



**NATIONAL FIRE PROTECTION ASSOCIATION**  
The leading international and knowledge organization on fire, electrical and related hazards

# Updating NFPA 45

---

Standard on Fire Protection for Laboratories  
Using Chemicals

American Chemical Society National Meeting  
August 18, 2015 | Laura Montville: Engineer, NFPA

## Agenda

---

- Background
- Overview of standard
- New requirements in 2015 edition
- Outreach efforts



nfpa.org

## Background

---

- Students injured during experiments or demonstrations involving flammable materials
- In 2011, CSB reported 150 students injured in school laboratory accidents in past 4 years

### Technical Committee on Laboratories Using Chemicals

- First Draft meeting: May 2013
- Second Draft meeting: February 2014



nfpa.org

3

## Overview of NFPA 45

---

- Laboratory unit classification
- Design and construction
- Fire protection
- Ventilating systems and hood requirements
- Chemical storage, handling, and disposal
- Flammable and combustible liquids
- Compressed and liquefied gases
- Lab operations and apparatus
- Educational and instructional labs
- Hazard identification



nfpa.org

4

## New Requirements

---



nfpa.org

5

## Retroactivity

---

- Unless specified, not retroactive

Now apply to new and existing laboratories:

- Chapters on laboratory operations and apparatus, educational and instructional laboratories, and hazard identification
- Establishment of fire prevention procedures, maintenance procedures, emergency plans, and procedures for extinguishing clothing fires
- Provisions on fire retardant clothing



nfpa.org

6

## 6.6 Fire Retardant Clothing

---

- New and existing laboratories
- Fire retardant lab coats and gloves when pyrophoric reagents are used outside a glovebox
- Natural-fiber clothing underneath
- Meet NFPA 2112



nfpa.org

7

## 7.11 Glove Boxes

---

- In accordance with ANSI/AIHA Z9.5
- If vented, vent to chemical exhaust system
- Operated at positive pressure
- Provided with pressure control
- Pressure relief shall be provided

3.3.24 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, 2014]



nfpa.org

8

## 11.2.6 Pyrophoric Reagent and Water Reactive Material Handling

---

**3.3.54** Pyrophoric Reagent. A solid or liquid substance that ignites at 54°C (130°F) or below on exposure to water vapor in air-producing flammable gas and heat.

- Handling in systems or enclosures that prevent the chemicals from igniting when a dry or an inert atmosphere is required by the manufacturer or the safety data sheet
- Handling only by those with experience in their hazards and properties or under close, direct supervision by those with experience in their hazards and properties.
- Personal Protective Equipment shall be worn
- Dispensing procedures- inside chemical fume hood or inert glove box
- Removing residual moisture and contaminants from lab equipment



nfpa.org

9

## 11.2.7 Open Flame Operations

---

- Whenever possible, use alternative methods
- Gas supply hoses: good condition, compatible with the gas being used, and rated at least 150 percent of working pressure
- Operations shall not be conducted under shelves, cabinets, or other overhanging equipment
- Additional requirements for biological operations using flammable liquids, including volume and distance to flames



nfpa.org

10

## Educational and Instructional Laboratories

- Scope of standard: applies to all educational and instructional lab units
- **3.3.13** Educational Laboratory Unit. A laboratory unit that is used under direct supervision of an instructor and used for educational purposes for students through the twelfth grade ~~by six or more persons for four or more hours per day or more than 12 hours per week.~~
- **3.3.31** 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. that is used for purposes of instruction for students beyond the twelfth grade.~~
- Instructor includes science teachers, assistant or associate professors, lecturers, substitute teachers, and teaching assistants



## Chapter 12- Educational and Instructional Laboratories

### Instructor Responsibilities

- Documented hazard risk assessment
- Safety briefing for students
- Provide PPE
- Safety barrier as required
- Trained and knowledgeable in fire safety procedures, emergency plans, hazards present



## Chapter 12- Educational and Instructional Laboratories

---

### Chemical Storage and Handling

- Educational- stored in a locked room outside of classroom, limit to amount needed for one day, preapportioned to the amount needed for each class session
- Instructional- limit to the lowest possible level necessary
- Dispensing done in prep room or prior to the arrival of students
- Minimum amount needed transferred to small bottle
- Bottles of chemicals only opened when experiment is being performed



nfpa.org

13

## Chapter 12- Educational and Instructional Laboratories

---

### Performance of Experiments and Demonstration

- Apply to experiments involving open flames, fire, use of flammable, reactive, toxic, or corrosive chemicals
- Shall not block means of egress
- Fumes, vapors, particulates, gases: perform in chemical fume hood
- Outside of fume hood: shield as specified, or 10 feet from students
- Safety briefing for experiments conducted by students



nfpa.org

14

## Chapter 12- Educational and Instructional Laboratories

---

References to other applicable requirements throughout NFPA 45

- Allowable quantities of flammable and combustible liquids and compressed gases
- Fire separation ratings
- Occupancy classifications
- Emergency gas shutoffs



nfpa.org

15

## Outreach and Advocacy

---

- Digital handbook
- Article in NFPA Journal
- Free access to NFPA 45 online



nfpa.org

16





**NATIONAL FIRE PROTECTION ASSOCIATION**  
The leading international and knowledge organization for fire, electrical and related issues

# Questions?

Laura Montville  
lmontville@nfpa.org  
[www.nfpa.org/45](http://www.nfpa.org/45)



**NATIONAL FIRE PROTECTION ASSOCIATION**  
The leading international and knowledge organization for fire, electrical and related issues

# Thank You!

Laura Montville  
lmontville@nfpa.org  
[www.nfpa.org/45](http://www.nfpa.org/45)