

HEALTHCARE LABORATORY CONSTRUCTION – GUIDELINE

BCA DIRECTIVE – 11H

INDEX	SECTIONS	TITLE	MARCH 14, 2017
	SECTION A	PURPOSE	
	SECTION B	REQUIREMENTS	

- A PURPOSE:**
To provide a reference for understanding the Maximum Allowable Quantities of Hazardous Materials allowed by code to before becoming an Hazardous occupancy.
- B CODE ANALYSIS:**
1. The **Florida Building Code Building, Chapters 3 & 4 & NFPA 1, Chapter 60** have very similar requirements for the requirements of occupancies with hazardous materials. The MAQ is the level allowed in the control area or Fire area that **if exceeded** the area becomes a Hazardous Occupancy that requires additional Life safety enhancements like shortened travel distances, explosion venting, higher density sprinkler coverage etc. This adds cost to the project; is not allowed in all buildings or in conjunction with all occupancies. Health Care occupancies have a dedicated chart in **NFPA 1, Chapter 60**.
 2. **NFPA 99-2012:** For the **1993 Edition of NFPA 99** there were further efforts to make the document more user-friendly (e.g., placing all “recommended” guidance either in notes or in the appendix). Significant technical changes included the following: revising laboratory requirements to correlate more closely with **NFPA 45, Standard for Laboratories Using Chemicals:**
 - a. **3.3.91* Laboratory.** A building, space, room, or group of rooms intended to serve activities involving procedures for investigation, diagnosis, or treatment in which flammable, combustible, or oxidizing materials are to be used.
 - b. **3.3.92* Laboratory Work Area.** A room or space for testing, analysis, research, instruction, or similar activities that involve the use of chemicals. This work area may or may not be enclosed.
 - c. **A.3.3.91 Laboratory.** These laboratories are not intended to include isolated frozen section laboratories; areas in which oxygen is administered; blood donor rooms in which flammable, combustible, or otherwise hazardous materials normally used in laboratory procedures are not present; and clinical service areas not using hazardous materials.
 - d. **A.3.3.92 Laboratory Work Area.** See **NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals.**
 3. **NFPA 45** has requirements for Laboratories that are also needing to be met. The basic lab sizes and classifications of the labs and Lab units may limit the quantities in smaller labs and on the lower levels of the building but is typically not the quantities that limit the total amount in the control area.
 4. **NFPA 45** recognizes the building code and the **NFPA 1** being adopted by the State of Florida making these the requirements we have to design our labs to and limit our chemical load in the building.
 5. Per the **Table NFPA 1-60.4.2.1.5, Note b:** Storage in excess of 10 gal (38 L) of Class I and Class II liquids combined or 60 gal (227 L) of Class IIIA liquids is permitted where stored in safety cabinets with an aggregate quantity not to exceed 180 gal (681 L).
 6. Control Areas and reduction would appear to be in force per **Table NFPA 1-60.4.2.2.1.**
 7. No doubling for sprinklering or storage is indicated anywhere.
 8. **NFPA 45-2012** says:
 - i. **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.

9. **NFPA 1-2012** says:
- i. **60.1 General Requirements.**
 - ii. **60.1.1 Applicability.** Occupancies containing high hazard contents shall comply with this chapter in addition to other applicable requirements of this *Code*. [5000:34.1.1.1]
 - iii. **60.4.2.1.1.3** For all occupancies not covered by **60.4.2.1.2** through **60.4.2.1.13**, the maximum allowable quantities of hazardous materials per control area shall be as specified in **Table 60.4.2.1.1.3.** [400:5.2.1.1.3]
 - iv. **60.4.2.1.5 Health Care Occupancies.** The maximum allowable quantities of hazardous materials per control area in health care occupancies shall be as specified in **Table 60.4.2.1.5.** [400:5.2.1.5]
10. **FBC Building code:**
[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.
11. **NFPA 99-2012**
B.12.3.6 Hazardous Materials. There are at least three major sources of concern with regard to nonradioactive hazardous materials unrelated to the intentional use of chemical agents to harm people (see **B.12.3.8**). The first is the possibility of a large spill or venting of hazardous materials near the facility; this is especially likely near major rail or truck shipping routes, near pipelines, or near heavy manufacturing plants. Second, every facility contains within its boundaries varying amounts of such materials, especially in the laboratory and custodial areas. A spill of a highly volatile chemical can quickly contaminate an entire structure by way of the air ducts. Finally, contaminated patients can pose a risk to staff, though on a more localized basis. Usually, removal of their clothing will reduce the risk materially. In any case, staff has to be prepared to seek advice on unknown hazards. This type of advice is not usually available from poison centers, but rather from a central referral, such as CHEMTREC, and its toll-free emergency information service number (800-424-9300).
12. **NFPA 1-60.4.2.1.5 table notes.**
Flammable and combustible liquid. **See note b, c, l.**
Note: The hazardous material categories and MAQs that are shaded in this table are not regulated by **NFPA 400** but are provided here for informational purposes. See **Chapter 2 of NFPA 400** for the reference code or standard governing these materials and establishing the MAQs. In accordance with **1.1.1.2 of NFPA 400**, materials having multiple hazards that fall within the scope of **NFPA 400** shall comply with **NFPA 400**.
- b. Storage in excess of 10 gal (38 L) of Class I and Class II liquids combined or 60 gal (227 L) of Class IIIA liquids is permitted where stored in safety cabinets with an aggregate quantity not to exceed 180 gal (681 L).
 - c. Fuel in the tank of operating mobile equipment is permitted to exceed the specified quantity where the equipment is operated in accordance with this code.
 - l. The quantities of alcohol-based hand rubs classified as Class I and Class II liquids and Level 1 aerosols are not limited when installed in individual dispensers in accordance with **66.18.6.** [400: **Table 5.2.1.5**]

Table 60.4.2.2.1 Design and Number of Control Areas

Floor Level	Maximum Allowable Quantity per Control Area (%) [*]	Number of Control Areas per Floor	Fire Resistance Rating for Fire Barriers [†] (hr)
Above grade plane			
>9	5.0	1	2
7-9	5.0	2	2
4-6	12.5	2	2
3	50.0	2	1
2	75.0	3	1
1	100.0	4	1
Below grade plane			
1	75	3	1
2	50	2	1
Lower than 2	NA	NA	NA

NA: Not applicable.

^{*}Percentages represent the maximum allowable quantities per control area shown in Table 60.4.2.1.1.3, with all the increases permitted in the footnotes of that table.

[†]Fire barriers are required to include floors and walls, as necessary, to provide a complete separation from other control areas. [5000: Table 34.2.5.1.1] [400: Table 5.2.2.1]

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1-284

FIRE CODE

Table 60.4.2.1.5 Maximum Allowable Quantities (MAQ) of Hazardous Materials per Control Area in Health Care Occupancies

Material	Class	Solid	Liquid ^k	Gas ^a (at NTP)
Flammable and combustible liquid ^{b,c,l}	See note	See note	See note	
Cryogenic fluid	Flammable	NA	10 gal	NA
	Oxidizing	NA	10 gal	NA
Explosives ^{d,e,f}	See note	See note	See note	See note
Flammable gas ^{c,g}	Gaseous	NA	NA	NP
	Liquefied	NA	20 gal	NA
Consumer fireworks	See note	See note	See note	See note
Flammable solid	NA	5 lb	NA	NA
Oxidizers	4	NP	NP	NA
	3	10 lb ^h	1 gal ^h	NA
	2	250 lb	25 gal	NA
	1	4,000 lb ⁱ	400 gal ⁱ	NA
Oxidizing gas	Gaseous	NA	NA	Per NFPA 99
	Liquefied	NA	15 gal	NA
Organic peroxides	I	NP	NP	NA
	II	NP	NP	NA
	III	1,500 lb	1,500 lb	NA
	IV	100,000 lb	100,000 lb	NA
	V	NL	NL	NA
Pyrophoric materials	NA	NP	NP	NP
Unstable reactives	4	NP	NP	NP
	3	NP	NP	NP
	2	10 lb	10 lb	NP ^g
	1	NL	NL	NP
Water-reactive	3	1 lb	1 lb	NA
	2	10 lb	10 lb	NA
	1	NL	NL	NA
Corrosives	NA	1,000 lb	100 gal	NP
Highly toxic	NA	3 lb	3 lb	NP ^j
Toxic	NA	125 lb	125 lb	NP ^j

For SI units, 1 lb = 0.454 kg; 1 gal = 3.785 L.

NTP: Normal temperature and pressure [measured at 70°F (21°C) and 14.7 psi (101 kPa)]. NA: Not applicable. NP: Not permitted. NL: Not limited.

Note: The hazardous material categories and MAQs that are shaded in this table are not regulated by NFPA 400 but are provided here for informational purposes. See Chapter 2 of NFPA 400 for the reference code or standard governing these materials and establishing the MAQs. In accordance with 1.1.1.2 of NFPA 400, materials having multiple hazards that fall within the scope of NFPA 400 shall comply with NFPA 400.

^aUnlimited amounts of gas are permitted to be used for personal medical or emergency medical use.

^bStorage in excess of 10 gal (38 L) of Class I and Class II liquids combined or 60 gal (227 L) of Class IIIA liquids is permitted where stored in safety cabinets with an aggregate quantity not to exceed 180 gal (681 L).

^cFuel in the tank of operating mobile equipment is permitted to exceed the specified quantity where the equipment is operated in accordance with this code.

^dThe use of explosive materials required by federal, state, or municipal agencies while engaged in normal or emergency performance of duties is not required to be limited. The storage of explosive materials is required to be in accordance with the requirements of NFPA 495, *Explosive Materials Code*.

^eThe storage and use of explosive materials in medicines and medicinal agents in the forms prescribed by the official United States Pharmacopoeia or the National Formulary are not required to be limited.

^fThe storage and use of propellant-actuated devices or propellant-actuated industrial tools manufactured, imported, or distributed for their intended purposes are required to be limited to 50 lb (23 kg) net explosive weight.

^gContainers, cylinders or tanks not exceeding 250 ft³ (7.1 m³) content at normal temperature and pressure (NTP) and used for maintenance purposes, patient care, or operation of equipment shall be permitted.

^hA maximum quantity of 200 lb (91 kg) of solid or 20 gal (76 L) of liquid Class 3 oxidizer is permitted where such materials are necessary for maintenance purposes, operation, or sanitation of equipment. Storage containers and the manner of storage are required to be approved.

ⁱThe permitted quantities are not limited in a building protected throughout by automatic sprinkler systems in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

^jGas cylinders not exceeding 20 ft³ (0.57 m³) at NTP are permitted in gas cabinets or fume hoods. [5000: Table 34.1.3.2(f)]

^kConversion. Where quantities are indicated in pounds and when the weight per gallon of the liquid is not provided to the AHJ, a conversion factor of 10 lb/gal (1.2 kg/L) shall be used.

^lThe quantities of alcohol-based hand rubs classified as Class I and Class II liquids and Level 1 aerosols are not limited when installed in individual dispensers in accordance with 66.18.6. [400: Table 5.2.1.5]