

NFPA 45 (2004) requirements that apply now

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:

- (5) A compressed gas cylinder larger than lecture bottle size, located such that it could prevent safe egress in the event of accidental release of cylinder contents.
- (6) A cryogenic container located such that it could prevent safe egress in the event of accidental release of container contents.

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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.

8.2 Basic Requirements

8.2.2* Laboratory units and laboratory hoods in which chemicals are present shall be continuously ventilated under normal operating conditions.

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A.8.2.2 A minimum ventilation rate for unoccupied laboratories (e.g., nights and weekends) is four room air changes per hour. Occupied laboratories typically operate at rates of greater than eight room air changes per hour, consistent with the conditions of use for the laboratory. It is not the intent of the standard to require emergency or standby power for laboratory ventilation systems.

8.4 Exhaust Air Discharge

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 unit.

8.4.7* The fume hood shall provide containment of the possible hazards and protection for personnel at all times when chemicals are present in the hood.

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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.

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.
- 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
 - (2) Shaft protected in accordance with the chapter for protection of vertical openings of NFPA 101
 - (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.

8.81 Chemical Fume Hood Interiors

- 8.8.1.3* Chemical fume hoods shall be provided with a means of preventing overflow of a spill of 2 L (0.5 gallon) of liquid.

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- A.8.8.1.3 The means of containing minor spills might consist of a 6.4 mm (1/4 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.**
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8.8.5 Other Hood Services

- 8.8.5.2 In existing installations where service controls are within the hood, additional shutoffs shall be located within 15 meters (50 feet) of the hood and shall be accessible and clearly marked.

8.12 Identification of Chemical Fume Hood Systems

- 8.12.2 A sign shall be affixed to each hood containing the following information from the last inspection, 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

9.2.3 Storage

9.2.3.4 Containers of materials that might become hazardous during prolonged storage shall be dated when first opened.

9.2.3.4.1 At the end of 6 months, the material shall be evaluated or tested for continued safe use.

9.2.3.4.2 Material that is found to be safe or that can be treated to be made safe shall be permitted to be redated and retained for an additional 6-month period.

11.1.4 Special Ventilation Requirements for Gas Cylinders.

11.1.4.1 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

11.1.4.2 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, *Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks*

11.1.4.3 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.

11.1.5.2.2 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.

11.1.6 Cylinders in Use.

11.1.6.5* The maximum internal volume (water volume) of all cylinders in each of the listed classifications, in use in the laboratory work area, shall comply with the following:

- (2)* Maximum quantity of oxidizing gases is as follows:
 - (a) For a laboratory work area of 500 ft² or less, the internal cylinder volume in scf equals 6.0.
 - (b) For a laboratory work area greater than 500 ft², the internal cylinder volume is 0.012 ft³ per ft² lab work area.

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A.11.1.6.5 Maximum quantities in 11.1.6.5(2) are doubled for sprinklered space.

- (4) Maximum quantity of health hazard 3 or 4 gases is as follows:
 - (a) For a laboratory work area of 500 ft² or less, the internal cylinder volume in scf equals 0.3.
 - (b) For a laboratory work area greater than 500 ft², the internal cylinder volume is 0.0006 ft³ per ft² lab work area.

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.

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A.13.1 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) Cryogens**

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.

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.

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.

APPLIES TO NEW LABS, NEW EQUIPMENT, ALTERED LABS OR EXISTING LABS THAT CHOOSE TO OPT IN TO THE NEW CODE

5.4.1 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:

- (3) A laboratory work area within a ~~Class B, Class C,~~ or Class D laboratory unit exceeds 1000 ft².
- (4) A hood in a laboratory work area is located adjacent to the primary means of exit access.

5.4.4 Emergency lighting facilities shall be provided for any laboratory work area requiring a second means of access to an exit.

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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.

6.2.1 Automatic Sprinkler Systems

6.2.2.1 Automatic sprinkler system protection shall be required for all new laboratories in accordance with the following:

- (2) Automatic sprinkler 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.
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6.3 Standpipe and Hose Systems

6.3.1 In all laboratory buildings that are two or more stories above or below grade level (level of exit discharge), standpipes shall be installed in accordance with NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*.

8.4 Exhaust Air Discharge

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 unit.

8.4.7* The fume hood shall provide containment of the possible hazards and protection for personnel at all times when chemicals are present in the hood.

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A.8.4.7 The chemical fume hood exhaust airflow should not be reduced to less than 25 ft³/min/ft² of internal hood work surface even when the sash is 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 50 ft of the hood and shall be accessible and clearly marked.

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A.8.8.4 Locating services, controls, and electrical fixtures external to the hood minimizes the potential hazards of corrosion and arcing.

8.8.5 Other Hood Services

8.8.5.1.1.1 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.

8.8.7 Measuring Device for Hood Airflow

8.8.7.1 A measuring device for hood airflow shall be provided on each chemical fume hood.

10.1 Quantity Limitations

10.1.2 Quantities of flammable and combustible liquids, including liquids in laboratory units located in health care occupancies, shall not exceed those specified for a Class D laboratory unit.

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~~. Laboratory units used for graduate or post-graduate research are not to be considered instructional laboratory units.

Table 10.1.1

Maximum Quantities of Flammable and Combustible Liquids and Liquefied Flammable Gases in Sprinklered Laboratory Units Outside of Inside Liquid Storage Areas

Lab Unit Fire Hazard Class	Flammable and Combustible Liquid Class	Excluding Quantities in Storage Cabinets		Including Quantities in Storage Cabinets	
		Max Qty/100 ft ² of Lab Unit	Max Qty per Lab Unit	Max Qty/100 ft ² of Lab Unit	Max Qty per Lab Unit
D	I	1 gal	75 gals 100 gals	2 gals	150 gals 100/200 gals*
D	I, II and IIIA	1 gal	75 gals 100 gals	2 gals	150 gals 100/200 gals*
B	I	5 gals	300 gals 25 gals	10 gals	600 gals 25/30 gals*
B	I, II and IIIA	10 gals	400 gals 25 gals	20 gals	800 gals 25/30 gals*

* higher limit allowed when laboratory is of 2 hour fire rated construction

Annex B Supplementary Definitions

Class I	Flashpoint below 100 degrees F
Class II	Flashpoint at or above 100 degrees F and below 140 degrees F
Class IIIA	Flashpoint at or above 140 degrees F and below 200 degrees F

11.1.6 11.1.6 Cylinders in Use.

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 item (1) as the reserve cylinder for the cylinder described in item (1)

11.1.6.4 Cylinders not “in use” shall not be stored in the laboratory unit.

11.1.6.5* The maximum internal volume (water volume) of all cylinders in each of the listed classifications, in use in the laboratory work area, shall comply with the following:

- (1)* Maximum quantity of flammable gases is as follows:
 - (a) For a laboratory work area of 500 ft² or less, the internal cylinder volume in scf equals 6.0.
 - (b) For a laboratory work area greater than 500 ft², the internal cylinder volume is 0.012 ft³ per ft² lab work area.

(3)* Maximum quantity of liquefied flammable gases is as follows:

- (a) For a laboratory work area of 500 ft² or less, the internal cylinder volume in scf equals 1.2.
- (b) For a laboratory work area greater than 500 ft², the internal cylinder volume is 0.0018 ft³ per ft² lab work area.

Annex A Explanatory Material

A.11.1.6.5 Maximum quantities in 11.1.6.5(1) and 11.1.6.5(3) are doubled for sprinklered space.