Second Revision No. 11-NFPA 45-2022 [Global Comment]

See attached Word file to reflect updates to extract material throughout the document.

Supplemental Information

File Name	Description	Approved
45_EC_67_MB_updates.docx	Updates to extract material. Final for production.	
45_SR-11_Extract-updates_FINAL.docx	For ballot	

Submitter Information Verification

Committee: LAB-AAA
Submittal Date: Mon Jun 06 10:10:29 EDT 2022

Committee Statement

Committee Statement: Extract material updated to reflect current language in the source documents.
Response Message: SR-11-NFPA 45-2022

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3.3.22 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,** 2021]

3.3.25 Glove Box.
A sealed enclosure in which items inside the box are handled exclusively using long gloves sealed to ports in the walls of the enclosure. [**801,** 2020~~2021~~]

3.3.26* Health Care Facilities.
Buildings, portions of buildings, or mobile enclosures in which human medical, dental, psychiatric, nursing, obstetrical, or surgical care is provided. (FUN) [**99,** 2021]

3.3.58 Safety Can.
A listed container~~,~~ of not more than 5.3 gal (20L) capacity~~,~~ having a screen or strainer in each fill and pour opening and having a spring-closing lid and spout cover designed to safely relieve internal pressure when exposed to fire. [**30,** 2021]

6.1.1.3
A sprinkler system installed in accordance with NFPA 13 shall be ~~properly~~ inspected, tested, and maintained by the property owner or their authorized representative in accordance with NFPA 25 to ~~provide at least the same level of performance and protection as designed~~ensure the system continues to provide a reasonable degree of protection for life and property from fire. [**13:**32.1].

A.3.3.26 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. This definition applies to normal, regular operations and does not pertain to facilities during declared local or national disasters. A health care facility is not a type of occupancy classification as defined by NFPA *101*. Therefore, the term *health care facility* should not be confused with the term *health care occupancy*. All health care occupancies (and ambulatory health care occupancies) are considered health care facilities; however, not all health care facilities are considered health care occupancies, as health care facilities also include ambulatory health care occupancies and business occupancies. [**99,** 2021~~2018~~]

A.3.3.44 Liquid (Physical State).
A material with a Reid vapor pressure greater than an absolute pressure of 40 psi (276 kPa) is considered to be a gas and is, therefore, not within the scope of NFPA 30. See NFPA 58. [**30**, 2021~~:A.3.3.34~~]

A.3.3.44.3 Ignitible Liquid.
Unless otherwise specified, the term *liquid* means an ignitible liquid. [**30**, 2021~~:A.3.3.34.3~~]

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The term *ignitible liquid* refers to any liquid that has a measurable closed-cup flash point. Class I liquids [FP < 100°F (37.8°C)], Class II and Class III liquids [FP ≥ 100°F (37.8°C)], and inflammable liquids are all ignitible liquids. [**30**, 2021~~:A.3.3.34.3~~]

B.1.1.1.2
Class I liquids shall be further subclassified in accordance with the following:

1. *Class IA Liquid.* A 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.* A 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.* A liquid that has a flash point at or above 73°F (22.8°C), but below 100°F (37.8°C).

[**30:**4.2.1.2]

B.2.2 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.2.2. [**704:**5.2]
Table B.2.2 Degrees of Health Hazards

Degree of Hazard*	Criteria†
4 — Materials that, under emergency conditions, can be lethal	Gases whose LC_{50} for acute inhalation toxicity is less than or equal to 1000 parts per million (ppm) Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than ten times its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 1000 ppm Dusts and mists whose LC_{50} for acute inhalation toxicity is less than or equal to 0.5 milligrams per liter (mg/L) Materials whose LD_{50} for acute dermal toxicity is less than or equal to 40 milligrams per kilogram (mg/kg) Materials whose LD_{50} for acute oral toxicity is less than or equal to 5 mg/kg
3 — Materials that, under emergency conditions, can cause serious or permanent injury	Gases whose LC_{50} for acute inhalation toxicity is greater than 1000 ppm but less than or equal to 3000 ppm Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4 Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L

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Degree of Hazard*	Criteria†
	Materials whose LD_{50} for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg Materials that are corrosive to the respiratory tract Materials that are corrosive to the eye or cause irreversible corneal opacity Materials that are corrosive to skin Cryogenic gases that cause frostbite and irreversible tissue damage Compressed liquefied gases with boiling points at or below –55°C (–66.5°F) that cause frostbite and irreversible tissue damage Materials whose LD_{50} for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg
2 — Materials that, under emergency conditions, can cause temporary incapacitation or residual injury	Gases whose LC_{50} for acute inhalation toxicity is greater than 3000 ppm but less than or equal to 5000 ppm Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC_{50} for acute inhalation toxicity, if its LC_{50} 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 Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 10 mg/L Materials whose LD_{50} for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg 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 Materials that are respiratory irritants Materials that cause severe but reversible irritation to the eyes or lacrimators Materials that are primary skin irritants or sensitizers Materials whose LD_{50} for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg
1 — Materials that, under emergency conditions, can cause significant irritation	Gases and vapors whose LC_{50} for acute inhalation toxicity is greater than 5000 ppm but less than or equal to 10,000 ppm Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 10 mg/L but less than or equal to 200 mg/L Materials whose LD_{50} for acute dermal toxicity is greater than 1000 mg/kg but less than or equal to 2000 mg/kg Materials that cause slight to moderate irritation to the respiratory tract, eyes, and skin Materials whose LD_{50} for acute oral toxicity is greater than 500 mg/kg but less than or equal to 2000 mg/kg

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Degree of Hazard*	Criteria†
0 — Materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials	Gases and vapors whose LC_{50} for acute inhalation toxicity is greater than 10,000 ppm Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 200 mg/L Materials whose LD_{50} for acute dermal toxicity is greater than 2000 mg/kg Materials whose LD_{50} for acute oral toxicity is greater than 2000 mg/kg Materials that are essentially nonirritating to the respiratory tract, eyes, and skin

*For each degree of hazard, the criteria are listed in a priority order based upon the likelihood of exposure.

†See Section B.3 of NFPA 704 for definitions of LC50 and LD50. [**704:** Table 5.2]

B.2.3.1
This [section] shall address the degree of ~~intrinsic susceptibility of materials to release energy, and those materials capable of rapidly releasing energy by themselves, through~~ hazard due to reaction with ambient air, light, or both, and the degree of intrinsic susceptibility of materials to release energy by self-reaction or polymerization. [**704:**7.1.1]

B.2.3.5.1 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**:3.3.6.1~~, 2017~~]

B.2.3.5.2 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**:3.3.6.2~~, 2017~~]

B.2.4 Degrees of Flammability Hazard.
The degrees of flammability hazard shall be ranked according to the susceptibility of materials to burning as detailed in Table B.2.4. [**704:**6.2]
Table B.2.4 Degrees of Flammability Hazards

Degree of Hazard	Criteria
4 — Materials that rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and ~~will~~ burn readily.	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~~.~~

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Degree of Hazard	Criteria
	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.
3 — Liquids and solids (including finely divided suspended 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. See Annex D of NFPA 704 for more information on the ranking of combustible dusts.	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 ignitible dust cloud, such as finely divided sulfur; *NFPA 70*, *National Electrical Code* 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.
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 Under normal conditions, these materials would not form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating they could release vapor in sufficient quantities to produce hazardous atmospheres with air. Materials in this degree also include finely divided suspended solids that do not require heating before ignition can occur. See Annex D of NFPA 704 for more information on ranking of combustible dusts.	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 ignitible 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.
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. Materials in this degree also include finely divided suspended	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 D6668, *Standard Test Method for the Discrimination Between Flammability Ratings of F = 0 and F = 1*.

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Degree of Hazard	Criteria
solids that do not require heating before ignition can occur. See Annex D of NFPA 704 for more information on ranking of combustible dusts.	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 Method of Testing for Sustained Combustibility, per 49 CFR 173, Appendix H, or the UN publications *Recommendations on the Transport of Dangerous Goods, Model Regulations* and *Manual of Tests and Criteria*. 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 D92, *Standard Test Method for Flash and Fire Points by Cleveland Open Cup*, 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.
0 — Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand	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 ASTM D6668, *Standard Test Method for the Discrimination Between Flammability Ratings of F = 0 and F = 1*

[**704:** Table 6.2]

Table B.2.5 Degrees of Instability Hazards

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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

[**704:** Table 7.2]

Second Revision No. 4-NFPA 45-2022 [Global Comment]

Please see the attached Word document to reflect changes in Chapter 11 from the Task Group on Stored Energy.

Supplemental Information

File Name	Description	Approved
45_SR4_Section_11.3.docx	Please see Word doc to reflect revisions in Chapter 11 from the Task Group on Stored Energy.	
45_Global_SR-4_for_ballot.docx	For ballot.	

Submitter Information Verification

Committee: LAB-AAA

Submittal Date: Tue May 10 08:51:53 EDT 2022

Committee Statement

Committee Statement: Task Group on Stored Energy created revisions in Chapter 11 to address aspects of the stored energy hazard as it relates to various laboratory apparatus to provide adequate analysis of the hazards and enhance clarity.

Response Message: SR-4-NFPA 45-2022

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~~11.2.8.3~~ [moved to 11.3.5.1]

~~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.~~

11.2.8.3*

Quantities of reactants shall be limited and procedures shall be developed to control or isolate vigorous or exothermic reactions.

11.3.1 General.

11.3.1.1* [original 11.3.5.4.1]

~~Pressure containing equipment~~Laboratory apparatus shall have a hazard analysis and risk assessment of the potential for hazards, including stored energy, before use~~, including the need for leak testing and grounding~~.

A.11.3.1.1

The hazard analysis should include the following:

(1) Failure modes and consequences of failure

(2) Evaluations of safeguards and mitigations

(3) Routine inspections

(4) Leak testing

(5) Grounding and bonding requirements

One key aspect of the hazard analysis is pressure stored energy. This is a function of different factors. For more information on assessing the risk associated with the quantity of stored energy, see *Pressure Systems Stored-Energy Threshold Risk Analysis*.

11.3.1.2 [original 11.3.5.4.2]

The hazard analysis and risk assessment shall be maintained for the life of the equipment, updated as necessary based on revised operations and modifications, and communicated to all operating personnel.

11.3.1.3

Apparatus shall be installed in compliance with applicable requirements of NFPA standards, including *NFPA 70*, as well as manufacturer's recommendations and generally accepted good engineering practices.

11.3.1.4

Apparatus shall be operated and maintained according to the manufacturer's instructions, the design limitations of the equipment, and applicable codes and regulations.

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11.3.5 Pressure Equipment.

11.3.5.1
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.

11.3.5.2*
Equipment used at pressures above ~~103~~34 kPa gauge (~~15~~5 psi) shall ~~be designed and constructed by qualified individuals for use at the expected temperature, pressure, and other operating conditions affecting safety.~~meet the following:

(1) Be designed and constructed by qualified individuals for use at the expected temperature, pressure, and other operating conditions affecting safety.

(2) Be fitted with a pressure relief device, such as a rupture disc or a relief valve, that vents to a safe location.

(3) *Be inspected on a regular basis to ensure the equipment is in good condition (e.g., no corrosion, cracks, distortion, scale formation, general chemical attack, any weakening of the closure, or any inability of the equipment to maintain pressure).

A.11.3.5.2
Equipment used with the potential for pressure require that the designer be cognitive of the stored energy, potential failure modes, and design principles for each type of equipment that may be part of the system. Normally this is performed by the manufacturer of the apparatus but for in-house fabricated apparatus or systems, the designer should have their proposal reviewed and approved by a qualified individual before use.
Pressure vessels, in particular, 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.11.3.5.2(3)
The organization should have processes to address the results of the inspection, including removal from service, derating, or disposal of the apparatus and to document and communicate any change of status as needed.

~~11.3.5.2~~ [moved to 11.3.5.2(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.~~

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~~11.3.5.3~~

~~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.~~

~~11.3.5.3.1~~

~~Such equipment shall be inspected on a regular basis.~~

~~11.3.5.3.2~~

~~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.~~

~~11.3.5.3.3~~

~~Any pressure equipment that has been found to be degraded shall be derated or discarded, whichever is appropriate.~~

~~11.3.5.4 Hazard Analysis.~~

Second Revision No. 5-NFPA 45-2022 [Global Comment]

Please see the attached Word document to reflect updates in Chapter 5 and Chapter 7 from the Task Group on Laboratory Egress.

Supplemental Information

File Name	Description	Approved
45_SR5_Section_5.3_and_7.9.docx	Please see Word doc to reflect revisions in Section 5.3 and Section 7.9 from the Task Group on Laboratory Egress.	
45_Global_SR-5_for_ballot.docx	For ballot.	

Submitter Information Verification

Committee: LAB-AAA

Submittal Date: Tue May 10 08:56:38 EDT 2022

Committee Statement

Committee Statement: Revisions were made in Chapter 5 and Chapter 7 by the Task Group on Laboratory Egress to clarify requirements for a second means of egress from a laboratory work area based on the placement of fume hoods in the laboratory.

Response Message: SR-5-NFPA 45-2022

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5.3.1*

A second means of access to an exit shall be provided from a laboratory work area if any of the following situations exist *(see Annex D):*

(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 m^2 (500 ft^2).

(3) A laboratory work area within a Class B, Class C, or Class D laboratory unit exceeds 93 m^2 (1000 ft^2).

(4) ~~A hood in a laboratory work area is located adjacent to the means of exit access.~~

(4) A compressed gas cylinder larger than lecture bottle size [approximately 5 cm × 33 cm (2 in. × 13 in.)] is located so that it could prevent safe egress in the event of accidental release of cylinder contents.

(5) A cryogenic container is located so that it could prevent safe egress in the event of accidental release of container contents.

5.3.2

Laboratory work areas with a single means of access to an exit shall comply with all the following:

(1) *Chemical fume hoods shall not be located so as to block access to the exit in the event of an incident in the hood.

(2) *A qualified design professional and owner safety representative shall review the laboratory conditions through a hazard analysis or risk assessment to determine the appropriate location for the chemical fume hood.

A.5.3.2(1)

In laboratory work areas with a second remote means of access to an exit, the placement of any chemical fume hood is normally not an egress issue as a single incident is unlikely to block more than one egress path. Laboratory type incidents can include fires, spills, exothermic reactions, explosions, and runaway experiments or reactions.

A.5.3.2(2)

Determining if a chemical fume hood could block access to the exit in the event of an incident in the hood depends on a variety of factors, including the following:

(1) The type and amount of chemicals, the type of operations, and the pressures are factors. Larger amounts of chemicals in use, more reactive or flammable materials, more hazardous operations, or higher pressures could suggest the chemical fume hood should be at the rear of the laboratory work area.

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(2) The width of the access to the exit is a factor. Narrower access to the exit could suggest that there is a higher likelihood that an incident could block the access to the exit.

(3) The parallel position of the chemical fume hood to the aisle is a factor. If it is parallel to the aisle, an incident could extend across the access to the exit, or perpendicular to the access to the exit, where an incident is less likely to impinge upon the access to the exit.

(4) The length of the access to the exit is a factor. Very short length of access to the exits might have less potential for blockage.

Operation of any nearby doors, high traffic, or busy workstation areas can also affect proper chemical fume hood operation. (See 7.9.2.)

The hazard analysis and/or risk assessment should address all of these factors and any other relevant factors.

~~5.3.2~~ 5.3.3

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.

~~5.3.3*~~ 5.3.4

The required exit access doors of all laboratory work areas within Class C or Class D laboratory units shall be allowed to be installed in accordance with one of the following if permitted by the egress provisions of NFPA *101*:

(1) Swing in the direction of exit travel
(2) Swing against the direction of exit travel
(3) A horizontal sliding door

~~A.5.3.3~~

~~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* and *NFPA 5000* 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.~~

5.4* 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.

~~A.5.4~~

~~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~~

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~~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.~~

7.9 Chemical Fume Hood Location.

7.9.1*

Chemical fume hoods shall be located in areas of minimum air turbulence.

~~7.9.2~~

~~Chemical fume hoods shall not be located adjacent to a single means of access to an exit or to high-traffic areas.~~

7.9.2*

Work stations not directly related to the chemical fume hood activity shall not be located directly in front of chemical fume hood openings.

Second Revision No. 13-NFPA 45-2022 [Detail]

Add new reference in alpha order:

G.1.2.10

Paulsen, S. S. 2009. Pressure Systems Stored-Energy Threshold Risk Analysis. Pacific Northwest National Laboratory.

Submitter Information Verification

Committee: LAB-AAA

Submittal Date: Tue Jun 28 08:50:44 EDT 2022

Committee Statement

Committee Statement: Informational resource added in Section G.1.2.10 to reflect the mention of this resource in new annex material in Section 11.3.1.1 provided by the Task Group on Stored Energy. The committee initially voted at the second draft meeting to put the information reference in Section G.2, but during the editorial review was placed in G.1.2.10 since reference is mentioned in Annex A.

Response Message: SR-13-NFPA 45-2022

Second Revision No. 10-NFPA 45-2022 [Section No. 2.2]

2.2 NFPA Publications.

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

NFPA 1, *Fire Code,* 2021 edition.

NFPA 10, *Standard for Portable Fire Extinguishers,* 2022 edition.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam,* 2021 edition.

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

NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems,* 2022 edition.

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

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems,* 2023 edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection,* 2022 edition.

NFPA 17, *Standard for Dry Chemical Extinguishing Systems,* 2021 edition.

NFPA 17A, *Standard for Wet Chemical Extinguishing Systems,* 2021 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* 2023 edition.

NFPA 30, *Flammable and Combustible Liquids Code,* 2021 edition.

NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials,* 2021 edition.

NFPA 54, *National Fuel Gas Code,* 2021 edition.

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

NFPA 69, *Standard on Explosion Prevention Systems,* 2019 edition.

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

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

NFPA 80, *Standard for Fire Doors and Other Opening Protectives,* 2022 edition.

NFPA 86, *Standard for Ovens and Furnaces,* 2023 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems,* 2021 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids,* 2020 edition.

NFPA 99, *Standard for Health Care Facilities,* 2005 edition.

NFPA *101®*, *Life Safety Code®,* 2021 edition.

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

NFPA 495, *Explosive Materials Code,* 2023 edition.

NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment,* 2021 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response,* 2022 edition.

NFPA 750, *Standard on Water Mist Fire Protection Systems,* 2023 edition.

NFPA 770, *Standard on Hybrid (Water and Inert Gas) Fire-Extinguishing Systems,* 2021 edition.

NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials,* 2020 edition.

NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems,* 2022 edition.

NFPA 2112, *Standard on Flame-Resistant Clothing for Protection of Industrial Personnel*

Against Short-Duration Thermal Exposures from Fire, 2023 edition.

Submitter Information Verification

Committee: LAB-AAA
Submittal Date: Thu May 26 15:15:04 EDT 2022

Committee Statement

Committee Statement: Updated edition year of NFPA 801.
Response Message: SR-10-NFPA 45-2022

Second Revision No. 3-NFPA 45-2022 [Section No. 2.3.3]

2.3.4 ASTM Publications.

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

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

ASTM D4359, *Standard Test for Determining Whether a Material is a Liquid or a Solid*, 2019.

ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, ~~2021~~ 2021a .

Submitter Information Verification

Committee: LAB-AAA

Submittal Date: Tue Apr 26 11:40:46 EDT 2022

Committee Statement

Committee Statement: Second revision to update edition year of ASTM E84 and correct the title of ASTM D5/D5M.

Response Message: SR-3-NFPA 45-2022

Public Comment No. 4-NFPA 45-2021 [Section No. 2.3.3]

Second Revision No. 8-NFPA 45-2022 [Section No. 2.4]

2.4 References for Extracts in Mandatory Sections.

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

NFPA 30, *Flammable and Combustible Liquids Code,* 2021 edition.

NFPA 54, *National Fuel Gas Code,* 2021 edition.

NFPA 55, *Compressed Gases and Cryogenic Fluids Code,* 2020 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems,* 2021 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids,* 2020 edition.

NFPA 99, *Health Care Facilities Code,* 2021 edition.

NFPA *101*®, *Life Safety Code*®, 2021 edition.

NFPA 400, *Hazardous Materials Code,* ~~2019~~ 2022 edition.

NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials,* ~~2021~~ 2020 edition.

NFPA 5000®, *Building Construction and Safety Code*®, 2021 edition.

Submitter Information Verification

Committee: LAB-AAA

Submittal Date: Thu May 26 15:03:38 EDT 2022

Committee Statement

Committee Statement: Updated edition year of NFPA 400.

Response Message: SR-8-NFPA 45-2022

Second Revision No. 2-NFPA 45-2022 [Section No. 3.3.12]

3.3.12* Ductless Enclosure.

An enclosure with a ductless ~~filtering~~ filtration system that does not comply with the requirements or definition of a chemical fume hood or ductless fume hood.

Submitter Information Verification

Committee: LAB-AAA

Submittal Date: Mon Apr 25 09:29:35 EDT 2022

Committee Statement

Committee Statement: Changed "filtering" to "filtration" to be consistent with the wording used in the standard.

Response Message: SR-2-NFPA 45-2022

Second Revision No. 7-NFPA 45-2022 [Section No. 3.3.62]

3.3.62 Use.

To place a material, including solids, liquids, and gases, into action. [**400,**~~2019~~ 2022]

3.3.62.1* Closed System Use.

Use of a solid or liquid hazardous material in a closed vessel or system that remains closed during normal operations where vapors emitted by the product are not liberated outside of the vessel or system and the product is not exposed to the atmosphere during normal operations and all uses of compressed gases. [**400,**~~2019~~ 2022]

3.3.62.2 Open System Use.

Use of a solid or liquid hazardous material in a vessel or system that is continuously open to the atmosphere during normal operations and where vapors are liberated or the product is exposed to the atmosphere during normal operations. [**400,**~~2019~~ 2022]

Submitter Information Verification

Committee: LAB-AAA

Submittal Date: Thu May 26 15:02:06 EDT 2022

Committee Statement

Committee Statement: Updated edition year of material extracted from NFPA 400.

Response Message: SR-7-NFPA 45-2022

Second Revision No. 9-NFPA 45-2022 [Section No. 6.5.3.1]

6.5.3.1 Emergency Action Plans.

Plans for laboratory emergencies shall be established for all new and existing laboratories.

6.5.3.2 Provisions Within the Emergency Action Plan.

~~Plans for laboratory emergencies shall be established for all new and existing laboratories.~~
The emergency action plan shall include the following procedures in the event of a chemical emergency, fire, or explosion:

(1) Procedures for sounding the alarm

(2) Procedures for notifying and coordinating with the fire department, governmental agencies, or other emergency responders or contacts, as required

(3) Procedures for evacuating and accounting for personnel, as applicable

(4) Procedures for establishing requirements for rescue and medical duties for those requiring or performing these duties

(5) Procedures and schedules for conducting drills

(6) Procedures for shutting down and isolating equipment under emergency conditions to include the assignment of personnel responsible for maintaining critical functions or for shutdown of process operations

(7) Appointment and training of personnel to carry out assigned duties, including steps to be taken at the time of initial assignment, as responsibilities or response actions change, and at the time anticipated duties change

(8) Alternative measures for occupant safety, when applicable

(9) Aisles designated as necessary for movement of personnel and emergency response

(10) Maintenance of fire protection equipment

(11) Safe procedures for startup to be taken following the abatement of an emergency

[**400:**7.2.3.2]

Submitter Information Verification

Committee: LAB-AAA

Submittal Date: Thu May 26 15:05:01 EDT 2022

Committee Statement

Committee Statement: Separated multiple requirements in existing Section 6.5.3.1. Separated material extracted from NFPA 400 into its own section.

Response Message: SR-9-NFPA 45-2022

Second Revision No. 1-NFPA 45-2022 [Section No. G.3]

G.3 References for Extracts in Informational Sections.

NFPA 30, *Flammable and Combustible Liquids Code*, 2021 edition.

NFPA 68, *Standard on Explosion Protection by Deflagration Venting*, 2018 edition.

NFPA 69, *Standard on Explosion Prevention Systems*, 2019 edition.

NFPA 99, *Health Care Facilities Code*, ~~2018~~ 2021 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 2022 edition.

Submitter Information Verification

Committee: LAB-AAA

Submittal Date: Thu Apr 14 15:32:34 EDT 2022

Committee Statement

Committee Statement: Updated edition year for references for extract in informational sections.

Response Message: SR-1-NFPA 45-2022