Key Elements of NFPA 99 (and the “other” NFPA standards): Perspectives from the Safety Office

April, 2013
Which Version(s) of NFPA 99 Apply?

- 1999
- 2002
- 2005
- 2012
NFPA Standards Referenced By TJC

- 10 (fire extinguishers)
- 13 (sprinklers)
- 25 (inspect/test of water-based suppress.)
- 30 (flammable liquids)
- 45 (labs)
- 72 (fire alarm)
- 80 (fire doors)
- 82 (waste/linen)
- 90A (air condit./vent.)
- 96 (cooking)
- 99 (healthcare)
- 101 (LSC)
- 105 (smoke doors)
- 110 (emergency power)
- 111 (SEPSS)
- 1962 (fire hose/nozzles)
What We Know about Healthcare Fires…

Annual Averages, 2006-2010, Healthcare Facilities

- 6,240 structure fires
- 6 civilian deaths
- 171 civilian injuries
- $52M in property damage

[Fires in Healthcare Facilities, NFPA, 11/12]
What We Know about Healthcare Fires…

Structure Fires by Occupancy Type, 2006-2010

- Nursing homes – 46%
- Hospitals and hospices – 23%
- Mental health facilities – 21%
- Clinics and doctors offices – 11%

[Fires in Healthcare Facilities, NFPA, 11/12]
What We Know about Healthcare Fires…

Structure Fire Deaths/Injuries by Occupancy Type, 2006-2010

- Nursing homes – 5 deaths / 110 injuries
- Hospitals and hospices – <1 death / 32 injuries
- Mental health facilities – <1 death / 23 injuries
- Clinics and doctors offices – 0 death / 6 injuries

[Fires in Healthcare Facilities, NFPA, 11/12]
What We Know about Healthcare Fires…

Leading Cause (2006-2010)?
- Playing with heat source
- Electrical distribution or lighting equipment
- Heating equipment
- Smoking materials
- Intentional
- Clothes dryer or washer
- Cooking equipment

[Fires in Healthcare Facilities, NFPA, 11/12]
What We Know about Healthcare Fires…

Structure Fires by Cause (%)

- Cooking equipment
- Clothes dryer or washer
- Intentional
- Smoking materials
- Heating equipment
- Electrical distribution or lighting...
- Playing with heat source

[Fires in Healthcare Facilities, NFPA, 11/12]
What We Know about Healthcare Fires…

How Do We Compare with Other Industries (2006-2010)?

- 1.2% of U.S. structure fires
- 0.2% of U.S. structure fire deaths
- 1.1% of U.S. structure fire injuries
- 0.5% of U.S. direct property loss

[Fires in Healthcare Facilities, NFPA, 11/12]
What We Know about Healthcare Fires…

Sprinkler Systems in Structure Fires, 2006-2010

- Present in 55% of fires
- 98% effective in controlling fire, when operating
- Average loss per fire:
  - $13,000 without automatic extinguishing system
  - $5,000 with sprinkler protection

[Fires in Healthcare Facilities, NFPA, 11/12]
What We Know about Healthcare Fires…

[Structure Fires]

Number of Fires


Nursing Home Fires
Hospital/Hospice Fires

[Fires in Healthcare Facilities, NFPA, 11/12]
What We Know about Healthcare Fires…

Structure Fire Injuries

Number of Injuries

Nursing Home Injuries

Hospital/Hospice Injuries

[Fires in Healthcare Facilities, NFPA, 11/12]
Corridor – NFPA Standards

- Lighting/emergency lighting – 101/99/110/70
- Corridor width - 101
- Corridor construction – 101/220
- Possible fire barriers – 101/251
- Finishes – 101
- Smoke-resistant ceiling - 101
- Door construction/latching/undercut – 101/80/252
- Smoke barrier doors – 101/105/80
Corridor – NFPA Standards (contd.)

- Fire extinguisher – 101/10
- Sprinkler system – 101/13/25/20
- Fire alarm system – 101/72
- Smoke detector – 101/72
- Exit signs -101/170
- Communication system (speaker) – 101/99
- HVAC system – 101/90A/99
Generator – NFPA / Other Standards

- Generator – 99/110
- Fuel oil storage – 30/704/IFC
- Battery maintenance/safety – 110/1926.441
- Sprinkler system – 13
- Lighting/emergency lighting – 101/99/70/110

- Noise exposure – 1910.95
- Portable wood ladders – 1910.25
2000 LSC References to 1999 NFPA 99

- 8.4.4 exception
- 8.4.5
- 9.2.4
- 18.2.9.2
- 18.2.10.2
- Table 18.3.2.1
- 18.3.2.2
- 18.3.2.3
- 18.3.2.4
- 18.5.1.2
- 18.5.1.3
- 18.5.1.4
- 19.3.2.2
- 19.3.2.3
- 19.3.2.4
- 20.2.9.2
- 20.3.2.1
- 20.3.2.2
- 21.2.9.2
- 21.3.2.1
- 21.3.2.2

[101: 2.1]
True or False?

New Construction
NFPA 99 applies to new construction.
True or False?

**Existing Facilities**

**NFPA 99 applies to existing facilities.**
Application of NFPA 99

“This document shall apply to all healthcare facilities. Construction and equipment requirements shall be applied only to new construction and new equipment, except as modified in individual chapters. Only the altered, renovated, or modernized portion of an existing system or individual component shall be required to meet the installation and equipment requirements stated in this standard.”

[99: 1.2]
“The scope of this document is to establish criteria to minimize the hazards of fire, explosion and electricity in health care facilities...”
Patient Care Area

Any portion of a healthcare facility wherein patients are intended to be examined or treated.
General Care Area

Patient bedrooms, examining rooms, treatment rooms, clinics and similar areas in which it is intended that the patient will come in contact with ordinary appliances such as nurse call system, electric beds, examining lamps, telephones, and entertainment devices.
Critical Care Area

Those special care units, intensive care units, operating rooms...and similar areas in which patients are intended to be subjected to invasive procedures and connected to line-operated patient-care-related electrical appliances.
Patient Care Vicinity?
Patient Care Vicinity

PCV ends at wall

PCV extends vertically 7’6” above floor
Patient Care Vicinity

- Within a patient care area
- Does not extend through walls or floors
- Does not move with patient through corridors
- Extends 6’ from bed or other treatment support device
## Wet Location or Not?

<table>
<thead>
<tr>
<th>Description of Area</th>
<th>Wet Location?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Room</td>
<td></td>
</tr>
<tr>
<td>Patient Room</td>
<td></td>
</tr>
<tr>
<td>ICU Room</td>
<td></td>
</tr>
<tr>
<td>Emergency Exam Room</td>
<td></td>
</tr>
<tr>
<td>Physical Therapy</td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td></td>
</tr>
</tbody>
</table>
The area in a patient care area where a procedure is performed that is normally subject to wet conditions while patients are present including standing fluids on the floor or drenching of the work area, either of which condition is intimate to the patient or staff.
## Wet Location or Not?

<table>
<thead>
<tr>
<th>Description of Area</th>
<th>Wet Location?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Room</td>
<td>Yes</td>
</tr>
<tr>
<td>Patient Room</td>
<td>No</td>
</tr>
<tr>
<td>ICU Room</td>
<td>No</td>
</tr>
<tr>
<td>Emergency Exam Room</td>
<td>Maybe</td>
</tr>
<tr>
<td>Physical Therapy</td>
<td>Maybe</td>
</tr>
<tr>
<td>Kitchen</td>
<td>No</td>
</tr>
</tbody>
</table>
Anesthetizing Location

Any area of a facility that has been designated to be used for the administration of nonflammable inhalation anesthetic agents in the course of examination or treatment, including the use of such agents for relative analgesia (i.e. conscious sedation).
“The electrical distribution system for patient care areas shall conform to requirements in Chapter 3.”

“These requirements apply to new construction. Existing installations need not be modified, provided that they meet the operational safety requirements in 3-3.3.2 and 3-3.3.3.” (1999 NFPA 99)
Existing Installations – 1999 NFPA 99

- 3-3.3.2: Grounding System in Patient Care Areas
- 3-3.3.3: Receptacle Testing in Patient Care Areas
Grounding System in Patient Care Areas

- Effectiveness of grounding system evaluated before acceptance or after alteration
- Voltage measurements between reference point and exposed fixed electrical equipment with conductive surfaces in a patient care vicinity
  - Voltage limit = 20 mV
- Impedance measurements between reference point and 10% of receptacles in PCV
  - Impedance limit = 0.1 ohm*
Receptacle Testing in Patient Care Areas

- **Test**
  - Physical integrity
  - Continuity of grounding circuit
  - Polarity of hot and neutral
  - Retention force of grounding blade ($\geq 115g$)

- **Frequency**
  - After installation, alteration, or servicing
  - Additional testing defined by performance data
  - Non-hospital grade receptacles: every 12 months
True or False

**Electrical Appliances**

All electrical appliances within the hospital shall receive electrical safety tests.
Electrical Appliances

All electrical appliances within the hospital shall receive electrical safety tests.

All appliances used in patient care areas shall be tested…before being put into service, after repair or modification, and at periodic intervals…

Electrical appliances in laboratories shall also be tested…
Draw a Diagram Explaining These…

- Normal power source
- Alternate power source
- Life safety branch
- Critical branch
- Equipment system
- Emergency system
- Automatic transfer switches
- Essential electrical system
- Non-essential electrical system
Hospital Electrical System

- Normal Power Source
- Alternate Power Source
- ATS(s)
- Life Safety Branch
- Critical Branch
- Equipment System

Non-essential Electrical System

Type 1 Essential Electrical System
Which Are Part of Life Safety Branch?

a) Lighting  
b) Exit signs  
c) Fire alarm  
d) Communication systems  
e) Telephone equipment rooms  
f) Illumination for generator set location  
g) Generator transfer fuel pump  
h) Elevator cab lighting and control systems  
i) Blood bank  
j) Automatic doors used for building egress  
k) Smoke control/stair pressurization systems
Which Are Part of Life Safety Branch?

a) Lighting
b) Exit signs
c) Fire alarm
d) Communication systems
e) Telephone equipment rooms
f) Illumination for generator set location
g) Generator transfer fuel-pump
h) Elevator cab lighting and control systems
i) Blood bank
j) Automatic doors used for building egress
k) Smoke control/stair pressurization systems
Which Are Part of Equipment System?

a) Nurse call system
b) Central suction systems
c) Med gas alarms
d) Kitchen hood exhaust systems
e) Heating equipment for patient care areas
f) Jockey pump for water-based FP system
g) Exhaust systems for isolation rooms
h) Electronic medical record systems
Which Are Part of Equipment System?

a) Nurse call system
b) Central suction systems
c) Med gas alarms
d) Kitchen hood exhaust systems
e) Heating equipment for patient care areas
f) Jockey pump for water-based FP system
g) Exhaust systems for isolation rooms
h) Electronic medical record systems
Working Clearances for All Electrical Equipment (OSHA)

- 3’ minimum clear distance
- 2.5’ width clear distance
- 6.25’ headroom
Working Clearance around Generating Equipment?

a) 24”
b) 30”
c) 36”
d) 42”
e) No requirement
OSHA Clearances around Electrical Equipment

- Equipment @ 0-150 volts = 3 feet
- Equipment @ 151-600 volts with exposed live parts on one side and no live or grounded parts on the other side = 3 feet
- Equipment @ 151-600 volts with exposed live parts on one side and grounded parts on the other side = 3.5 feet
- Equipment @ 151-600 volts with exposed live parts on both sides of the work space = 4 feet.
- Plus more for 600+ volts…
Required Separation?

New healthcare

- Transformer room
- Generator room

Exit access corridor
Required Separation

New healthcare

Exit access corridor

30” working clearance around generator

Generator room

2-hr FRR barrier
New healthcare

Transformer room (individual dry-type transformer >112.5 kVA)

1-hr FRR barrier

Exit access corridor

Exceptions to 1-hr barrier
- <112.5 kVA
- Enclosed w/ventilating openings and Class 155 insul. Systems*
Other Inspection/Testing (Type 1 EES)

- Generator inspection/testing per TJC/NFPA 110
- Main and feeder circuit breakers inspected ___________.
- Storage batteries inspected ________________.

(Must maintain written records)
Other Inspection/Testing (Type 1 EES)

- Generator inspection/testing per TJC/ NFPA 110
- Main and feeder circuit breakers inspected annually.
- Storage batteries inspected every 7 days.

(Must maintain written records)
Required Separation?

New healthcare

Oxidizing gas cylinder manifold room (any quantity)

Exit access corridor
Required Separation

**New healthcare**

- Oxidizing gas cylinder manifold room (any quantity)
- 1-hr FRR barrier

No other purpose for room
- No storage of combustible materials

Exit access corridor
Bulk System

An assembly of equipment with storage capacities of more than

- **28,000** cubic feet (NTP) of nitrous oxide, or
- **20,000** cubic feet (NTP) of oxygen, including unconnected reserves

**Bulk O₂** – see NFPA 50

**Bulk Nitrous Oxide** – See CGA Standard for Installation of Nitrous Oxide Systems at Consumer Sites
Securing of Gas Cylinders
Medical Air Compressor Intake

The medical air compressor intake shall be located outdoors above roof level a minimum distance of _____ feet from any door, window, exhaust, intake or other building opening...

...and a minimum distance of _____ feet above ground.
Medical Air Compressor Intake

The medical air compressor intake shall be located outdoors above roof level a minimum distance of 10 feet from any door, window, exhaust, intake or other building opening...

...and a minimum distance of 20 feet above ground. (with exceptions)
Medical Air Quality

- Medical air compressor monitoring:
  - _____________________________
  - _____________________________
  - _____________________________
  - _____________________________
  - _____________________________

- Continuous frequency
Medical Air Quality

- Medical air compressor monitoring:
  - Dewpoint
  - Carbon monoxide
  - Gaseous/liquid hydrocarbons (for oil-containing compressors)

- Continuous frequency
  - Except gaseous hydrocarbons monitored quarterly
Required Labeling for Medical Gas, Vacuum and WAGD Piping?

New or existing healthcare

Exit access corridor

40'

Medical gas piping

50'
Required Labeling for Medical Gas, Vacuum and WAGD Piping?

New or existing healthcare

Exit access corridor

Gas name & operating pres.
At least every 20’
At least once in each room
Every story

Medical gas piping
Shutoff Valve Labeling

- Name of gas
- Caution not to close except in emergency
- Rooms or areas served

CAUTION

(Name of gas) VALVE

DO NOT CLOSE EXCEPT IN EMERGENCY

THIS VALVE CONTROLS SUPPLY TO _____
CAUTION
MEDICAL-SURGICAL VACUUM VALVE
DO NOT CLOSE EXCEPT IN EMERGENCY
THIS VALVE CONTROLS VACUUM TO...
## Inhaled Anesthetic Agents

<table>
<thead>
<tr>
<th>Generic or chemical name</th>
<th>Commercial name</th>
<th>Year of introduction</th>
<th>Currently in use?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diethyl ether</td>
<td>Ether</td>
<td>1842</td>
<td>No</td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td>Nitrous oxide</td>
<td>1844</td>
<td>Yes</td>
</tr>
<tr>
<td>Chloroform</td>
<td>Chloroform</td>
<td>1847</td>
<td>No</td>
</tr>
<tr>
<td>Cyclopropane</td>
<td>Cyclopropane</td>
<td>1933</td>
<td>No</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>Trilene®</td>
<td>1934</td>
<td>No</td>
</tr>
<tr>
<td>Fluroxene</td>
<td>Fluoromar®</td>
<td>1954</td>
<td>No</td>
</tr>
<tr>
<td>Halothane</td>
<td>Fluothane®</td>
<td>1956</td>
<td>Yes</td>
</tr>
<tr>
<td>Methoxyflurane</td>
<td>Penthrane®</td>
<td>1960</td>
<td>Infrequently</td>
</tr>
<tr>
<td>Enflurane</td>
<td>Ethrane®</td>
<td>1974</td>
<td>Yes</td>
</tr>
<tr>
<td>Isoflurane</td>
<td>Forane®</td>
<td>1980</td>
<td>Yes</td>
</tr>
<tr>
<td>Desflurane</td>
<td>Suprane®</td>
<td>1992</td>
<td>Yes</td>
</tr>
<tr>
<td>Sevoflurane</td>
<td>Ultane®</td>
<td>1995</td>
<td>Yes</td>
</tr>
</tbody>
</table>

[Anesthetic Gases: Guidelines for Workplace Exposures, OSHA, 5/18/00]
## Exposure Limits

<table>
<thead>
<tr>
<th>Anesthetic Gas</th>
<th>OSHA PEL (ppm)</th>
<th>NIOSH REL (ppm)</th>
<th>ACGIH TLV-TWA (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrous Oxide</td>
<td>None</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>Isoflurane</td>
<td>None</td>
<td>2 (1-hr ceiling)</td>
<td>None</td>
</tr>
<tr>
<td>Halothane</td>
<td>None</td>
<td>2 (1-hr ceiling)</td>
<td>50</td>
</tr>
<tr>
<td>Desflurane</td>
<td>None</td>
<td>2 (1-hr ceiling)</td>
<td>None</td>
</tr>
<tr>
<td>Sevoflurane</td>
<td>None</td>
<td>2 (1-hr ceiling)</td>
<td>None</td>
</tr>
<tr>
<td>Enflurane</td>
<td>None</td>
<td>2 (1-hr ceiling)</td>
<td>75</td>
</tr>
<tr>
<td>Methoxyflurane</td>
<td>None</td>
<td>2 (1-hr ceiling)</td>
<td>None</td>
</tr>
</tbody>
</table>
Oxygen Cylinder Storage

Oxygen Cylinders
How many “E” sized oxygen cylinders may be stored within 1 smoke compartment without taking any special separation or enclosure precautions?
Oxygen Cylinder Storage

Oxygen Cylinders

How many “E” sized oxygen cylinders may be stored within 1 smoke compartment without taking any special separation or enclosure precautions?

\[ 300 \text{ ft}^3 \div 25 \text{ ft}^3/\text{container} = 12 \text{ containers} \]

Applies to all non-flammable compressed gases
Compressed Gas Cylinder Storage Requirements

- Storage and manifold rooms for piped gas systems – Chapter 4, 1999 NFPA 99
- Other cylinder storage rooms (e.g., Respiratory Therapy) – Section 9.4, 2005 NFPA 99
Storage Requirements?

Respiratory therapy department

Exit access corridor

25'

Shelving

20'

RT storage room

O₂ cylinder storage area
Storage Requirements – 2005 NFPA 99
(applies to all nonflammable gases)

Respiratory therapy department

Exit access corridor

Less than 3000 ft³:
- Noncombustible construction
- Doors preventing unauthorized entry
- No flammable gas/liquid stored with O₂ / N₂O

O₂ cylinder storage area

No combustibles within 5’ (sprinklered)
No combustibles within 20’ (non-sprinklered)
Or cylinders in ½-hr FPR cabinet
New healthcare, respiratory therapy department

- Exit access corridor: 25’
- Shelving: 20’
- RT storage room
- $O_2$ cylinder storage area

Storage Requirements – 2005 NFPA 99 (applies to all nonflammable gases)

- $\geq 3000$ ft$^3$:
  - 1-hr FRR barrier
  - Individual securing of cylinders not required
  - Dedicated mechanical ventilation

-More…
CAUTION
OXIDIZING GASES STORED WITHIN
NO SMOKING
Posted at Patient Rooms?

DANGER

NO SMOKING
OXYGEN
IN USE
Name Requirements for Fire Doors
Fire Doors

Self-closing
Rating
Swing w/ egress*
No deadbolt/lock*
Latch hardware
1/8” gap
Coordinator
Vision panel
FPR/size
No coverings
Plates <16”*
3/4” undercut*

[101:7.2.1, 8.2.3 and NFPA 80]
15-2.5.4 When holes are left in a door or frame due to changes or removal of hardware or plant-ons, the holes shall be repaired by the following methods:

(a) Install steel fasteners that adequately fill the holes

(b) Fill the screw or bolt holes with the same material as the door or frame
“Laboratories in hospitals shall comply with the requirements of Chapter 10 as applicable and the requirements of NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*, as applicable.”
NFPA 45 or 99

- Lab in building with inpatients
- Lab in building with outpatients incapable of self-preservation
- Lab in building with outpatients capable of self-preservation
- Freestanding clinical lab
**Primary Reference Document?**

**NFPA 45 or 99**
- Lab in building with inpatients – **NFPA 99**
- Lab in building with outpatients incapable of self-preservation – **NFPA 99**
- Lab in building with outpatients capable of self-preservation – **NFPA 45**
- Freestanding clinical lab – **NFPA 45**
NFPA 99 Laboratory?

New or existing healthcare

Frozen Section Lab

O.R.

O.R.

Cath. Lab
NFPA 99 Laboratory?

New or existing healthcare

Frozen Section Lab

“NFPA 99 Laboratory” only if they are using flammable liquids

Not an “NFPA 99 Laboratory”
NFPA 99 Laboratory?

New or existing healthcare

- Immunology
- Pathology
- Chemistry
- Histology
Nomenclature

New or existing healthcare

Exit access corridor

Lab. Work Area

Lab. Work Area

Lab. Work Area

Laboratory Unit (enclosed space with one or more laboratory work areas)
Required Separation?

New or existing healthcare

Exit access corridor

40’

Laboratory Unit

Flammable liquid storage cabinet

50’
Required Separation

New or existing healthcare

Exit access corridor

40'

50'

Laboratory Unit

Severe hazard:
1-hr FRR barrier
AASS

Ordinary hazard:
1) AASS
Smoke-resisting
Self-closing doors

or

2) 1-hr FRR barrier

Flammable liquid storage cabinet
Severe vs. Ordinary Hazard

Who ultimately determines if a laboratory is classified as a severe hazard?
“The hazard level of a laboratory is considered severe if quantities of flammable, combustible, or hazardous materials...are capable of sustaining a fire condition of sufficient magnitude to breach a 1-hr fire separation...one method is included in the NFPA Fire Protection Handbook...”

[NFPA 99, 1999 edition: A-10.5.1]
Severe vs. Ordinary Hazard (2002 NFPA 99)

Ordinary Hazard
- < 10 gal. flammable liquids or
- < 60 gal. flammable liquids in storage cabinet

Severe Hazard
- > 10 gal. flammable liquids or
- > 60 gal. flammable liquids in storage cabinet

[NFPA 99 Handbook, 2002 edition, commentary for section 11.3.1.1.1]
Severe vs. Ordinary Hazard (2005 NFPA 99)

Quantities in excess of those identified in 11.7.2.3.1 and 11.7.2.3.2 are considered severe hazards:

- **11.7.2.3.1** The total volume of Class I, II, and IIIA liquids outside of approved storage cabinets and safety cans shall not exceed 1 gal per 100 ft$^2$.

- **11.7.2.3.2** The total volume of Class I, II, and IIIA liquids, including those contained in approved storage cabinets and safety cans, shall not exceed 2 gal per 100 ft$^2$.

[NFPA 99 Handbook, 2005 edition, commentary for section 11.3.1]
Compliant or Not?

New or existing healthcare

Exit access corridor

Laboratory Unit

Flammable liquid storage cabinet
Not Compliant

New or existing healthcare

Exit access corridor

40’

If > 1,000 sf, need 2 exit access doors

Travel distance to exit access door shall be ≤ 75’.

Laboratory Unit

50’

Flammable liquid storage cabinet
Also required if:

- Explosion hazard blocking escape
- Hood adjacent to exit access
- Compressed gas or cryogenic hazards (see NFPA 45: 3.4.1, 2000 ed.)
Ideal Capture Velocity?

**Laboratory Fume Hoods**

Ideal capture velocity for laboratory fume hoods:

___________ fpm to ___________ fpm
Laboratory Fume Hoods

Ideal capture velocity for laboratory fume hoods:

80 fpm to 120 fpm
Stack Height?

New or Existing healthcare

Exhaust fan → EF

Hood exhaust duct

Fume hood

Laboratory

Stack height?
Stack Height

New or Existing healthcare

Exhaust fan → EF

Hood exhaust duct →

Fume hood →

Extend at least 10’ above the highest roof point to protect personnel

Laboratory
Opportunities for Improvement?
Opportunities for Improvement

Dead zone

Eddies
Opportunities for Improvement?
Signage Required on EFs?

New or Existing healthcare

- Exhaust fan
- Exhaust duct
- Fume hood
- General exhaust duct
- Laboratory
Signage Required on EFs

New or Existing healthcare

Exhaust fan

Arrow indicating fan rotation
Hoods/areas served
Hazard warning

Exhaust duct

General exhaust duct

Fume hood

Laboratory
Laboratory Fume Hoods
A permanently-installed airflow measuring device is required on fume hoods.
Fume Hood Inspection/Testing?

- ________________________________
- ________________________________
- ________________________________
- ________________________________
- ________________________________
- ________________________________

(when installed, modified, or annually)
(sign on hood or inspection log)
Fume Hood Inspection/Testing

- Physical condition
- Airflow measuring device
- Low flow alarms
- Face velocity
- Verification of inward airflow
- Factors affecting hood performance

(when installed, modified, or annually)
(sign on hood or inspection log)
Standards, Guidelines

Fume hoods

- *Fume Hoods Recommended Practice*, Scientific Equipment and Furniture Association

Biological Safety Cabinets

- NSF 49: Class II Biosafety Cabinetry
Fans and Motors

Air supply and exhaust fans, motors, and components shall be inspected at least annually.
Laboratories
Equipment shall conform to the nonpatient electrical equipment requirements in Chapter 7.
Laboratory Equipment

Laboratories
- Grounded portable equipment
- Temperature limit controls on electrical heating equipment
- Meet requirements for equipment in NFPA 45
- Annual visual inspection of power cord
- Policies for testing appliances
Signage on Laboratory Refrigerators/Freezers?
No food or drink.

Not approved for flammable materials.
Fire Extinguishers - Compliant or Not?

New or existing construction

Exit access corridor

Fire Extinguisher

40’

50’
Fire Extinguishers

New or existing construction (ordinary hazard*)

Exit access corridor

Fire Extinguisher

Travel distance ≤ 75’ for class A hazards

1,500 ft² coverage per unit of A* (e.g. 2A = 3,000 ft²)

[NFPA 10:6.2.1]
Compliant or Not?

New or existing healthcare

Exit access corridor

Fire Extinguisher

40'

Laboratory

Flammable liquid storage cabinet

50'
Class B Hazards

New or existing healthcare, ordinary hazard

- Fire Extinguisher
- Exit access corridor
- Travel distance for class B hazards:
  - \( \leq 30' \) for 10B rating
  - \( \leq 50' \) for 20B rating
- Laboratory
- Flammable liquid storage cabinet
- 40'
- 50'
Compliant or Not?

New or existing healthcare

Exit access corridor

40’

Kitchen

Fire Extinguisher

Fryer with oil

50’
New or existing healthcare

K extinguisher
Travel distance ≤ 30’
Placard instructing to activate fire suppress. system first

Fire Extinguisher

or

Kitchen

Fryer with oil

40’

50’
Auto Extinguishing System for Grease-Producing Cooking Devices

- Activates fire alarm
- Deactivates fuel source
- Controls exhaust fans
- Inspected annually (EC.02.03.05)
- Fusible links/sprinkler heads replaced annually if they have buildup of grease

LS.02.01.35
"Where the eyes or body...may be exposed to corrosive materials...facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use."
True or False?

Emergency Eye Wash and Shower Equipment

Emergency eye wash and shower units shall be flushed weekly.

[ http://path.upmc.edu]
Maintenance

- Eye wash fountains inspected at least every 3 months (OSHA recommendation)
- Emergency eye wash and shower equipment tested periodically (NFPA 99)
Practical Considerations

- Privacy curtains
- Drains
- “Tepid” water
- Travel time of 10 seconds
- Weekly activation vs. annual performance testing
- Inspection tags
Expiration Dates!
## Container Sizes – Flammable Liquids

<table>
<thead>
<tr>
<th></th>
<th>Class IA</th>
<th>Class IB</th>
<th>Class IC</th>
<th>Class II</th>
<th>Class III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass</td>
<td>1 pt</td>
<td>1 qt</td>
<td>1 gal</td>
<td>1 gal</td>
<td>5 gal</td>
</tr>
<tr>
<td>Metal</td>
<td>1 gal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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</tr>
<tr>
<td>Metal / Approved Plastic</td>
<td>1 gal</td>
<td>5 gal</td>
<td>5 gal</td>
<td>5 gal</td>
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</tr>
</tbody>
</table>

*Class IA = FP < 73°F and BP < 100°F
Flammable Liquid Cabinet

[AIHA Laboratory Health and Safety Committee]
Flammable Liquid Storage Cabinets

No more than _______ storage cabinets shall be located within any one fire area.
Flammable Liquid Storage Cabinets

No more than ___3___ storage cabinets shall be located within any one fire area.
True or False?

Storage Cabinets
Flammable liquid storage cabinets shall be vented.
Permitted Flammable Liquid Storage?

New or existing healthcare

Exit access corridor

Laboratory

Flammable liquid storage cabinet

40’

50’
Permitted Flammable Liquid Storage

New or existing healthcare

Exit access corridor

40 gal. on bench, in safety cans, and in flammable liquid storage cabinets

and

20 gal. on bench

Laboratory

Flammable liquid storage cabinet
The total volume of Class I, II, and IIIA liquids outside of approved storage cabinets and safety cans shall not exceed 1 gal per 100 ft².

The total volume of Class I, II, and IIIA liquids, including those contained in approved storage cabinets and safety cans, shall not exceed 2 gal per 100 ft².
Liquids used for painting or maintenance shall be permitted to be stored in closed containers outside of storage cabinets and inside liquid storage rooms if limited to amount that does not exceed a 10-day supply.
Thank you!

Leo Old
Lold@ensafe.com
901-232-4415 (c)
901-372-7962 (o)