every portion of a piping system shall have uninterruptible pressure relief.

11.2.4.1 Any part of the system that can be isolated from the rest of the system shall have adequate pressure relief.

11.2.4.2 Piping shall be designed for a pressure greater than the maximum system pressure that can be developed under abnormal conditions.

11.2.4.3 A pressure relief system shall be designed to provide a discharge rate sufficient to avoid further pressure increase and shall vent to a safe location.

11.2.5* Permanent piping shall be identified at the supply point and at each discharge point with the name of the material being transported.

11.2.6* Piping systems, including regulators, shall not be used for gases other than those for which they are designed and identified unless a thorough review of the design specifications, materials of construction, and service compatibility is made and other appropriate modifications have been made.

11.3 Outdoor Installation of Compressed Gas Cylinders for Servicing Laboratory Work Areas (Located Outside of Laboratory Work Areas).

11.3.1 Compressed gas cylinders installed or stored outside of laboratory buildings shall be installed and operated in accordance with the requirements in NFPA 55, *Compressed Gases and Cryogenic Fluids Code*.

11.3.2 Compressed gas delivery systems shall be designed in accordance with NFPA 55, *Compressed Gases and Cryogenic Fluids Code*.

11.4 Cryogenic Fluids.

11.4.1 All system components used for cryogenic fluids shall be selected and designed for such service.

11.4.1.1 Design pressure for vessels and piping shall be not less than 150 percent of maximum pressure relief.

11.4.1.2* Systems or apparatus handling a cryogenic fluid that can cause freezing or liquefaction of the surrounding atmosphere shall be designed to prevent contact of the condensed air with organic materials.

11.4.1.3 Systems or apparatus handling liquid oxygen shall be designed to prevent contact of the oxygen with organic materials.

11.4.2 Pressure relief of vessels and piping handling cryogenic fluids shall comply with the applicable requirements Section 11.2.

11.4.3 The space in which cryogenic systems are located shall be ventilated commensurate with the properties of the specific cryogenic fluid in use.

Chapter 12 Laboratory Operations and Apparatus

12.1 Operations.

12.1.1* **Hazards of Chemicals and Chemical Reactions.** Experiments and tests conducted in educational and instructional laboratory units shall be under the direct supervision of an instructor.

12.1.1.1 Before laboratory tests or chemical reactions are begun, evaluations shall be made for hazards that can be encountered or generated during the course of the work.

12.1.1.2 Evaluations shall include the hazards associated with the properties and the reactivity of the materials used and any intermediate and end products that can be formed, hazards associated with the operation of the equipment at the operating conditions, and hazards associated with the proposed reactions — for example, oxidation and polymerization. (See also 12.1.1.4.)

12.1.1.3 Regular reviews of laboratory operations and procedures shall be conducted with special attention given to any change in materials, operations, or personnel.

12.1.1.4* Where reactions are being performed to synthesize materials, the hazard characteristics of which have not yet been determined by test, precautions shall be employed to control the highest possible hazard based on a known hazard of similar material.

12.1.1.5 Where use of a new material might present a severe explosion potential, initial experiments or tests shall be conducted in an enclosure that is designed to protect people and property from potential explosion damage. (See Chapter 7.)

12.1.1.6 Unattended or automatic laboratory operations involving hazardous chemicals shall be provided with regular surveillance for abnormal conditions. (See 12.1.2.4 and 12.2.4.1.)

12.1.2 Heating Operations.

12.1.2.1 All heating of flammable or combustible liquids shall be conducted so as to minimize fire hazards.

12.1.2.2 Provisions shall be made to contain liquid that might be accidentally released from glass apparatus containing more than 0.25 L (8.4 oz) of flammable liquid or combustible liquid heated to its flash point.

12.1.2.3 Supplementary fire-extinguishing equipment shall be provided, if necessary.

12.1.2.4 Unattended operations shall be provided with override control and automatic shutdown to prevent system failure that can result in fire or explosion.

12.1.2.5 Strong oxidizing materials, such as perchloric acid, shall not be heated by gas flames or oil baths.

12.1.3 Distillation Operations.

12.1.3.1 Distillations shall be conducted in equipment designed and fabricated for this use and shall be assembled with

consideration being given to fire hazards from vent gases and possible equipment breakage or failure.

12.1.3.2 Care shall be taken to avoid the presence of unstable components (e.g., peroxides) in the still pot and to avoid overheating still contents.

12.1.3.3 Glass equipment used for distillations shall be inspected for cracks, scratches, and other defects prior to each use.

12.1.3.4 Faulty glass equipment shall be discarded or repaired.

12.1.4* **Other Separation Operations.** Filtrations, extractions, sublimations, adsorptions, evaporations, centrifuging operations, and other separation techniques that involve flammable or combustible materials shall be protected from ignition sources and shall be provided with ventilation that prevents the accumulation of an ignitable concentration of vapors in the work area.

12.1.5 Mixing and Grinding Operations.

12.1.5.1 Mixing, grinding, stirring, and agitating operations involving flammable and combustible materials shall require the same precautions against fire as set forth in 12.1.4.

12.1.5.2 Precautions shall be taken to avoid local overheating during grinding and mixing of solids.

12.1.5.3 Care shall be taken to avoid fire or explosion hazards from flammable or combustible materials.

12.1.6 Other Operations.

12.1.6.1 Other laboratory operations, such as reactions at temperatures and pressures either above or below ambient conditions shall be conducted in a manner that minimizes hazards.

12.1.6.2 Shielding shall be used whenever there is a reasonable probability of explosion or vigorous chemical reaction and associated hazards during charging, sampling, venting, and discharge of products. (See Chapter 7 and 12.2.5.)

12.1.6.3 Glass apparatus containing gas or vapors under vacuum or above ambient pressure shall be shielded, wrapped with tape, or otherwise protected from shattering (such as engineering controls or by apparatus design) during use.

12.1.6.4 Quantities of reactants shall be limited and procedures shall be developed to control or isolate vigorous or exothermic reactions.

12.1.6.5 Flammable gases or vapors evolved during drying operations shall be condensed, trapped, or vented to avoid ignition.

12.1.6.6 Spraying of flammable or combustible paint and varnishes shall comply with the requirements of NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*.

12.2 Apparatus.

12.2.1 General.

12.2.1.1 Apparatus shall be installed in compliance with applicable requirements of NFPA standards, including NFPA 70, *National Electrical Code*.

12.2.1.2 Operating controls shall be accessible under normal and emergency conditions.

12.2.2 Refrigeration and Cooling Equipment.

12.2.2.1 Each refrigerator, freezer, or cooler shall be prominently marked to indicate whether it meets the requirements for storage of flammable liquids.

12.2.2.2* Refrigerators, freezers, and other cooling equipment used to store or cool flammable liquids shall be listed as special purpose units for use in laboratories or equipment listed for Class I, Division 1 locations, as described in Article 501 of NFPA 70, *National Electrical Code*.

12.2.2.2.1* Domestic refrigerators, freezers, and other cooling equipment shall be permitted to store or cool flammable liquids if modified as follows:

- (1) Any electrical equipment located within the outer shell, within the storage compartment, on the door, or on the door frame shall meet the requirements for Class I, Division 1 locations, as described in Article 501 of NFPA 70, *National Electrical Code*.
- (2) Electrical equipment mounted on the outside of the storage compartment shall be installed in one of the following ways:
 - (a) To meet the requirements for Class I, Division 2 locations
 - (b) To be located above the storage compartment
 - (c) To be located on the outside surface of the equipment where exposure to hazardous concentrations of vapors will be minimal

12.2.2.3 Refrigerators, freezers, and cooling equipment located in a laboratory work area designated as a Class I location, as specified in the Exception to 5.6.2, shall be approved for Class I, Division 1 or 2 locations and shall be installed in accordance with Article 501 of NFPA 70, *National Electrical Code*.

12.2.3 Heating Equipment.

12.2.3.1 All unattended electrical heating equipment shall be equipped with a manual reset over-temperature shutoff switch, in addition to normal temperature controls, if overheating could result in a fire or explosion.

12.2.3.2 Heating equipment with circulation fans or water cooling shall be equipped with an interlock arranged to disconnect current to the heating elements if the fan fails or the water supply is interrupted.

12.2.3.3 Burners, induction heaters, ovens, furnaces, and other heat-producing equipment shall be located a safe distance from areas where temperature-sensitive and flammable materials and compressed gases are handled.

12.2.3.4 Oven and furnace installations shall comply with NFPA 86, *Standard for Ovens and Furnaces*.

12.2.4 Heated Constant Temperature Baths.

12.2.4.1 Electrically heated constant temperature baths shall be equipped with over-temperature shutoff switches in addition to normal temperature controls, if overheating could result in a fire or an explosion.

12.2.4.2 Bath containers shall be of noncombustible materials.

12.2.5 Pressure Equipment.

12.2.5.1* Equipment used at pressures above 103 kPa gauge (15 psi) shall be designed and constructed by qualified individuals for use at the expected temperature, pressure, and other operating conditions affecting safety.

12.2.5.2 Pressure equipment shall be fitted with a pressure relief device, such as a rupture disc or a relief valve. The pressure relief device shall be vented to a safe location.

12.2.5.3 Equipment operated at pressures above 103 kPa gauge (15 psi), such as autoclaves, steam sterilizers, reactors, and calorimeters, shall be operated and maintained according to manufacturers' instructions, the design limitations of the equipment, and applicable codes and regulations.

12.2.5.3.1 Such equipment shall be inspected on a regular basis.

12.2.5.3.2 Any significant change in the condition of the equipment, such as corrosion, cracks, distortion, scale formation, or general chemical attack, or any weakening of the closure, or any inability of the equipment to maintain pressure, shall be documented and removed from service immediately and shall not be returned to service until approved by a qualified person.

12.2.5.4 Any pressure equipment that has been found to be degraded shall be derated or discarded, whichever is appropriate.

12.2.6 Analytical Instruments.

12.2.6.1 Analytical instruments, such as infrared, ultraviolet, atomic absorption, x-ray, mass spectrometers, chromatographs, and thermal analyzers, shall be installed in accordance with the manufacturers' instructions and applicable standards and codes.

12.2.6.2 Analytical instruments shall be operated in accordance with manufacturers' instructions or approved recommended operating procedures.

12.2.6.3 Hazards to personnel from high voltage, vapors or fumes, radiation, flames, flashbacks, and explosions shall be minimized.

Chapter 13 Hazard Identification

13.1 Identification of Entrances.

13.1.1* Entrances to laboratory units, laboratory work areas, storage areas, and associated facilities shall be identified by signs to warn emergency response personnel of unusual or severe hazards that are not directly related to the fire hazard of contents.

13.1.2 The hazards shall be communicated in the plans for fire fighting. (See 6.6.3.1.)

13.2* Exhaust Systems. Exhaust systems used for the removal of hazardous materials shall be identified to warn personnel of the possible hazards.

13.3 Labeling of Containers.

13.3.1 Content identification, including precautionary information, shall be provided directly on all original and subsequent containers of hazardous chemicals, except those being used in ongoing experiments.

13.3.2 Containers of materials that become hazardous during prolonged storage shall be dated when first opened, to facilitate hazard control. (See 9.2.3.4 and A.9.2.3.4.)

13.4 Identification Systems. Graphic systems used to identify hazards shall comply with ANSI Z535.1, *Safety Color Code*; ANSI Z535.2, *Environmental and Facility Safety Signs*; ANSI Z535.3, *Criteria for Safety Symbols*; and ANSI Z535.4, *Product Safety Signs and Labels*, or other approved graphic systems.

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.1.1.2(1) Either condition of 1.1.2(1) meeting the minimum quantity will bring the lab within the scope of NFPA 45. A school lab with a low pressure natural gas system supplying Bunsen burners (with less than the minimum quantities of combustible or flammable liquids and less than the minimum quantities of other flammable gases) is an example of a lab outside the scope of NFPA 45.

A.1.1.2(2) The hazards of pilot plants are primarily based on the process, the chemistry, and the equipment, not the laboratory environment.

A.1.1.2(7) NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*, provides direction for controlling hazards associated with radioactive materials. NFPA 801 should be used only for issues related to radioactive materials in a laboratory. All other nonradioactive, laboratory issues are covered by NFPA 45.

A.1.3 See Figure A.1.3 for determining the applicability of NFPA 45 to a lab setting. Existing laboratories using chemicals that are not in compliance with this standard should be permitted to be continued being used if they provide protection to life and adjoining property that is equivalent to that in this standard.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 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.3.2.4 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction

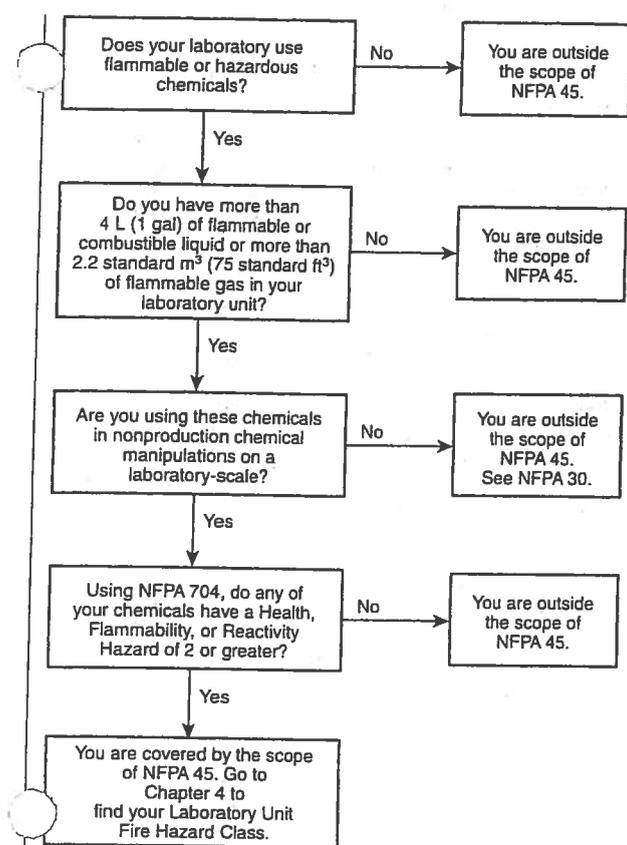


FIGURE A.1.3 Guide for Determining the Applicability of NFPA 45 to a Laboratory Setting.

tion should utilize the system employed by the listing organization to identify a listed product.

A.3.3.4 Biological Safety Cabinet. There are several types of biological safety cabinets.

Class II Type A1 cabinets (formerly designated Type A). Type A1 cabinets, which are not suitable for work with volatile toxic chemicals and volatile radionuclides, have the following characteristics:

- (1) Maintain minimum average inflow velocity of 0.38 m/sec (75 ft/min) through the work access opening
- (2) Have HEPA-filtered downflow air that is a portion of the mixed downflow and inflow air from a common plenum (i.e., a plenum from which a portion of the air is exhausted from the cabinet and the remainder supplied to the work area)
- (3) Can exhaust HEPA-filtered air back into the laboratory or to the environment through an exhaust canopy
- (4) Can have positive pressure contaminated ducts and plenums that are not surrounded by negative pressure plenums

Class II Type A2 cabinets (formerly designated Type B3). Type A2 cabinets used for work with minute quantities of volatile toxic chemicals and tracer amounts of radionuclides required as an adjunct to microbiological studies must be exhausted through

properly functioning exhaust canopies. Type A2 cabinets have the following characteristics:

- (1) Maintain a minimum average inflow velocity of 0.5 m/sec (100 ft/min) through the work access opening
- (2) Have HEPA-filtered downflow air that is a portion of the mixed downflow and inflow air from a common exhaust plenum
- (3) Can exhaust HEPA-filtered air back into the laboratory or to the environment through an exhaust canopy
- (4) Have all biologically contaminated ducts and plenums under negative pressure or surrounded by negative pressure ducts and plenums

Class II Type B1 cabinets. Type B1 cabinets can be used for work treated with minute quantities of volatile toxic chemicals and tracer amounts of radionuclides required as an adjunct to microbiological studies if work is done in the direct exhausted portion of the cabinet, or if the chemicals or radionuclides will not interfere with the work when recirculated in the downflow air. Type B1 cabinets have the following characteristics:

- (1) Maintain a minimum average inflow velocity of 0.5 m/sec (100 ft/min) through the work access opening
- (2) Have HEPA-filtered downflow air composed largely of uncontaminated recirculated inflow air
- (3) Exhaust most of the contaminated downflow air through a dedicated duct exhausted to the atmosphere after passing through a HEPA filter
- (4) Have all biologically contaminated ducts and plenums under negative pressure or surrounded by negative pressure ducts and plenums

Class II Type B2 cabinets (sometimes referred to as total exhaust). Type B2 cabinets can be used for work with volatile toxic chemicals and radionuclides required as an adjunct to microbiological studies. Type B2 cabinets have the following characteristics:

- (1) Maintain a minimum average inflow velocity of 0.5 m/sec (100 ft/min) through the work access opening
- (2) Have HEPA-filtered downflow air drawn from the laboratory or the outside air (i.e., downflow air is not recirculated from the cabinet exhaust air)
- (3) Exhaust all inflow and downflow air to the atmosphere after filtration through a HEPA filter without recirculation in the cabinet or return to the laboratory
- (4) Have all contaminated ducts and plenums under negative pressure, or surrounded by directly exhausted (nonrecirculated through the work area) negative pressure ducts and plenums

A.3.3.8 Chemical. For fire hazard ratings of many chemicals, see the NFPA's *Fire Protection Guide to Hazardous Materials*, which contains the following NFPA documents:

- (1) NFPA 49, *Hazardous Chemicals Data*
- (2) NFPA 325, *Guide to Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids*

A.3.3.9 Chemical Fume Hood. For further information on descriptions of types of chemical fume hoods and exhaust ventilation devices, see ANSI/AIHA Z9.5, *Laboratory Ventilation*. The following are types of chemical fume hoods:

- (1) *Conventional hood.* A square-post hood without an airfoil directional vane across the bottom of the hood face, and in most cases without provision for a bypass. As the sash is lowered in hoods without an air bypass, the face velocity increases rapidly. The square-post design and absence of a

deflector vane have been known to create turbulence at the hood face. The turbulence at the hood face can bring fumes from the hood interior out to the hood face, where they are easily drawn out into the room by the air turbulence caused by a person working at the hood, persons passing the hood, or minor room cross drafts. If hoods are not equipped with a bypass, face velocities could become objectionably high as the sash is closed, and with the sash completely closed, airflow can be insufficient to carry vapors away.

- (2) *Bypass air hood.* A hood having a bypass protected by a grille that serves to maintain a relatively constant volume of airflow regardless of sash position. Current design recommends a streamlined entry profile with a deflector vane across the bottom of the hood to direct the airflow across the work surface.
- (3) *Auxiliary air hood.* A bypass air hood with the addition of an auxiliary air bonnet to provide a direct source of makeup air in addition to the makeup air from the laboratory work area.
- (4) Special purpose hoods are as follows:
 - (a) *Radioisotope hoods.* Designed primarily for use with radiochemicals
 - (b) *Perchloric acid hoods.* Designed primarily for use with perchloric acid
 - (c) *Walk-in hoods.* Designed primarily for extra headroom to accommodate tall equipment

A.3.3.12 Cryogenic Fluid. See National Safety Council Data Sheet 1-688-86, *Cryogenic Fluids in the Laboratory*.

A.3.3.18 Face (of hood). This area is used to calculate the square footage of the hood opening, and face velocity is measured in this plane.

A.3.3.23 Flammable Solid. A chemical is considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

A.3.3.25 Health Care Facilities. Health care facilities include, but are not limited to, hospitals, nursing homes, limited care facilities, clinics, medical and dental offices, and ambulatory health care centers, whether permanent or movable. [99, 2005]

A.3.3.30 Inside Liquid Storage Area. Such areas include the following:

- (1) *Inside a room.* A room totally enclosed within a building and having no exterior walls
- (2) *Cut-off room.* A room within a building and having at least one exterior wall
- (3) *Attached building.* A building having only one common wall with another building having other types of occupancies
- (4) *Liquid warehouse.* A separate, detached building or attached building used for warehousing-type operations for liquids

A.3.3.38 Laboratory Work Area. This work area can be enclosed.

A.3.3.45.2 Educational Occupancy. Educational occupancies include academies, kindergartens, and schools. An educational occupancy is distinguished from an assembly occupancy in that the same occupants are regularly present.

A.3.3.45.4 Industrial Occupancy. See NFPA 101, *Life Safety Code*, Chapter 40, for more information.

A.3.3.48 Oxidizer. Examples of other oxidizing gases include bromine, chlorine, or fluorine.

A.3.3.57 Storage Cabinet. Some local jurisdictions require bottom-venting of flammable liquids storage cabinets. Although this is not required by NFPA 30, *Flammable and Combustible Liquids Code*, some manufacturers provide plugged vent connections to accommodate these local jurisdictions.

A.3.3.59 Unattended Laboratory Operation. Absence for lunch, telephone calls, and so forth, without coverage by a knowledgeable person, constitutes an unattended laboratory operation.

A.4.2.1 The largest amounts of flammable and combustible liquids are permitted in Class A laboratory units, and the least amounts in Class D laboratory units.

A.4.3.1 For explosion hazard protection requirements, see Chapter 7.

A.4.3.1(3) For sources of data on chemical reactivity hazard and hazardous chemical reactions, see the NFPA's *Fire Protection Guide to Hazardous Materials*, which contains the following NFPA documents:

- (1) NFPA 49, *Hazardous Chemicals Data*
- (2) NFPA 325, *Guide to Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids*
- (3) NFPA 491, *Manual of Hazardous Chemical Reactions*

A.5.1.10 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems, requires that approved fire dampers be provided in all air-transfer openings in partitions required to have a fire resistance rating. The standard requires that approved fire dampers be provided where ducts or air grilles penetrate partitions required to have a fire resistance rating of 2 hours or more. Thus, although any air-transfer opening would have to be fire dampered in a required fire barrier of any rating, penetrations by ducts or air grilles would not have to be fire dampered if the required rating of the barrier is less than 2 hours.

A.5.4.1 A door to an adjoining laboratory work area or laboratory unit is considered to be a second means of access to an exit, provided that the laboratory unit is not of a higher fire hazard classification.

A.5.4.3 It should be noted that while doors swinging against egress and horizontally sliding doors are permitted in certain Class C and Class D laboratory work areas, NFPA 101, *Life Safety Code*, and NFPA 5000, *Building Construction and Safety Code*, place limitations on their use based on number of occupants and area. Before doors swinging against egress and horizontally sliding doors are used, both NFPA 101 and NFPA 5000 should be reviewed for requirements and limitations.

A.5.5 Modern laboratory design concepts provide a wide selection of laboratory furniture and equipment. Although such selections will be dictated by several factors, such as laboratory function, cost, serviceability, accessibility, repair, and so forth, any laboratory design should recognize and accommodate — to the extent practical — several needs directly related to improving the fire safety posture of the laboratory work area.

Casework design should be flexible to provide optimum use of storage capacity without interfering with the normal needs of the laboratory. This design can include desk areas that do not encourage underdesk storage, restraining techniques for items stored above eye level, ease of egress, provision for separation of incompatible chemicals or materials, provisions for ventilated or corrosion-resistant storage, or

properly identified special facilities for unique waste storage needs, such as chemical, biological, or radioactive materials.

Easy access to laboratory utilities, such as piping, valves, and electrical switches and circuit-breaker panels, should be provided. All valves and switches should be properly identified in accordance with the governing codes and standards.

The use of slip-resistant floor surfaces should be considered.

A.6.2.3 It is suggested that automatic fire-extinguishing systems activate both a local audible alarm and an audible or visible alarm at a constantly attended location.

A.6.3.1 All laboratory buildings should be provided with standpipes and 3.8 cm (1½ in.) hose connections for use by trained occupants. Hose connections should be fitted with hose lines and combination straight stream-fog nozzles. Waterflow through the standpipe system should activate an audible fire alarm system on the premises.

A.6.6.2 Maintenance procedures should include inspection, testing, and maintenance of the following:

- (1) Utilities (steam, gas, electrical)
- (2) Air supply and exhaust systems
- (3) Fire protection equipment
- (4) Detectors and alarms
- (5) Compressed gas regulators and pressure relief valves
- (6) Waste disposal systems
- (7) Fire doors
- (8) Emergency lighting and exit signs
- (9) Electrically operated equipment

A.6.6.3 An emergency response plan should be prepared and updated. The plan should be available for inspection by the AHJ, upon reasonable notice. The following information should be included in the emergency plan:

- (1) The type of emergency equipment available and its location
- (2) A brief description of any testing or maintenance programs for the available emergency equipment
- (3) An indication that hazard identification marking is provided for each storage area
- (4) Location of posted emergency response procedures
- (5) Material safety data sheets (MSDSs) for all hazardous materials stored on site
- (6) A list of responsible personnel who are designated and trained to be liaison personnel for the fire department; these individuals should be knowledgeable in the site emergency response procedures and should aid the emergency responders with the following functions:
 - (a) Pre-emergency planning
 - (b) Identifying where flammable, pyrophoric, oxidizing, and toxic gases are located
 - (c) Accessing MSDSs
- (7) A list of the types and quantities of compressed and liquefied gases normally at the facility

A.6.6.3.1(5) Unusual non-fire hazards that emergency response personnel might encounter in responding to a fire in a chemical laboratory might include the following:

- (1) Poisons
- (2) Corrosives
- (3) Irritants
- (4) Radioactivity
- (5) Nonionizing radiation
- (6) Biological hazards

Laboratory management should train emergency response personnel in detailed emergency response plans that address these special hazards.

Laboratory management should also encourage the public fire department to become familiar with these hazards through in-service inspections, joint emergency plan development, and coordinated emergency response drills.

Emergency telephones are of value when connected directly to an emergency office and when located within the laboratory building so that they can be readily used by laboratory personnel. They are also valuable when available at an exterior location for use by evacuees or passersby. An emergency telephone system should be interconnected with a mass notification system, such as a public address system.

The management of each laboratory work area covered by this standard should be responsible for developing and distributing an evacuation plan for the facility. The plan should be written with accompanying diagrams and distributed to each supervisor and posted in appropriate locations for all employees to read and study. In addition to fires and explosions, the evacuation plan should also consider hazardous incidents such as spills, leaks, or releases of flammable, toxic, or radioactive materials, and acts of nature such as tornadoes, hurricanes, and floods. The evacuation plan should include, but not be limited to, the following:

- (1) Conditions under which evacuation will be necessary
- (2) Method of alarm transmission
- (3) Action to be taken by personnel upon receiving an alarm in addition to evacuation (e.g., turn off flames and other ignition sources)
- (4) Primary and secondary routes to horizontal and vertical exits leading either to the exterior of the building or to safe refuge zones within the building, as might be permitted if total evacuation is not necessary and the alarm system is appropriately zoned
- (5) Instructions necessary to prevent evacuees from hampering fire-fighting operations or essential duties of emergency personnel (i.e., move away from the building to a predesignated area)
- (6) Accountability to determine if everyone has left the facility (Wardens or supervisors should be instructed to check all occupied spaces in their assigned area upon sounding of an alarm to ensure that everyone has heard the alarm and is evacuating. Personnel from particular groups, departments, floors, or areas should be instructed to gather in a predesignated area outside the building or in a safe refuge zone. Special procedures should be established for evacuation of handicapped persons. Wardens or supervisors should be responsible for accounting for all personnel in their areas, including guests and visitors.)
- (7) Methods of notifying personnel as to when it is safe to re-enter the facility (Dependence on duly authorized persons, such as wardens, to pass this word will prevent someone from entering the facility prematurely.)

Laboratory management should conduct fire exit drills at least once a year to test the evacuation procedures by familiarizing personnel with exits, especially emergency exits not normally used, and the safe and efficient use of the exits. For required frequency of fire exit drills in educational occupancies and health care occupancies, see NFPA 101, *Life Safety Code*. (Fire exit drills differ from fire drills in that the latter are held for purposes of fire-fighting practice by the fire brigade or other emergency organizations. Because a conflict exists

between evacuation and fire fighting, management should appoint different persons to be responsible for each procedure, as one cannot effectively direct fire-fighting operations and evacuation simultaneously.)

Fire alarm systems, where available, should be used in the conduct of fire exit drills. No one should be excused from participating in a fire exit drill.

A.6.6.3.2 Laboratory personnel should be thoroughly indoctrinated in procedures to follow in cases of clothing fires. The most important instruction, one that should be stressed until it becomes second nature to all personnel, is to immediately drop to the floor and roll. All personnel should recognize that, in case of ignition of another person's clothing, they should immediately knock that person to the floor and roll that person around to smother the flames. Too often a person will panic and run if clothing ignites, resulting in more severe, often fatal, burn injuries.

Fire-retardant or flame-resistant clothing is one option available to help reduce the occurrence of clothing fires. Refer to NFPA 1975, *Standard on Station/Work Uniforms for Emergency Services*, for performance requirements and test methods for fire-resistant clothing.

It should be emphasized that use of safety showers, fire blankets, or fire extinguishers are of secondary importance. These items should be used only when immediately at hand. It should be recognized that rolling on the floor not only smothers the fire but also helps to keep flames out of the victim's face, reducing inhalation of smoke.

A.7.3(3) For further information on venting, see NFPA 68, *Standard on Explosion Protection by Deflagration Venting*.

A.7.5.3 A protective coating, such as mineral oil, can be applied to transparent sight panels exposed to corrosive vapors.

A.8.1 NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, and NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids*, contain additional requirements for general environmental ventilating systems.

A.8.2.1 For additional information on laboratory ventilation, see ANSI/AIHA Z9.5, *Laboratory Ventilation*. For information on preventing the spread of smoke by means of utilizing supply and exhaust systems to create airflows and pressure differences between rooms or building areas, see NFPA 92A, *Standard for Smoke Control Systems Utilizing Barriers and Pressure Differences*.

A.8.2.2 It is not the intent of this standard to require emergency or standby power for laboratory ventilation systems.

A.8.2.3 Hoods having explosionproof electrical devices are sometimes referred to as *explosionproof hoods*. This term does not imply that they will contain an explosion, only that the electrical equipment will not provide a source of ignition.

A.8.3.2 Special studies such as air-dispersion modeling might be necessary to determine the location of air intakes for laboratories away from the influence of laboratory exhaust and other local point source emissions.

A.8.3.4 Room air current velocities in the vicinity of fume hoods should be as low as possible, ideally less than 30 percent of the face velocity of the fume hood. Air supply diffusion devices should be as far away from fume hoods as possible and have low exit velocities.

A.8.4.1 Ductless chemical fume hoods that pass air from the hood interior through an adsorption filter and then discharge the air into the laboratory are only applicable for use with nuisance vapors and dusts that do not present a fire or toxicity hazard.

A.8.4.2 Consideration should be made of the potential contamination of the fresh air supply by exhaust air containing vapors of flammable or toxic chemicals when using devices for energy conservation purposes.

A.8.4.4 Ducts should be sealed to prevent condensation, and so forth, from leaking into occupied areas.

A.8.4.7 Laboratory fume hood containment can be evaluated using the procedures contained in ASHRAE 110, *Method of Testing Performance of Laboratory Fume Hoods*. Face velocities of 0.4 m/sec to 0.6 m/sec (80 ft/min to 120 ft/min) generally provide containment if the hood location requirements and laboratory ventilation criteria of this standard are met.

In addition to maintaining proper fume hood face velocity, fume hoods that reduce the exhaust volume as the sash opening is reduced should maintain a minimum exhaust volume to ensure that contaminants are diluted and exhausted from a hood. The chemical fume hood exhaust airflow should not be reduced to less than the flow rate recommended in ANSI/AIHA Z9.5, *Laboratory Ventilation*.

A.8.4.9 Due to their low capture efficiency, canopy hoods should only be used for exhausting heat and nuisance odors and not for exhausting chemicals.

A.8.4.12 Exhaust stacks should extend at least 3 m (10 ft) above the highest point on the roof to protect personnel on the roof. Exhaust stacks might need to be much higher to dissipate effluent effectively, and studies might be necessary to determine adequate design. Related information on stack height can be found in Chapter 14, *Airflow Around Buildings*, of the ASHRAE *Handbook of Fundamentals*.

A.8.5.1 The designer of a laboratory exhaust system should consider the physical and chemical properties and hazard characteristics of the materials being conveyed. The exceptions cited recognize that some laboratory operations generate corrosive vapors that might attack available metallic duct materials. When it has been ascertained that metallic ducts will not withstand such an attack by the chemicals to be exhausted or where the unique nature of the work to be done mandates the use of nonmetallic ducts, nonmetallic ducts can be used. The designer should consider the use of chemical-resistant thermoplastic-lined metallic duct materials.

A.8.7.4 For informative material regarding spark-resistant fan construction, see Air Movement and Control Association (AMCA) Standards Handbook 99-0401-86, *Classifications for Spark Resistant Construction*.

A.8.7.6 Exhaust fans should be tested to ensure they do not rotate backward in new installations or after repair on motors.

A.8.8.1.1 Specifying the flame spread rating alone does not ensure that the liner will provide containment of a small fire.

A.8.8.1.2 Baffles normally should be adjusted for the best operating position for general use. Only where high heat loads or the routine use of large quantities of light or heavy gases occur should compensating adjustment be made. In most cases, however, the low concentrations of heavier-than-air and lighter-than-air vapors take on the characteristics of

the large volumes of air going through the hood. It is recommended that the total adjustment not exceed 20 percent of the total airflow.

A.8.8.1.3 The means of containing minor spills might consist of a 6.4 mm (¼ in.) recess in the work surface, use of pans or trays, or creation of a recess by installing a curb across the front of the hood and sealing the joints between the work surface and the sides, back, and curb of the hood.

A.8.8.2 A hood sash greatly enhances the safety provided by a chemical fume hood, and it is recommended that the hood design incorporate this feature. For example, a hood sash can be adjusted to increase the face velocity when working on high hazard material. The sash can be used as a safety shield. It can be closed to contain a fire or runaway reaction, and it can be closed to contain experiments when the hood is left unattended.

Hoods without sashes or hoods with a side or rear sash in addition to a front sash do not offer the same degree of protection as do hoods with protected single face openings, and, thus, their use is not recommended. A small face opening can be desirable to save exhaust air and energy or to increase the maximum face velocity on existing hoods.

A.8.8.3 Users should be instructed and periodically reminded not to open sashes rapidly and to allow hood sashes to be open only when needed and only as much as necessary.

A.8.8.4 Locating services, controls, and electrical fixtures external to the hood minimizes the potential hazards of corrosion and arcing.

A.8.9.1 A person walking past the hood can create sufficient turbulence to disrupt a face velocity of 0.5 m/sec (100 ft/min). In addition, open windows or air impingement from an air diffuser can completely negate or dramatically reduce the face velocity and can also affect negative differential air pressure.

A.8.9.3 Place low hazard activities (such as desks and microscope benches) away from the chemical fume hood. The term *directly in front of* does not include those areas that are separated by a barrier such as a lab bench or other large structure that would serve as a shield.

A.8.10.1 A hazard and risk assessment should be conducted for fume hood operations. Circumstances exist where hood fire suppression systems might be appropriate as a stand-alone protection measure or as part of a more comprehensive strategy to reduce hazards and risks. This assessment should be reviewed when fume hood operations change. See the objectives of the standard stated in Section 1.2.

A.8.10.2(9) For further information, see the report entitled "An Investigation of Chemical Fume Hood Fire Protection Using Sprinkler and Water Mist Nozzles" prepared by Factory Mutual Research Corporation.

A.8.10.3.1 In 2001 at the University of California, a fire resulted in an injury and caused approximately \$3.5 million in damage. Based on the investigation, it was concluded that the practice of not having fire dampers on the exhaust duct of the ventilation system at the shaft wall appears to have been beneficial in this fire scenario. The investigation observed that the exhaust system was effective at removing significant quantities of combustion products from the building during the fire, thereby reducing the amount of combustion products spreading to other areas of the building. The shutting down of the supply air by fire dampers did not significantly hinder the exhaust system because fresh air was provided through a broken

window. However, if the window had not failed, the team concluded that the exhaust system probably would not have performed as well.

If protection of the openings is desired, one method is to use a subduct assembly. Where a branch duct connects to an enclosed exhaust riser located inside a shaft, which has a required fire resistance rating of 1 hour or more and in which the airflow moves upward, protection of the opening into the fire resistance-rated enclosure should be made with a steel subduct turned upward a minimum of 0.6 m (22 in.) in length and of a minimum thickness of 22 gauge [0.76 mm (0.030 in.)]. The steel subduct should be carried up inside the riser from each inlet duct penetration. This riser should be appropriately sized to accommodate the flow restriction created by the subduct.

A.8.10.7 Installation of sprinklers in the void area or in the chemical fume hood is an acceptable method to prevent flame spread.

A.8.11.1 If perchloric acid is heated above ambient temperature, it will give off vapors that can condense and form explosive perchlorates. Limited quantities of perchloric acid vapor can be kept from condensing in laboratory exhaust systems by trapping or scrubbing the vapors at the point of origin. Scrubbing systems have been described in published articles.

A.8.11.8 Perchloric acid hoods should be washed down after each use.

A.8.11.10 A simple and sensitive test for perchlorates is available that uses a 0.3 percent solution of methylene blue in water. A few drops of the test solution in a small quantity [about 25 mL (0.84 oz)] of water washed from the duct to be tested will produce a violet precipitate if perchlorates are present. Approximately 12 mg (0.00042 oz) of perchlorate in this volume [500 mg/L (0.067 oz/gal)] can be recognized easily as a positive test. Because the methylene blue test can produce false negatives and false positives, as shown in "Returning Perchlorate-Contaminated Fume Hood Systems to Service, Part II" (Bader et al.), a more specific and quantifiable method for perchlorates is available that uses a perchlorate ion selective electrode. Several methods were compared in "Returning Perchlorate-Contaminated Fume Hood Systems to Service, Part I" (Phillips et al.) and in *Perchloric Acid and Perchlorates* (Schilt).

An effective method for washing down ductwork suspected of perchlorate contamination has been recommended in the *CRC Handbook of Laboratory Safety*. The method uses steaming of the ducts for 24 hours to condense water on all surfaces and dissolve and wash away perchlorate deposits. If tests after 24 hours show perchlorates in the final wash water, the steaming should be continued for another 24 hours until the test is negative. Where radiation contamination is present, in other than airtight ductwork, a continuous washdown or use of steam methods should not be done unless all the exhaust system is made airtight.

A.8.12.1 Laboratory hoods in which radioactive materials are handled should be identified with the radiation hazard symbol. For information, see NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*.

A.8.13.1 The operating characteristics of some chemical fume hood designs, particularly auxiliary air chemical fume hoods, change at intermediate positions of sash height. It is, therefore, important to verify inward airflow over the face of

the hood according to 8.13.1(5) at several sash heights from full open to closed.

A number of test procedures for verifying performance of chemical fume hoods that have been installed in the field have been published.

A test procedure is given in *Standard on Laboratory Fume Hoods*, by The Scientific Equipment and Furniture Association (SEFA), that uses a velometer and visible fume for checking hood performance.

A standard has been issued by the American Society of Heating, Refrigerating, and Air Conditioning Engineers entitled ASHRAE 110, *Method of Testing Performance of Laboratory Fume Hoods*.

The Environmental Protection Agency's *Procedure for Certifying Laboratory Fume Hoods to Meet EPA Standards* contains a test procedure utilizing sulfur hexafluoride as a test gas.

A.8.13.5.1 The annual inspection of air supply and exhaust fans, motors, and components should ensure that equipment is clean, dry, tight, and friction-free. Bearings should be properly lubricated on a regular basis, according to manufacturers' recommendations. Protective devices should be checked to ensure that settings are correct and that ratings have been tested under simulated overload conditions. Inspections should be made by personnel familiar with the manufacturers' instructions and equipped with proper instruments, gauges, and tools.

A.9.1 Before a hazardous chemical is ordered, controls should be established to ensure that adequate facilities and procedures are available for receiving, storing, using, and disposing of the material. Information sources include the following NFPA documents, which are contained in NFPA's *Fire Protection Guide to Hazardous Materials*:

- (1) NFPA 49, *Hazardous Chemicals Data*
- (2) NFPA 325, *Guide to Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids*
- (3) NFPA 491, *Manual of Hazardous Chemical Reactions*

A.9.2.2.1 The route used to transport hazardous materials between receiving rooms, storage rooms, dispensing rooms, and laboratory units of a facility should be appropriate to both the quantity and characteristics of the material being transported. Where possible, heavy or bulky quantities of hazardous materials should be transported by elevator, preferably one reserved exclusively for freight. In any event, the transport of hazardous materials in any quantity on an elevator should be accomplished by the minimum number of persons necessary to accomplish the task safely. All other persons should be excluded from an elevator while hazardous materials are present. Use of stairways for transport of small quantities of hazardous materials should be minimized.

A.9.2.2.2 Some common construction materials are subject to serious corrosion or formation of explosive compounds if used for or contacted by certain chemicals and gases commonly used in the laboratory. For example, copper tubing forms explosive compounds if it is used to pipe acetylene; azide salts are not compatible with copper or lead piping; mercury amalgamates in lead pipes.

Thermoplastic pipe used in chemical service, such as in laboratory waste drains, will frequently soften even when not directly attacked by chemical solvents. When this happens, much of the original strength and rigidity of the pipe is lost. If installed above ground or floor level, such piping should be provided with adequate rack support to prevent sagging. Burying plastic pipe used for chemical waste is not recommended

because normal expansion might cause the pipe to collapse if the pipe has been softened by solvent attack.

A.9.2.3.1 This section establishes maximum allowable quantities of hazardous materials for individual laboratory units based upon reference to the locally adopted building and/or fire code. It is the intent of the Committee to draw a correlation between the term *laboratory unit* used in NFPA 45 and other terms such as *control area* or *laboratory suite*, which are typically used in locally adopted building and fire codes. For example, if the locally adopted building code utilizes a control area methodology, the maximum allowable quantities of hazardous materials for an individual laboratory unit would be equal to the baseline maximum quantities established for a control area. The maximum quantities of flammable and combustible liquids in a laboratory unit might then need to be modified based upon the application of Table 10.1.1(a) and Table 10.1.1(b).

A.9.2.3.2 For guidance, see NFPA's *Fire Protection Guide to Hazardous Materials*, which contains NFPA 49, *Hazardous Chemicals Data*, and NFPA 491, *Manual of Hazardous Chemical Reactions*.

A.9.2.3.4 There are several chemicals that can increase in hazard potential if subjected to long-term storage. Time alone can be only partially responsible, depending on the specific chemical. For example, exposure to air or light can cause the formation of highly shock-sensitive or friction-sensitive peroxides. Some hygroscopic or water-reactive compounds, such as metallic sodium, can autoignite on exposure to air or moisture. Another example is picric acid, which becomes highly shock-sensitive when its normal water content is allowed to evaporate. Reactive monomers that have been inhibited to reduce the chance of unintentional polymerization can become unstable when the inhibitor is consumed.

Such chemicals as described in 9.2.3.4 and A.9.2.3.4, which can increase in hazard potential over time, are common to chemical laboratories and are routinely handled without incident. Still, the user should use appropriate reference material to adequately assess the often multiple hazards associated with the use of chemicals.

A.9.2.3.4.1 Managing time-sensitive chemicals might be perceived as being complex. For help in determining what chemicals are time-sensitive, their inspection periods, inspection methodologies, and pass/fail criteria for these inspections, see one of the two sources by Bailey et al. or the source by Quigley et al.

A.9.2.3.5 See NFPA 30, *Flammable and Combustible Liquids Code* for performance-based requirements if storage cabinets are vented for any reason.

A.10.1.2 Transferring flammable liquids from 1 gal- or 4 L-sized glass shipping containers to metal containers is a relatively expensive and hazardous operation. Such practices are not considered prudent, and are not recommended or required by NFPA for fire protection in laboratories using chemicals.

NFPA 45 allows glass containers in accordance with 10.1.2(1).

Class IA and IB flammable liquids in glass containers larger than the 500 mL (1 pt) and 1 L (1 qt) sizes permitted by Tab 10.1.2 should be kept in containers of sufficient size to contain the contents of the glass containers.

The presence of flammable liquids in glass containers presents substantial hazards from accidental breakage. Many su

pliers furnish glass containers with shatter-resistant coatings. These shatter-resistant glass containers offer significant protection from accidental breakage and are recommended for use when hazardous chemicals need to be kept in glass rather than plastic or metal containers.

A.10.3.1 Ventilation for dispensing operations should be provided to prevent overexposure of personnel dispensing flammable liquids. Control of solvent vapors is most effective if local exhaust ventilation is provided at or close to the point of transfer. Explosion venting is not required for separate inside liquid storage areas if containers are no greater than 227 L (60 gal) and if dispensing from containers larger than 4 L (1 gal) is by means of approved pumps or other devices drawing through a top opening. Movement of liquid to or from equipment in a closed system is not subject to this requirement.

A.10.3.2 Where practicable, dispensing operations should be separated from the storage of flammable and combustible liquids because of the exposure of greater quantities to the hazards of dispensing operations. Movement of liquid to or from equipment in a closed system is not subject to this requirement.

A.10.3.3 The requirement permits the use of squeeze bottles in laboratories. Their use greatly reduces spills, while aiding in accurately dispensing liquids onto small components or surfaces. The small rate of intermittent discharge through a squeeze bottle's discharge tube has not proven to be a hazard over many years of use.

In laboratory occupancies where pouring from and filling of laboratory-size containers is performed within a laboratory fume hood or other similarly ventilated enclosure or space, ignition due to static discharge is not likely to occur. This might be attributed to a combination of factors such as the following:

- (1) Smaller size containers than those used in industrial or commercial occupancies
- (2) Low flow rates during manual pouring/ filling
- (3) Ventilation to below the lower flammable limits
- (4) Contact made between containers (Good laboratory technique dictates that liquids be poured down the side of the container or by use of a stirring rod, thus avoiding splashing or turbulence.)

Perhaps of some yet-to-be-determined significance is the undefined charge transfer mechanism that can take place between nonconductive containers or between containers and the person performing the transfer. (For information on methods to reduce static electricity, see NFPA 77, *Recommended Practice on Static Electricity*.)

A.10.4.3 Relief discharge to a laboratory exhaust might not be appropriate for all sizes of containers for all solvents. Not all lab hoods and exhaust systems are constructed the same and might not be capable of containing or withstanding the vented vapors. Many fume hoods contain ignition sources. The user should evaluate each system based on the use.

A.10.4.6 Examples of these methods include, but are not limited to, a dead man valve or a remotely actuated valve on the liquid line or removal of the pressure being applied.

A.10.5.3 The requirements of 10.5.3 can be accomplished by either of the following:

- (1) Limiting the temperatures of internal heated surfaces that can be exposed to the vapors to no more than 80 percent of the autoignition temperature of the material being heated

- (2) Providing mechanical exhaust ventilation that discharges to a safe location to keep the concentration of flammable gas or vapor below 25 percent of the lower flammable limit (The ventilation equipment should be interlocked with the heating system so that heating cannot take place unless the ventilation system is operating.)

Also, any electrical equipment located within the outer shell, within the compartment, on the door, or on the door frame should be suitable for Class I, Division 1 hazardous (classified) locations and any electrical equipment mounted on the outside of the equipment should be as follows:

- (1) Suitable for Class I, Division 2 hazardous (classified) locations
- (2) Installed on the outside surface of the equipment where exposure to vapors will be minimal

Consideration should also be given to providing deflagration venting, as described in NFPA 86, *Standard for Ovens and Furnaces*.

A.11.1.2 Cylinders of hydrogen fluoride and hydrogen bromide should be returned to the supplier within 2 years of the shipping date.

Cylinders of corrosive or unstable gases should be returned to the supplier when the expiration date of the maximum recommended retention period has been reached. Examples of such corrosive or unstable gases include the following:

- (1) Acid and alkaline gases
- (2) Gases subject to autopolymerization
- (3) Gases subject to explosive decomposition

Cylinders not in active use should be removed from laboratory work areas to a storage facility, as described in CGA Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*. In the absence of a maximum recommended retention time, a 36-month interval should be used.

A.11.1.3 Such vessels cannot be used in commerce unless DOT approved.

A.11.2.1 For additional information, see the following:

- (1) CGA Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*
- (2) ASME B31.1, *Power Piping* (including addendum)
- (3) ASME B31.3, *Process Piping*
- (4) National Safety Council Data Sheet 1-688-86, *Cryogenic Fluids in the Laboratory*

A.11.2.3 Additional shutoff valves, located in accessible locations outside of the areas in which the gases are used, are acceptable.

A.11.2.5 It is recommended that each intermediate regulator and valve also be identified. The identification should conform to ANSI A13.1, *Scheme for the Identification of Piping Systems*.

A.11.2.6 Great care should be taken when converting a piping system from one gas to another. In addition to the requirements of 11.2.6, thorough cleaning to remove residues might be essential. For example, inert oil-pumped nitrogen will leave a combustible organic residue that is incompatible with oxygen and other oxidizing agents. Similar incompatibilities can occur with other materials.

A.11.4.1.2 Air can be condensed when it contacts containers or piping containing cryogenic fluids. When this occurs, the

concentration of oxygen in the condensed air increases, thereby increasing the likelihood of ignition of organic material.

A.12.1.1 Reference sources include the following, contained in NFPA's *Fire Protection Guide to Hazardous Materials*:

- (1) NFPA 49, *Hazardous Chemicals Data*
- (2) NFPA 325, *Guide to Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids*
- (3) NFPA 491, *Manual of Hazardous Chemical Reactions*

A.12.1.1.4 When a new chemical is produced, it should be subjected to a hazard analysis as appropriate to the reasonably anticipated hazard characteristics of the material. Such tests might include, but are not limited to, differential thermal analysis, accelerating rate calorimetry, drop weight shock sensitivity, auto-ignition temperature, flash point, thermal stability under containment, heat of combustion, and other appropriate tests.

A.12.1.4 Protection against ignition sources associated with typical laboratory apparatus can be achieved by distance, pressurization of motor or switch housings, or inerting techniques that can effectively prevent flammable vapor concentrations from contacting ignition sources. (See NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment*, for requirements for purge systems for electrical enclosures, and NFPA 69, *Standard on Explosion Prevention Systems*, for requirements for inerting systems.)

A.12.1.6.4 Procedures might include chilling, quenching, cut-off of reactant supply, venting, dumping, and "short-stopping" or inhibiting.

A.12.2.2.1 Figure A.12.2.2.1 gives examples of labels that can be used on laboratory refrigerators.

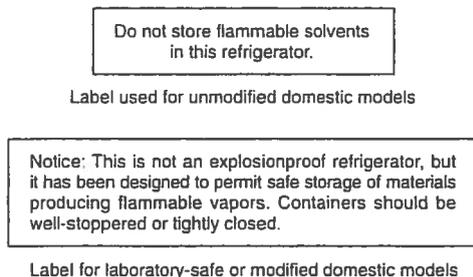


FIGURE A.12.2.2.1 Labels to Be Used in Laboratory Refrigerators.

A.12.2.2.2 Protection against the ignition of flammable vapors in refrigerated equipment is available through three types of laboratory refrigerators: explosionproof, "laboratory-safe" (or "explosion-safe"), and modified domestic models.

Explosionproof refrigeration equipment is designed to protect against ignition of flammable vapors both inside and outside the refrigerated storage compartment. This type is intended and recommended for environments such as pilot plants or laboratory work areas where all electrical equipment is required to meet the requirements of Article 501 of NFPA 70, *National Electrical Code*.

The design concepts of the "explosion-safe" or "laboratory-safe" type of refrigerator are based on the typical laboratory environment. The primary intent is to eliminate ignition of vapors inside the storage compartment by sources also within the com-

partment. In addition, commercially available "laboratory-safe" refrigerators incorporate such design features as thresholds, self-closing doors, friction latches or magnetic door gaskets, and special materials for the inner shell. All of these features are intended to control or limit the damage should an exothermic reaction occur within the storage compartment. Finally, the compressor and its circuits and controls are located at the top of the unit to further reduce the potential for ignition of floor-level vapors. In general, the design features of a commercially available "laboratory-safe" refrigerator are such that they provide important safeguards not easily available through modification of domestic models.

A.12.2.2.2.1 The use of domestic refrigerators for the storage of typical laboratory solvents presents a significant hazard to the laboratory work area. Refrigerator temperatures are almost universally higher than the flash points of the flammable liquids most often stored in them. In addition to vapor accumulation, a domestic refrigerator contains readily available ignition sources, such as thermostats, light switches, and heater strips, all within or exposed to the refrigerated storage compartment. Furthermore, the compressor and its circuits are typically located at the bottom of the unit, where vapors from flammable liquid spills or leaks could easily accumulate.

Although not considered optimum protection, it is possible to modify domestic refrigerators to achieve some degree of protection. However, the modification process can be applied only to manual defrost refrigerators; the self-defrosting models cannot be successfully modified to provide even minimum safeguards against vapor ignition. The minimum procedures for modification include the following:

- (1) Relocation of manual temperature controls to the exterior of the storage compartment, sealing all points where capillary tubing or wiring formerly entered the storage compartment
- (2) Removal of light switches and light assemblies and sealing of all resulting openings
- (3) Replacement of positive mechanical door latches with magnetic door gaskets

Regardless of the approach used (explosionproof, "laboratory-safe," modified domestic, or unmodified domestic), every laboratory refrigerator should be clearly marked to indicate whether it is safe for storage of flammable materials. Internal laboratory procedures should ensure that laboratory refrigerators are being properly used.

A.12.2.5.1 Pressure vessels require specialized design beyond the scope of normal workshop practice. For design of pressure vessels, see Section VIII, "Rules for Construction of Pressure Vessels," Division 1, ASME *Boiler and Pressure Vessel Code*.

A.13.1.1 Examples of severe or unusual hazards that might require posting of signs include the following:

- (1) Unstable chemicals
- (2) Radioactive chemicals
- (3) Carcinogens, mutagens, and teratogens
- (4) Pathogens
- (5) High-pressure reactions
- (6) High-powered lasers
- (7) Water-reactive materials
- (8) Cryogenics

Also, the names and home telephone numbers of one or more persons working in each laboratory work area should be

posted at the entrance to that work area. Such information should be kept current.

It is important to recognize that an extremely toxic substance need not be identified as a proportionately hazardous substance. The quantity of the substance, the ease of penetration of its container or risk of its release by fire, and the probability of harming emergency response personnel are the true measures of the hazard level. This standard does not exclusively endorse any particular convention for communicating unusual hazards to emergency response personnel, recognizing that professional judgments need to be made on a facility-by-facility basis. These judgments should recognize several existing conventions.

Use of the system presented in NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, which might be suitable for flammable liquid storage cabinets or those laboratories containing a nearly constant chemical inventory, is not recommended for multichemical laboratories where the chemicals can change frequently. Such laboratories can include any of the following:

- (1) Analytical, biological (public health, genetic engineering, bacteriological)
- (2) Physical and chemical (organic, inorganic, physical, research, crystallographic, forensic)
- (3) Instructional (college and high school chemistry and physics laboratories)
- (4) Metallurgical
- (5) Mineralogical
- (6) Fine art restoration and identification
- (7) Dental

Even where storage within a laboratory involves unusually high amounts of flammable or toxic or reactive materials (and hence calls for hazard identification), a lettered sign is generally more easily understood than a numerical designation. Hence, the NFPA 704 system is not recommended for laboratories in general.

A.13.2 The exhaust system should be identified "WARNING — Chemical Laboratory Exhaust" (or "Chemical Fume Hood Exhaust" or other appropriate wording). Exhaust system discharge stacks and discharge vents and exhaust system fans should be marked to identify the laboratories or work areas being served.

Annex B Supplementary Definitions

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

B.1 NFPA 30 Definitions. The following definitions are extracted from NFPA 30, *Flammable and Combustible Liquids Code*.

B.1.1 Flammable Liquid. Any liquid that has a closed-cup flash point below 100°F (37.8°C), as determined by the test procedures and apparatus set forth in NFPA 30, Section 4.4, and a Reid vapor pressure that does not exceed an absolute pressure of 40 psi (276 kPa) at 100°F (37.8°C), as determined by ASTM D 323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)*. [30, 2008]

B.1.2 Classification of Flammable Liquids. Class I liquids shall be further subclassified in accordance with the following:

- (1) Class IA Liquid — Any liquid that has a flash point below 73°F (22.8°C) and a boiling point below 100°F (37.8°C)

- (2) Class IB Liquid — Any liquid that has a flash point below 73°F (22.8°C) and a boiling point at or above 100°F (37.8°C)

- (3) Class IC Liquid — Any liquid that has a flash point at or above 73°F (22.8°C), but below 100°F (37.8°C)

[30:4.3.1]

B.1.3 Combustible Liquid. Any liquid that has a closed-cup flash point at or above 100°F (37.8°C), as determined by the test procedures and apparatus set forth in NFPA 30, Section 4.4. [30, 2008]

B.1.4 Classification of Combustible Liquids. Combustible liquids shall be classified in accordance with the following:

- (1) Class II Liquid — Any liquid that has a flash point at or above 100°F (37.8°C) and below 140°F (60°C)

- (2) Class III Liquid — Any liquid that has a flash point at or above 140°F (60°C)

- (a) Class IIIA Liquid — Any liquid that has a flash point at or above 140°F (60°C), but below 200°F (93°C)

- (b) Class IIIB — Any liquid that has a flash point at or above 200°F (93°C)

[30:4.3.2]

B.2 NFPA 704 Definitions. The following definitions are extracted from NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*.

B.2.1 Health Hazard. Health hazard ratings shall address the capability of a material to cause personal injury due to contact with or entry into the body via inhalation, ingestion, skin contact, or eye contact. [704:5.1.1]

The degrees of health hazard shall be ranked according to the probable severity of the effects of exposure to emergency response personnel detailed in Table B.2.1. [704:5.2]

B.2.2 Flammability Hazards. Flammability hazards ratings shall address the degree of susceptibility of materials to burning [704:6.1.1]. Because many materials will burn under one set of conditions but will not burn under others, the form or condition of the material shall be considered, along with its inherent properties. [704:6.1.2]

B.2.3 Degrees of Hazard. The degrees of flammability hazard shall be ranked according to the susceptibility of materials to burning as detailed in Table B.2.3. [704:6.2]

B.2.4 Instability Hazards.

B.2.4.1 This [section] shall address the degree of intrinsic susceptibility of materials to release energy [704:7.1.1], [and] those materials capable of rapidly releasing energy by themselves, through self-reaction or polymerization. [704:7.1.1.1]

B.2.4.2 The violence of a reaction or decomposition can be increased by heat or pressure... [or] by mixing with other materials to form fuel-oxidizer combinations, or by contact with incompatible substances, sensitizing contaminants, or catalysts. [704: A.7.1.1]

B.2.4.3 Because of the wide variations of unintentional combinations possible in fire or other emergencies, these extraneous hazard factors (except for the effect of water) shall not be applied to a general numerical rating of hazards. Where large quantities of materials are stored together, inadvertent mixing shall be considered in order to establish appropriate separation or isolation. [704:7.1.2]

The NFPA 704 ratings are applied to numerous chemicals in the NFPA *Fire Protection Guide to Hazardous Materials*, which contains withdrawn standards NFPA 49, *Hazardous Chemicals Data*, and NFPA 325, *Guide to Fire Hazard Properties of Flammable*

Table B.2.1 Degrees of Health Hazards

Degree of Hazard*	Criteria
4 — Materials that, under emergency conditions, can be lethal	<p>Gases whose LC₅₀ for acute inhalation toxicity is less than or equal to 1000 parts per million (ppm)</p> <p>Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than ten times its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 1000 ppm</p> <p>Dusts and mists whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.5 milligrams per liter (mg/L)</p> <p>Materials whose LD₅₀ for acute dermal toxicity is less than or equal to 40 milligrams per kilogram (mg/kg)</p> <p>Materials whose LD₅₀ for acute oral toxicity is less than or equal to 5 mg/kg</p>
3 — Materials that, under emergency conditions, can cause serious or permanent injury	<p>Gases whose LC₅₀ for acute inhalation toxicity is greater than 1000 ppm but less than or equal to 3000 ppm</p> <p>Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4</p> <p>Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L</p> <p>Materials whose LD₅₀ for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg</p> <p>Materials that are corrosive to the respiratory tract</p> <p>Materials that are corrosive to the eye or cause irreversible corneal opacity</p> <p>Materials that are corrosive to skin</p> <p>Cryogenic gases that cause frostbite and irreversible tissue damage</p> <p>Compressed liquefied gases with boiling points at or below -55°C (-66.5°F) that cause frostbite and irreversible tissue damage</p> <p>Materials whose LD₅₀ for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg</p>
2 — Materials that, under emergency conditions, can cause temporary incapacitation or residual injury	<p>Gases whose LC₅₀ for acute inhalation toxicity is greater than 3000 ppm but less than or equal to 5000 ppm</p> <p>Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 5000 ppm and that does not meet the criteria for either degree of hazard 3 or degree of hazard 4</p> <p>Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 10 mg/L</p> <p>Materials whose LD₅₀ for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg</p> <p>Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that can cause severe tissue damage, depending on duration of exposure</p> <p>Materials that are respiratory irritants</p> <p>Materials that cause severe but reversible irritation to the eyes or lacrimators</p> <p>Materials that are primary skin irritants or sensitizers</p> <p>Materials whose LD₅₀ for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg</p>
1 — Materials that, under emergency conditions, can cause significant irritation	<p>Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 5000 ppm but less than or equal to 10,000 ppm</p> <p>Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 10 mg/L but less than or equal to 200 mg/L</p> <p>Materials whose LD₅₀ for acute dermal toxicity is greater than 1000 mg/kg but less than or equal to 2000 mg/kg</p> <p>Materials that cause slight to moderate irritation to the respiratory tract, eyes, and skin</p> <p>Materials whose LD₅₀ for acute oral toxicity is greater than 500 mg/kg but less than or equal to 2000 mg/kg</p>
0 — Materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials	<p>Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 10,000 ppm</p> <p>Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 200 mg/L</p> <p>Materials whose LD₅₀ for acute dermal toxicity is greater than 2000 mg/kg</p> <p>Materials whose LD₅₀ for acute oral toxicity is greater than 2000 mg/kg</p> <p>Materials that are essentially nonirritating to the respiratory tract, eyes, and skin</p>

*For each degree of hazard, the criteria are listed in a priority order based upon the likelihood of exposure.
[704: Table 5.2]

Table B.2.3 Degrees of Flammability Hazards

Degree of Hazard	Criteria
4 — Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily.	<p>Flammable gases. Flammable cryogenic materials. Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e., Class IA liquids). Materials that ignite spontaneously when exposed to air. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.</p>
3 — Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions.	<p>Liquids having a flash point below 22.8°C (73°F) and a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (100°F) (i.e., Class IB and Class IC liquids). Finely divided solids, typically less than 75 micrometers (µm) (200 mesh), that present an elevated risk of forming an ignitable dust cloud, such as finely divided sulfur, <i>National Electrical Code</i> Group E dusts (e.g., aluminum, zirconium, and titanium), and bis-phenol A. Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g., dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.</p>
2 — Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air.	<p>Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e., Class II and Class IIIA liquids). Finely divided solids less than 420 µm (40 mesh) that present an ordinary risk of forming an ignitable dust cloud. Solid materials in a flake, fibrous, or shredded form that burn rapidly and create flash fire hazards, such as cotton, sisal, and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.</p>
1 — Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur.	<p>Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes in accordance with ASTM D 6668, <i>Standard Test Method for the Discrimination Between Flammability Ratings of F = 0 and F = 1</i>. Liquids, solids, and semisolids having a flash point at or above 93.4°C (200°F) (i.e., Class IIIB liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the <i>Method of Testing for Sustained Combustibility</i>, per 49 CFR 173, Appendix H, or the UN publications <i>Recommendations on the Transport of Dangerous Goods and Manual of Tests and Criteria</i>. Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water noncombustible liquid/solid content of more than 85 percent by weight. Liquids that have no fire point when tested by ASTM D 92, <i>Standard Test Method for Flash and Fire Points by Cleveland Open Cup</i>, up to the boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. Combustible pellets, powders, and granules greater than 420 µm (40 mesh). Finely divided solids less than 420 µm that are nonexplosible in air at ambient conditions, such as low volatile carbon black and polyvinylchloride (PVC). Most ordinary combustible materials. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.</p>
0 — Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand	<p>Materials that will not burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D [of NFPA 704]</p>

[704: Table 6.2]

Liquids, Gases, and Volatile Solids. These were withdrawn as NFPA standards (and are therefore no longer published in the *National Fire Codes*[®]). However, they are maintained by NFPA staff in a database that will be available to the public electronically in the future and in updates of the *NFPA Fire Protection Guide to Hazardous Materials*. The Committee wished to note that the documents were withdrawn solely for expediency in updating the data, which was not possible in a 3- to 5-year revision cycle. [704:A.4.2.2]

B.2.4.4 The degree of instability hazard shall indicate to fire-fighting and emergency personnel whether the area shall be evacuated, whether a fire shall be fought from a protected location, whether caution shall be used in approaching a spill or fire to apply extinguishing agents, or whether a fire can be fought using normal procedures. [704:7.1.3]

B.2.4.5 Definitions.

B.2.4.5.1 Stable Materials. Those materials that normally have the capacity to resist changes in their chemical composition, despite exposure to air, water, and heat as encountered in fire emergencies. [704, 2007]

B.2.4.5.2 Unstable Materials. A material that, in the pure state or as commercially produced, will vigorously polymerize, decompose or condense, become self-reactive, or otherwise undergo a violent chemical change under conditions of shock, pressure, or temperature. [704, 2007]

B.2.5 Degrees of Hazard. The degrees of hazard shall be ranked according to ease, rate, and quantity of energy release of the material in pure or commercial form detailed in Table B.2.5. [704, 7.2]

Annex C Supplementary Information on Explosion Hazards and Protection

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

C.1 Scope. This annex is intended to provide laboratory management with information to assist in understanding the potential consequences of an explosion and the need for adequately designed protection. It is not intended to be a design manual.

C.2 Explosion. An explosion is the bursting or rupture of an enclosure or a container due to the development of internal pressure from a deflagration. [69, 2008] Reactive explosions are further categorized as deflagrations, detonations, and thermal explosions.

C.2.1 Container Failure. When a container is pressurized beyond its burst strength, it can violently tear asunder (explode). A container failure can produce subsonic, sonic, or supersonic shock waves, depending on the cause of the internal pressure.

C.2.1.1 The energy released by failure of a vessel containing a gas or liquid is the sum of the energy of pressurization of the fluid and the strain energy in the vessel walls due to pressure-induced deformation.

C.2.1.2 In pressurized gas systems, the energy in the compressed gas represents a large proportion of the total energy released in a vessel rupture, whereas in pressurized liquid systems, the strain energy in the container walls represents the more significant portion of the total explosion energy available, especially in high-pressure systems.

Table B.2.5 Degrees of Instability Hazards

Degree of Hazard	Criteria
4 — Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures.	Materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of 1000 W/mL or greater
3 — Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation.	Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 100 W/mL and below 1000 W/mL Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures
2 — Materials that readily undergo violent chemical change at elevated temperatures and pressures.	Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100 W/mL
1 — Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures.	Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.01 W/mL and below 10 W/mL
0 — Materials that in themselves are normally stable, even under fire conditions.	Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.01 W/mL Materials that do not exhibit an exotherm at temperatures less than or equal to 500°C (932°F) when tested by differential scanning calorimetry

[704:Table 7.2]

C.2.1.3 Small-volume liquid systems pressurized to over 34,500 kPa (5000 psi), large-volume systems at low pressures, or systems contained by vessels made of materials that exhibit high elasticity should be evaluated for energy release potential under accident conditions. This does not imply that nonelastic materials of construction are preferred. Materials with predictable failure modes are preferred.

C.2.1.4 Liquid systems containing entrained air or gas store more potential energy and are, therefore, more hazardous than totally liquid systems because the gas becomes the driving force behind the liquid.

C.2.1.5 For gas-pressurized liquid systems, such as nitrogen over oil, an evaluation of the explosion energy should be made for both the lowest and highest possible liquid levels.

C.2.1.6 For two-phase systems, such as carbon dioxide, an energy evaluation should be made for the entire system in the gas phase, and the expansion of the maximum available liquid to the gas phase should then be considered.

C.2.2 Deflagration. A deflagration is propagation of a combustion zone at a velocity that is less than the speed of sound in the unreacted medium. [68, 2007]

C.2.2.1 The reaction rate is proportional to the increasing pressure of the reaction. A deflagration can, under some conditions, accelerate and build into a detonation.

C.2.2.2 The deflagration-to-detonation transition (D-D-T) is influenced by confinement containment that allows compression waves to advance and create higher pressures that continue to increase the deflagration rates. This is commonly called *pressure piling*.

C.2.3 Detonation.

C.2.3.1 A detonation is propagation of a combustion zone at a velocity that is greater than the speed of sound in the unreacted medium. [68, 2007]

C.2.3.2 A detonation causes a high-pressure shock wave to propagate outwardly, through the surrounding environment, at velocities above the speed of sound.

C.2.4 Thermal Explosion. A thermal explosion is a self-accelerating exothermic decomposition that occurs throughout the entire mass, with no separate, distinct reaction zone.

C.2.4.1 A thermal explosion can accelerate into a detonation.

C.2.4.2 The peak pressure and rate of pressure rise in a thermal explosion are directly proportional to the amount of material undergoing reaction per unit volume of the container. This is quite unlike gas or vapor explosions, where the loading density is normally fixed by the combustible mixture at one atmosphere. The Frank-Kamenetskii theory is useful in evaluating the critical mass in the thermal explosion of solids.

C.3 Effects of Explosions.

C.3.1 Personnel Exposure. Personnel exposed to the effects of an explosion are susceptible to injury from the following:

- (1) Missiles and explosion-dispersed materials
- (2) Thermal and corrosive burns
- (3) Inhalation of explosion products
- (4) Overpressure, including incident, reflection-reinforced incident, and sustained overpressure
- (5) Body blowdown and whole-body displacement

Injuries from missiles and explosion-dispersed materials, burns, and inhalation of explosion products are discussed in terms of injury related to small explosions. The magnitude of physiological damage due to explosions is given in Table C.3.1(a) and Table C.3.1(b).

C.3.2 Damage to Structural Elements. The potential for damage to high-value buildings and equipment also warrants special consideration. Failure of building components should not be overlooked as a source of injury to personnel.

C.3.2.1 Where the incident impulse is reinforced by reflection, as will be the case in large explosions within or near structures, the incident peak pressures for given damage are substantially lowered. The reflected pressure might be from 2 to 19 times greater than the incident pressure, depending on the magnitude of the incident pressure and the distance from reflecting surfaces. However, when a small explosion located more than a few inches from a reflecting surface has a TNT equivalence of less than 100 g (3.5 oz), the reinforcement phenomenon is negligible because of the rapid decay of both the incident pressure wave and the reflected pressure wave with distance.

C.3.2.2 Thermal explosions and deflagrations having impulses with rates of pressure rise greater than 20 milliseconds require peak pressures approximately three times those of detonations in order to produce similar damage.

C.3.2.3 A sustained overpressure will result when a large explosion occurs in a building with few openings or inadequate explosion venting. This sustained overpressure is more damaging than a short duration explosion of equivalent rate of pressure rise and peak pressure. Explosions with TNT equivalencies of less than 100 g (3.5 oz) would not be expected to create significant sustained overpressures, except in small enclosures. (For small explosions, burns, inhalation of toxic gases, and missile injuries usually exceed blast wave injuries.)

C.4 Hazard Analysis.

C.4.1 The determination of the degree of hazard presented by a specific operation is a matter of judgment. An explosion hazard should be evaluated in terms of likelihood, severity, and the consequences of an explosion, as well as the protection required to substantially reduce the hazard. A review of the explosion hazard analysis by an appropriate level of management is recommended.

C.4.2 The severity of an explosion is measured in terms of the rate of pressure rise, peak explosion pressure, impulse, duration of the overpressure, dynamic pressure, velocity of the propagating pressure wave, and residual overpressures. The effects of an explosion within an enclosure, such as a laboratory hood, laboratory work area, or laboratory unit can be far more severe than the effects of a similar explosion in an open space. Of primary importance is the missile hazard. Some explosions, such as in overpressurized lightweight glassware, can generate pressure waves that, in themselves, do not endanger personnel, but the resulting fragments can blind, otherwise injure, or kill the experimenter. An explosion that develops pressures sufficient to endanger personnel in a laboratory work area usually will present a serious missile hazard. Consideration of missile hazards should include primary missiles from the vessel in which the explosion originates, secondary missiles accelerated by the expanding blast wave, and the mass, shape, and velocity of the missiles. It should be noted that an improperly anchored or inadequately designed shield also can become a missile. The possibility of flames and dispersion of hot, corrosive, or toxic materials likewise should be considered.

Table C.3.1(a) Blast Effects from Detonations

Blast Effect	Range (ft) for Indicated Explosive Yield (TNT Equivalent)				Criteria
	0.1 g	1.0 g	10 g	100 g	
1% eardrum rupture	1.1	2.4	5.2	11	23.5 kPa ($P_i = 3.4$ psi)
50% eardrum rupture	0.47	1.0	2.2	4.7	110 kPa ($P_i = 16$ psi)
No blowdown	0.31	1.3	6.9	-30	57 kPa · msec ($I_i + I_q = 1.25$ psi · msec) 0.9 m/sec ($V_{max} = 0.3$ ft/sec)
50% blowdown	<0.1	0.29	1.1	4.1	57 kPa · msec ($I_i + I_q = 8.3$ psi · msec) 0.6 m/sec ($V_{max} = 2.0$ ft/sec)
1% serious displacement injury	<0.1	<0.2	<0.5	-1.1	373 kPa · msec ($I_i + I_q = 54$ psi · msec) $V_{max} 4$ msec ($V_{max} = 13$ ft/sec)
Threshold lung hemorrhage	<0.1	<0.2	0.5	1.8	180 kPa · msec ($I_i + I_q = 26$ psi · msec)
Severe lung hemorrhage	<0.1	<0.2	<0.5	-1.1	360 kPa · msec ($I_i + I_q = 52$ psi · msec)
1% mortality	<0.1	<0.2	<0.5	<1	590 kPa · msec ($I_i + I_q = 85$ psi · msec)
50% mortality	<0.1	<0.2	<0.5	<1	900 kPa · msec ($I_i + I_q = 130$ psi · msec)
50% large 1.5 m ² to 2.3 m ² (16 ft ² to 25 ft ²) windows broken	0.26	1.1	5.7	-30	21 kPa · msec ($I_r = 3$ psi · msec)
50% small 0.12 m ² to 0.56 m ² (1.3 ft ² to 6 ft ²) windows broken	0.17	0.40	1.9	9.9	55 kPa · msec ($I_r = 8$ psi · msec)

For U.S. customary units, 1 g = 0.04 oz; 1 m = 3.3 ft.

P_i = peak incident overpressure kPa (psi)

V_{max} = maximum translational velocity for an initially standing man m/sec (ft/sec)

I_i = impulse in the incident wave kPa · msec (psi · msec)

I_q = dynamic pressure impulse in the incident wave kPa · msec (psi · msec)

I_r = impulse in the incident wave upon reflection against a surface perpendicular to its path of travel kPa · msec (psi · msec)

Note: The overpressure-distance curves of thermal explosions and deflagrations do not match those of TNT detonations. Nondetonation explosions have lower overpressures in close for comparable energy releases but carry higher overpressures to greater distances. The critical factor is impulse. Impulse is the maximum incident overpressure (psi) multiplied by the pulse duration (msec).

Table C.3.1(b) Criteria for Estimating Missile Injuries

Kind of Missile	Critical Organ or Event	Related Impact Velocity	
		m/sec	ft/sec
Nonpenetrating 4.5 kg (10 lb) object	Cerebral concussion: Threshold	4.6	15
	Skull fracture: Threshold Near 100%	4.6	15
		7.0	23
Penetrating* 10 g (0.35 oz) glass fragments	Skin laceration: Threshold	15	50
	Serious wounds: Threshold 50% 100%	30	100
		55	180
		91	300

*Eye damage, lethality, or paralysis can result from penetrating missiles at relatively low velocities striking eyes, major blood vessels, major nerve centers, or vital organs.

C.4.3 The likelihood of an explosion is estimated by considering such factors as the properties of the reactants; history of the reaction based on literature search, and so forth; possible intermediates and reaction products; pressure, volume, stored energy, design integrity, and safety factors of

reaction vessels; pressure relief provisions, in the case of pressure vessels; and explosive limits, quantities, oxygen enrichment, and so forth, of flammable gases or vapors. The term *likelihood*, rather than *probability*, is used to describe an estimated event frequency based on experience, knowledge, or intuitive reasoning, rather than on statistical data. In general, there will be insufficient data to develop mathematical probabilities.

C.4.4 The consequences of an explosion can be estimated by considering the interactions of the explosion with personnel, equipment, and building components at varying distances from the center of the explosion. This analysis should include the following:

- (1) Numbers and locations of personnel
- (2) Injury and fatality potentials
- (3) Repair or replacement cost of equipment
- (4) Ability of the building or room or equipment to withstand the explosion and the cost to restore the facility equipment
- (5) Adverse impact on research and development and business interruption costs as a result of loss of use of facility

C.4.5 Figure C.4.5 provides guidance on distinguishing between high-pressure and low-pressure reactions.

Items in C.4.5.1 through C.4.5.3 apply to the classification of reactions in vessels as either high pressure or low

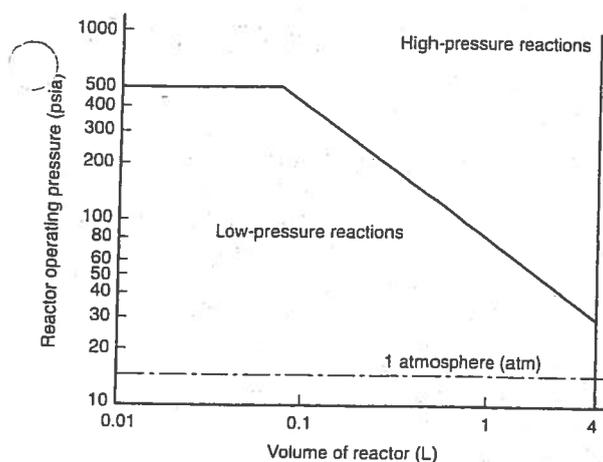


FIGURE C.4.5 Pressure Classification of Reactions.

C.4.5.1 Reactions that produce pressures below the curve in Figure C.4.5 are classified as low-pressure reactions.

An exception to this paragraph follows: Experimental reactions involving materials that are known to be inherently unstable, such as reactions with acetylenic compounds and certain oxidations, such as halogenations or nitrations, should be considered high-pressure reactions, even though they might fall below the curve in Figure C.4.5.

C.4.5.2 Reactions that produce pressures above the curve in Figure C.4.5 should be classified as high-pressure reactions.

An exception to this paragraph follows: Routine reactions where pressures and temperatures are expected between certain predetermined limits based on long experience or routine work might be considered low-pressure reactions, if the reaction vessel is built of suitable materials, has an adequate safety factor, and is provided with pressure relief in the form of a properly designed safety relief valve or a rupture disc that discharges to a safe location.

C.4.5.3 Items C.4.5.3.1 through C.4.5.3.4 contain recommendations for protecting against explosion hazards of reactions conducted above atmospheric pressures.

C.4.5.3.1 High-pressure experimental reactions should be conducted behind a substantial fixed barricade that is capable of withstanding the expected lateral forces. The barricade should be firmly supported at top and bottom to take these forces. At least one wall should be provided with explosion venting directed to a safe location. (See *NFPA 68, Standard on Explosion Protection by Deflagration Venting*.)

C.4.5.3.2 Reaction vessels should be built of suitable materials of construction and should have an adequate safety factor.

C.4.5.3.3 All reaction vessels should be provided with a pressure relief valve or a rupture disc.

C.4.5.3.4 Low-pressure reactions should be conducted in or behind portable barricades.

C.5 Explosion Hazard Protection.

C.5.1 It is important to remember that a conventional laboratory hood is not designed to provide explosion protection.

C.5.2 The design of explosion hazard protection measures should be based on the following considerations:

- (1) Blast effects, as follows:
 - (a) Impulse
 - (b) Rate and duration of pressure rise
 - (c) Peak pressure
 - (d) Duration of overpressure
 - (e) Velocity of the propagating pressure wave
 - (f) Residual overpressure and underpressure
- (2) Missiles, as follows:
 - (a) Physical properties of the material
 - (b) Mass
 - (c) Shape
 - (d) Velocity

C.5.3 Protection can be provided by one or more of the following methods:

- (1) Providing special preventive or protective measures (such as explosion suppression, high-speed fire detection with deluge sprinklers, explosion venting directed to a safe location, or explosion-resistant enclosures) for reactions, equipment, or the reactants themselves
- (2) Using remote control to minimize personnel exposure
- (3) Conducting experiments in a detached or isolated building, or outdoors
- (4) Providing explosion-resistant walls or barricades around the laboratory
- (5) Limiting the quantities of flammable or reactive chemicals used in or exposed by the experiments
- (6) Limiting the quantities of reactants of unknown characteristics to fractional gram amounts until the properties of intermediate and final products are well established
- (7) Providing sufficient explosion venting in outside walls to maintain the integrity of the walls separating the hazardous laboratory work area from adjacent areas (Inside walls should be of explosion-resistant construction.)
- (8) Disallowing the use of explosion hazard areas for other nonexplosion hazard uses
- (9) Locating offices, conference rooms, lunchrooms, and so forth, remote from the explosion hazard area

C.5.4 **Explosion-Resistant Hoods and Shields.** Laboratory personnel can be protected by specially designed explosion-resistant hoods or shields for TNT equivalencies up to 1.0 g (0.04 oz). For slightly greater TNT equivalencies, specially designed hoods provided with explosion venting are required. For TNT equivalencies greater than 2.0 g (0.07 oz), explosion-resistant construction, isolation, or other protective methods should be used.

C.5.4.1 Conventional laboratory hoods are not designed to provide explosion protection.

C.5.4.2 When explosion-resistant hoods or shields are used, they should be designed, located, supported, and anchored so as to do the following:

- (1) Withstand the effects of the explosion
- (2) Vent overpressures, injurious substances, flames, and heat to a safe location
- (3) Contain missiles and fragments
- (4) Prevent the formation of secondary missiles caused by failure of hood or shield components

C.5.4.3 Commercially available explosion shields should be evaluated against the criteria of C.5.4.2 for the specific hazard.

C.5.4.4 Mild steel plate offers several advantages for hood and shield construction. It is economical, easy to fabricate, and tends to fail, at least initially, by bending and tearing, rather than by spalling, shattering, or splintering.

The use of mirrors or closed-circuit television to view the experiments allows the use of nontransparent shields without hampering the experimenter.

C.5.4.5 When transparent shields are necessary for viewing purposes, the most common materials used are safety glass, wire-reinforced glass, and acrylic or polycarbonate plastic. Each of these materials, although providing some missile penetration resistance, has a distinct failure mode.

Glass shields tend to fragment into shards and to spall on the side away from the explosion. Plastics tend to fail by cracking and breaking into distinct pieces. Also, plastics can lose strength with age, exposure to reactants, or mechanical action. Polycarbonates exhibit superior toughness compared to acrylics.

Glass panels and plastic composite panels (safety glass backed with polycarbonate, with the safety glass toward the explosion hazard) have been suggested as an improved shield design. The glass blunts sharp missiles, and the polycarbonate contains any glass shards and provides additional resistance to the impulse load.

C.5.5 Explosion-Resistant Construction. As explained in C.5.4, explosion-resistant construction can be required for TNT equivalencies greater than 2.0 g (0.07 oz). Explosion-resistant construction should be designed based on the anticipated blast wave, defined in terms of peak impulse pressure and pulse duration, and the worst-case expected missile hazard, in terms of material, mass, shape, and velocity. Missile velocities of 305 m/sec to 1220 m/sec (1000 ft/sec to 4000 ft/sec) normally can be expected.

C.5.5.1 The response of a wall to an explosive shock is a function of the pressure applied and of the time period over which the pressure is applied. The pressure-time product is known as impulse.

Detonations of small quantities of explosive materials usually involve very short periods of time (tenths of milliseconds) and high average pressure.

Gaseous deflagrations usually involve longer time periods and low average pressures.

C.5.5.2 Information on design of explosion-resistant walls and barricades can be obtained from references in Annex G.

C.5.6 Explosion Venting. Peak pressure and impulse loadings resulting from deflagrations (not detonations) can be significantly reduced by adequate explosion venting. (See *NFPA 68, Standard on Explosion Protection by Deflagration Venting, for information on calculating required vent areas.*)

C.5.6.1 Explosion vents should be designed and located so that fragments will not strike occupied buildings or areas where personnel could be located. Blast mats, energy-absorbing barriers, or earthen berms can be used to interrupt the flight of fragments.

C.5.6.2 An air blast, unlike a missile, is not interrupted by an obstacle in its line of travel. Instead, the blast wave will diffract around the obstacle and, except for slight energy losses, is essentially fully reconstituted within five to six obstacle dimensions beyond the obstacle. However, in the case of a small

[TNT equivalence of 100 g (3.5 oz) or less] explosion, the wave decay with distance can more than offset the reinforcement phenomena.

Annex D Supplementary Information on the Concept of the Laboratory Unit

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

D.1 Definitions. The following terms, defined in Section 3.3 of this standard, are essential to the understanding of this annex:

- (1) Laboratory
- (2) Laboratory work area
- (3) Laboratory unit
- (4) Laboratory unit separation

D.2 Basic Concepts.

D.2.1 The concept of a laboratory is too nebulous to be used for establishing requirements for fire protection. The term *laboratory* has too many differing and conflicting interpretations.

D.2.2 The requirements of this standard are based on the concept of the laboratory work area and the laboratory unit.

D.2.3 The term *laboratory work area* applies to any area that serves the purpose of a laboratory. It need not be enclosed. If enclosed, it need not constitute an individual fire area. If the boundaries of a laboratory work area do coincide with fire separation from adjacent areas, then that laboratory work area is also a laboratory unit and is more properly defined as such.

D.2.4 The term *laboratory unit* is meant to comprise any separate fire area that contains one or more laboratory work areas. The fire resistance rating of the separation between the laboratory unit and adjacent areas, or below, is dependent on the size of the unit; its class, according to Chapter 4; amounts of flammable and combustible liquids; and the presence, or lack, of an automatic extinguishing system.

Consider the laboratory unit shown in Figure D.2.4(a); the laboratory unit is totally enclosed by a fire separation. This

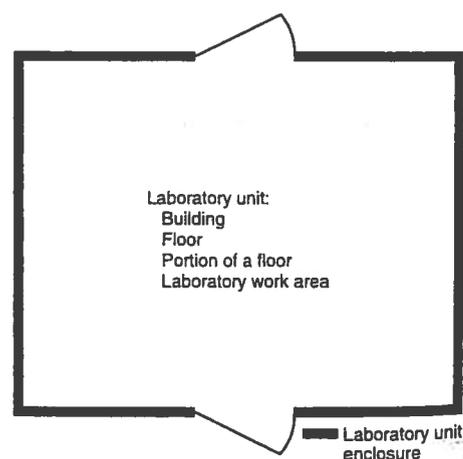


FIGURE D.2.4(a) Laboratory Unit.

laboratory unit can be an entire building, just one floor of a building, or only a portion of one floor of a building.

Figure D.2.4(b) shows the same laboratory unit, but with more details added. Note that, by adding work benches and a desk, the laboratory unit is now divided into three distinct work areas and a non-laboratory area, namely the office area. Further, although there is no physical separation between these four areas, other than the furniture, they are still separate and distinct and can be so treated. For example, smoking might be allowed at the desk but not in the work areas. Or, the work area at the upper left quadrant might be restricted to very simple, nonhazardous routines.

In Figure D.2.4(c), the work areas and the office area shown in Figure D.2.4(b) are separated by physical barriers, most likely the steel panel and glass partitions commonly used in laboratory

partitioning. Although the partitions have no fire resistance rating, they still afford a minimal degree of protection.

Figure D.2.4(d) shows an entirely different situation. The corridor is now a required means of exit access. Therefore, it should be separated from the laboratory units by fire-rated construction. This converts the single laboratory unit into two laboratory units: one having two separate workrooms and one having a workroom and an office.

Figure D.2.4(e) shows how a non-laboratory area and a Class C laboratory unit are separated both from each other and from an exit passageway. On the other side of the means of exit access, the two laboratory work areas of Figure D.2.4(e) are now separated by a fire partition into two laboratory units of differing class.

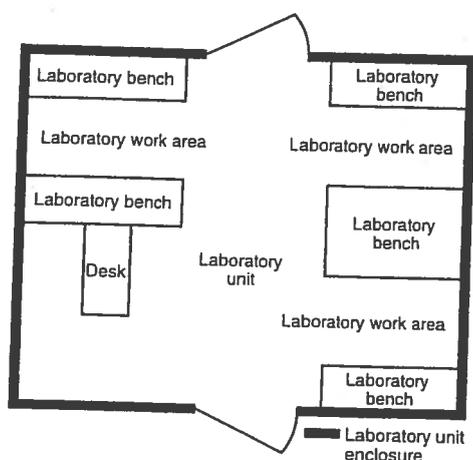


FIGURE D.2.4(b) Laboratory Unit Without Partitioning.

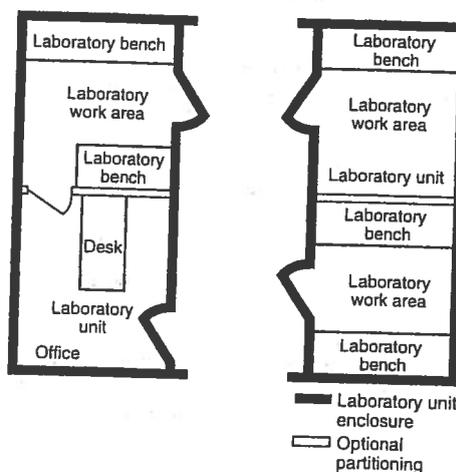


FIGURE D.2.4(d) Laboratory Units Separated by an Exit Passageway.

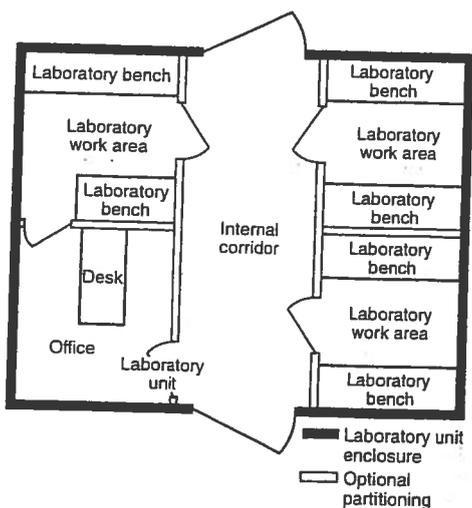


FIGURE D.2.4(c) Laboratory Unit with Optional Partitioning.

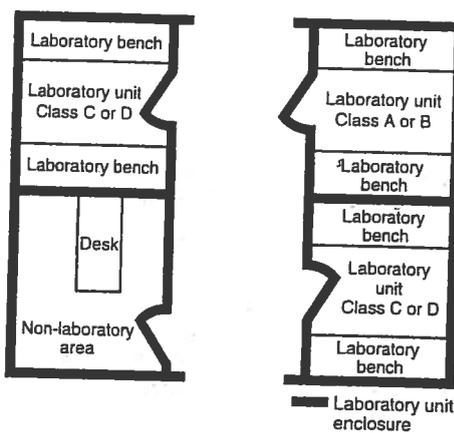


FIGURE D.2.4(e) Separation of Laboratory Units and Non-Laboratory Areas.

D.3 Factors Affecting Laboratory Unit Fire Hazard Classification.

D.3.1 The primary factor in determining laboratory unit fire hazard classification is the quantity of Class I, Class II, and Class IIIA liquids, as defined in Annex B. A survey of flammable liquid usage and storage in any particular laboratory unit should identify the quantities of Class I liquids alone and Class I, Class II, and Class IIIA liquids combined. The survey should differentiate between the total amounts present and the amounts that are not stored in approved storage cabinets or safety cans. Further, flammable and combustible liquids inside liquid storage areas meeting the requirements of NFPA 30, *Flammable and Combustible Liquids Code*, are disregarded.

D.3.2 As shown in Table 10.1.1(a) and Table 10.1.1(b), maximum quantities of liquids differ by a factor of 2, depending on the presence or absence of automatic sprinkler protection (or equivalent protection).

D.3.3 The area of the laboratory unit will establish whether the quantities of Class I or Class I, Class II, and Class IIIA liquids actually present exceed the maximum limits specified in Table 10.1.1(a) and Table 10.1.1(b).

D.3.4 The construction requirements in Table 5.1.1 will establish whether the actual laboratory unit separation is proper for the laboratory unit fire hazard class and size.

D.4 Correcting Nonconforming Laboratory Units. The simplest, most obvious means of handling a noncomplying laboratory unit is to reduce the quantities of flammable and combustible liquids present. This could involve moving some liquids to an inside liquid storage area, but the chances are that a surprising amount of such liquids is not in frequent use and could even be of no value at all.

D.5 New Construction. In new construction, the laboratory designer should determine the intended use of each laboratory work area and intended storage levels of Class I, Class II, and Class IIIA liquids. Then, based on this information and desired space requirements, the laboratory designer can determine the probable laboratory unit fire hazard class, allowable area (as specified in Table 5.1.1), and construction requirements.

Annex E Flammability Characteristics of Common Compressed and Liquefied Gases

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

E.1 Table E.1 presents the flammability characteristics of common compressed and liquefied gases. The information provided in Table E.1 is not intended to be inclusive or exhaustive. Furthermore, practically all compressed and liquefied gases present varying health hazards to laboratory or emergency personnel. Therefore, the user is urged to seek additional information from reliable references to adequately assess the reactivity or toxicity of the material.

Table E.1 Flammability Characteristics of Common Compressed and Liquefied Gases

Gas	Flammable Limits (if flammable, percent by volume)	Reference Source
Acetylene	2.5-82	MGD
Allene*	1.5-11.5	MGD
Ammonia*	15-28	MGD
Arsine*	5.1-78	NIOSH
Boron Trichloride*	(a)	MGD
Boron Trifluoride	(a)	MGD
1,3-Butadiene*	2-12	627
n-Butane	1.6-8.4	325
iso-Butane*	1.8-8.4	325
1-Butene*	1.6-10	627, 325
2-Butene*	1.7-9.7	627
Carbon Monoxide	12.5-74	627
Carbonyl Chloride (Phosgene)*	(a)	NIOSH
Carbonyl Fluoride*	(a)	NIOSH
Carbonyl Sulfide*	12-29	325
Chlorine	(a)	NIOSH
Chlorine Dioxide*	(b)	NIOSH
Chlorine Trifluoride*	(a)	NIOSH
1-Chloro-1,1-difluoroethane*	9-14.8	MGD
Chlorotrifluoroethylene*	8.4-38.7	MGD
Cyanogen*	6-32	MGD
Cyanogen Chloride*	(a)	NIOSH
Cyclopropane*	2.4-10.4	MGD, 627
Deuterium	5-75	325
Diazomethane*	(b)	NIOSH
Diborane	0.8-98	325, 627
1,1-Difluoroethane*	3.7-18	MGD
1,1-Difluoroethylene*	5.5-21.3	MGD
Dimethyl Ether*	3.4-27	325, 627
2,2-Dimethyl Propane*	1.4-7.5	325, 627
Ethane*	3.0-12.5	MGD, 325, 627
Ethylacetylene*	(b)	MGD
Ethylamine*	3.5-14	325
Ethyl Chloride*	3.8-15.4	325
Ethylene	2.7-36	325, 627
Ethylene Oxide*	3-100	MGD
Fluorine	(a)	NIOSH
Formaldehyde	7-73	325
Germane	(b)	MGD
Hexafluoroacetone*	(a)	NIOSH
Hydrogen	4-75	325, 627
Hydrogen Bromide*	(a)	NIOSH
Hydrogen Chloride*	(a)	NIOSH
Hydrogen Cyanide*	5.6-40	325, 627
Hydrogen Fluoride*	(a)	NIOSH
Hydrogen Iodide*	(a)	MGD
Hydrogen Selenide*	(b)	NIOSH
Hydrogen Sulfide	4-44	325, 627
Ketene	(b)	NIOSH
Methane	5-15	325, 627
Methylacetylene* (Propyne)	2-11.1	325
Methylamine*	4.9-20.7	325
Methyl Bromide*	10-16	325

Table E.1 Continued

Gas	Flammable Limits (if flammable, percent by volume)	Reference Source
3-Methyl-1-butene*	1.5-9.1	325, 627
Methyl Chloride*	8.1-17.4	325
Methyl Fluoride*	(b)	MGD
Methyl Mercaptan*	3.9-21.8	325
2-Methylpropene	1.8-9.6	325, 627
Natural Gas	3.8/6.5-13/17	325
Nitric Oxide	(a)	NIOSH
Nitrogen Dioxide*	(a)	MGD
Nitrogen Trioxide*	(a)	MGD
Nitrogen Trifluoride	(a)	MGD
Nitrosyl Chloride*	(a)	MGD
Oxygen	(a)	MGD
Oxygen Difluoride	(a)	NIOSH
Ozone	(a)	NIOSH
iso-Pentane*	1.4-7.6	325
Perchloryl Fluoride*	(a)	NIOSH
Phosphine*	(c)	NIOSH
Propane*	2.1-9.5	325, 627
Propylene*	2.0-11.1	325
Selenium Hexafluoride	(a)	NIOSH
Silane	(c)	MGD
Silicon Tetrafluoride	(a)	MGD
Stibine	(b)	NIOSH
Sulfur Dioxide*	(a)	NIOSH
Sulfur Tetrafluoride*	(a)	NIOSH
Suluryl Fluoride*	(a)	NIOSH
Tetrafluoroethylene*	10/11-50/60	MGD, 325
Tetrafluorohydrazine	(b)	MGD
Trimethylamine*	2-11.6	MGD, 325
Vinyl Bromide*	9-15	325
Vinyl Chloride*	3.6-33	325, 627
Vinyl Fluoride*	2.6-21.7	MGD
Vinyl Methyl Ether*	2.6-39	MGD

Notes:

(1) Flammable range:

- (a) Not flammable
- (b) Flammable, but range not reported
- (c) Spontaneously flammable

(2) Reference sources for flammable range:

325 — NFPA 325, *Guide to Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids*. Although NFPA 325 has been officially withdrawn from the *National Fire Codes*[®], the information is still available in NFPA's *Fire Protection Guide to Hazardous Materials*.

627 — U.S. Bureau of Mines Bulletin 627, *Flammability Characteristics of Combustible Gases and Vapors*.

MGD — *Matheson Gas Data Book*.

NIOSH — National Institute for Occupational Safety and Health, *Pocket Guide to Chemical Hazards*.

* Liquefied gas.

Annex F Safety Tips for Compressed Gas Users

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

General Hazards. Thoroughly know the hazards of the gas are using. All compressed gases have the pressure hazard, but

a gas can also have more hazards; gases can be toxic, corrosive, flammable, asphyxiating, oxidizing, pyrophoric, and/or reactive. All these factors can impact the design of the system and how the gases are utilized.

F.2 Eye Protection. Always wear eye protection when working on or near compressed gas systems. Make it your job not to let anyone without eye protection into any area where compressed gases are used or stored.

F.3 Train Users. Never let anyone use or connect a cylinder to any system unless that person is trained and knowledgeable in the dangers of pressure, the chemical properties of the compressed gas, and the proper Compressed Gas Association (CGA) compressed gas fittings and connections.

F.4 Cylinder Identification. Do not use a compressed gas cylinder unless the cylinder is clearly marked or labeled with the cylinder's contents. Reject any cylinder that is unmarked or has conflicting markings or labels. Never rely on the color of the cylinder to identify the contents. If there is any conflict or doubt concerning the contents, do not use the cylinder. Return it to your vendor.

F.5 Cylinder Content. Be certain that the content of the cylinder is the correct product for use in the system to which you are connecting it.

F.6 Regulator Use. Never use a compressed gas cylinder without a pressure-reducing regulator or device that will safely reduce the cylinder pressure to the pressure of your system. Only use regulators that have both a high-pressure gauge and a low-pressure gauge. This allows you to monitor both the pressure in the compressed gas cylinder and the pressure in the system.

F.7 Pressure Gauge Use. As per ANSI B 40.1, *Pressure Gauges and Gauge Attachments*, never use a gauge above 75 percent of its maximum face reading. For example, a 20,700 kPa (3000 psi) system should use at least 27,600 kPa (4000 psi) gauges. If your system can achieve a maximum pressure of 517 kPa (75 psi), the gauge monitoring the system should be at least 690 kPa (100 psi). (Immediately replace any gauge whose pointer does not go back to its zero point when pressure is removed.)

F.8 Valves. Be sure the valve on the compressed gas cylinder and the pressure-reducing regulator you are using have the proper CGA connections for the pure gas (CGA V-1) or gas mixture (CGA V-7) you are using. NEVER USE AN ADAPTOR BETWEEN A CYLINDER AND A PRESSURE-REDUCING REGULATOR.

F.9 Proper Connection. Be certain the CGA connection(s) on the cylinder and the pressure-reducing regulator fit together properly without being too loose or too tight. Proper connections will go together smoothly. Never use excessive force to connect a CGA connection. NEVER USE AN AID, such as pipe dope or Teflon[®] tape, TO CONNECT A REGULATOR TO A CYLINDER.

F.10 Connections. Be certain that the pressure-reducing regulator you are using is compatible with the gas, and be certain that it is rated and marked for the maximum pressure rating of the CGA connection on the compressed gas cylinder valve you are attaching it to. All compressed gas cylinder connections can be found listed with their recommended gases and the maximum allowed pressures in CGA/ANSI V-1, *Standard for Compressed Gas Cylinder Valve Outlet and Inlet Connections*.

F.11 Regulator Compatibility. Never replace the CGA connection that the regulator manufacturer has put on a regulator with one for a different gas service. Only the regulator manufacturer or a trained service representative knows the gas compatibility of the regulator's internal design and can properly reclean the regulator.

F.12 Procedures. After attaching a pressure-reducing regulator to a compressed gas cylinder, do the following:

- (1) Turn the regulator's adjustment screw out (counterclockwise) until it feels loose.
- (2) Stand behind the cylinder with the valve outlet facing away from you.
- (3) Observe the high-pressure gauge on the regulator from an angle; do not pressurize a gauge while looking directly at the glass or plastic faceplate.
- (4) Open the valve handle on the compressed gas cylinder S-L-O-W-L-Y, until you hear the space between the cylinder valve gently fill the gas. (You can also watch the pressure rise on the high-pressure gauge. If you turned the regulator's adjustment screw back properly, there should be no gas flow out of the regulator or pressure rise on the low-pressure gauge.)
- (5) If you are using a nontoxic, nonflammable gas, you can ensure purity by shutting off the cylinder valve and gently cracking the CGA connection at the cylinder valve. (Generally, three pressurizations with venting will ensure the interior of the connection has a clean, representative sample of the gas in the compressed gas cylinder. For toxic or flammable gases, you can purchase special venting regulators that can be safely vented to a fume hood or vented gas cabinet.)
- (6) When you are ready to use the compressed gas cylinder, fully open the cylinder valve until you feel it stop. Then, close it one-quarter turn. (A fully open valve that has no play in it can confuse a person who is checking to see if it is open. Many accidents have been recorded by people trying to open a previously fully opened valve by using a large wrench.)
- (7) Use the following practices on acetylene cylinders to allow quick closing of the valve in the event of an emergency:
 - (a) Open acetylene cylinder valves no more than one and one-half turns.
 - (b) Leave the wrench on the valve spindle when the cylinder is being used, if the acetylene cylinder has a T-wrench instead of a hand-wheel valve.

F.13 Pressure Relief. Make sure any system you are pressurizing (piping, manifolds, containers, etc.) that can be isolated or closed off has its own pressure-relief device. It is the user's responsibility to see that the system has proper pressure-relief device(s) built into it. Do not rely on the relief device on the compressed gas cylinder's regulator; it is not designed to protect downstream systems. This is very critical when cryogenic liquids are used. Pressure-relief discharge points should be vented to safe locations (not directed toward people or routed to safe locations for hazardous gases).

F.14 Cylinders Not in Use. Shut off cylinders that are not in use. Always have a cylinder cap on any cylinder that is being stored or is not in use.

F.15 Backflow Precautions. Use backflow check valves where flammable and oxidizing gases are connected to a common piece of equipment or where low- and high-pressure gases are connected to a common set of piping. Do not rely on a closed valve to prevent backflow.

F.16 Pressure Relief. The relief device on a cylinder of liquefied flammable gas (generally found on the cylinder valve) always should be in direct contact (communication) with the vapor space of the cylinder in both use and storage. Never lay a cylinder of liquefied flammable gas on its side unless it is so designed (and so marked) to allow that positioning, as in the case of propane cylinders for forklift trucks.

F.17 Protection of Cylinders in Use. Cylinders in use should be secured by a holder or device specifically designed to secure a cylinder. Never stand a single cylinder in an open area unsecured. Always protect cylinders from dangers of overhead hazards, high temperatures, and other sources of damage, such as vehicle traffic.

F.18 Moving Cylinders. Always use a cylinder cart to move large cylinders or specially designed cylinder holders to carry small cylinders. Never pick up a cylinder by its cap.

F.19 Refilling. Never refill a cylinder or use a cylinder for storing any material. If gas is accidentally forced back or sucked back into a cylinder, mark the cylinder well and inform your gas supplier. (Almost all recent deaths involving compressed gas cylinders occurred as users were putting gas back into cylinders and fillers at the compressed gas plants.)

F.20 Asphyxiation. Possibly the greatest hazard to a user of compressed gases — and especially users of cryogenic fluids — is asphyxiation. Remember that, except for oxygen and for air with at least 19.5 percent oxygen, ALL GAS IS AN ASPHYXIAN. Vent gas only into safe and properly ventilated locations outside the building or fume hood. EXPOSURE TO AN ATMOSPHERE THAT HAS 12 PERCENT OR LESS OXYGEN WILL BRING ABOUT UNCONSCIOUSNESS WITHOUT WARNING AND SO QUICKLY THAT THE INDIVIDUAL CANNOT HELP OR PROTECT THEMSELVES.

F.21 Cryogenic Gases. If you are transferring cryogenic gases inside or have equipment using cryogenic gases that vents anything more than a few cubic centimeters of gas per minute inside (i.e., not to a hood), you should have adequate 24-hour ventilation and install continuous oxygen meter(s)/monitor(s) with a "low oxygen" alarm.

Remember, all compressed gases are hazardous; understand those hazards completely and design your system accordingly. The major compressed gas vendors have the technical expertise available to support users. NEVER BECOME COMPLACENT WHEN USING A COMPRESSED GAS. Always respect the hazards and treat them accordingly.

Annex G Informational References

G.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.

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

NFPA 30, *Flammable and Combustible Liquids Code*, 2008 edition.

NFPA 68, *Standard on Explosion Protection by Deflagration Venting*, 2007 edition.

NFPA 69, *Standard on Explosion Prevention Systems*, 2008 edition.

- NFPA 70[®], *National Electrical Code*[®], 2011 edition.
- NFPA 77, *Recommended Practice on Static Electricity*, 2007 edition.
- NFPA 86, *Standard for Ovens and Furnaces*, 2011 edition.
- NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 2009 edition.
- NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids*, 2010 edition.
- NFPA 92A, *Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences*, 2009 edition.
- NFPA 101[®], *Life Safety Code*[®], 2009 edition.
- NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment*, 2008 edition.
- NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 2007 edition.
- NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*, 2008 edition.
- NFPA 1975, *Standard on Station/Work Uniforms for Emergency Services*, 2009 edition.
- NFPA 5000[®], *Building Construction and Safety Code*[®], 2009 edition.
- Fire Protection Guide to Hazardous Materials*, 13th edition, 2001.
- G.1.2 Other Publications.**
- G.1.2.1 AMCA Publication.** Air Movement and Control Association International, Inc., 30 West University Drive, Arlington Heights, IL 60004-1893.
- AMCA Standards Handbook 99-0401-86, *Classification for Spark Resistant Construction*, 1986.
- G.1.2.2 ANSI Publications.** American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.
- ANSI/AIHA Z9.5, *Laboratory Ventilation*, 2003.
- ANSI/ASME A13.1, *Scheme for the Identification of Piping Systems*, 2007.
- ANSI B40.1, *Pressure Gauges and Gauge Attachments*, 2005.
- G.1.2.3 ASHRAE Publications.** American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., 1791 Tullie Circle, NE, Atlanta, GA 30329-2305.
- ASHRAE *Handbook of Fundamentals*, Chapter 14, "Airflow Around Buildings," 2007.
- ASHRAE 110, *Method of Testing Performance of Laboratory Fume Hoods*, 1995.
- G.1.2.4 ASME Publications.** American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.
- ASME *Boiler and Pressure Vessel Code*, Section VIII, "Rules for Construction of Pressure Vessels," Division 1, 2007.
- ASME B31.1, *Power Piping*, 2007.
- ASME B31.3, *Process Piping*, 2006.
- G.1.2.5 ASTM Publications.** ASTM International, 100 Barr Harbor Drive, P. O. Box C700, West Conshohocken, PA 19428-2959.
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- ASTM D 323, *Standard Method of Test for Vapor Pressure of Petroleum Products (Reid Method)*, 2006.
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1 leap, there's other things that's been done, I've just replaced
2 a unit after twenty years and you talk about tremendous cost
3 savings and one of the new units and we've experienced huge
4 costs savings throughout with energy. With the combination of
5 that and what's in the houses work and maybe we should wait just
6 49 to see how the new equipment is working. As a consumer, I'd
7 ask you all to take a look at that and are we making houses too
8 high priced and the causes for moisture and mold. Again, my
9 personal experience, the new units, our air conditioning units
10 we put in we paid a little extra for them but the cost savings
11 was tremendous and it shocked me as much as fifty to a hundred
12 dollars a month in savings just replacing the unit. Thank you
13 very much.

14 MR. CALHOUN: On the Virginia Statewide
15 Fire Prevention Code, Amy Hager.

16 MS. HAGER: My name is Amy Hager, Bed
17 and Breakfast Association of Virginia. We've been very involved
18 with the state fire marshal's office learning about fire and
19 safety requirements and really this code kind of thing, it's
20 really taught us a little more over the last few months. So if
21 you want to take a quick run to the state fire marshal's office
22 and if you do that you can basically and have a core group.
23 Everyone agrees that fire safety is very important and very key.
24 Our state association and we do have our own inspection
25 process, which we do require our bed and breakfasts to pass our

1 fire inspection procedures. Now, the state fire marshal's
2 office has suggested in making changes to the code that would
3 require an annual inspection of hospitals, motels and B&Bs.
4 Because 65% of those members are two rooms to five rooms, we're
5 obviously smaller than hospitals and to have a required
6 inspection fee without a guarantee of inspection is the only
7 issue we have with the change in the code. We feel our numbers
8 are small where they wouldn't get inspected annually and
9 therefore this new change would really prevent or create any
10 more safety among our members. The one suggestion that we do
11 have and that we think is fair and we in rewriting the change is
12 that you pay for your inspection once you've been inspected
13 before you get a certificate of inspection. We agree fire can
14 definitely be a hot priority especially in our association with
15 our members. But our members are so much smaller compared to
16 others and we feel that in comparison to others, we feel just
17 that change in the wording would be much better for our smaller
18 members. Thank you.

19 MR. CALHOUN: Comments for the Virginia
20 Uniform Statewide Building Code, Eddy Aliff.

21 MR. ALIFF: I'm Eddy Aliff with Virginia
22 Association of Baptists. We represent the small Christian
23 schools and should be in a group B section. There was an
24 amendment that you folks introduced about reducing the square
25 footage of sprinkling from 20,000 down to 12,000. We always