2008 NYC Fire Code

New Laboratory Standards

Operational & Maintenance Provisions
effective July 2008

Design & Certificate of Fitness
Requirements Effective July 1, 2009

History

- The new Fire Code legislation was signed by Mayor Bloomberg on June 3, 2008.
- The new Code took effect on July 1, 2008 with maintenance & operational requirements immediately enforceable.
- Beginning July 1, 2009, the FDNY will begin enforcing new certificate of fitness, new permit and new design requirements of the new code.

Applicability

- Laboratories that were lawfully existing under the old code (prior to July 1, 2008) will have most of the new design criteria waived (grandfathered).

- New laboratory and chemical storage room construction (including substantial alterations) and laboratories and chemical storage rooms that were not lawfully existing under the old Code (prior to July 1, 2008) will be required to fully comply with the new Code.

Lawfully Existing

<u>FC 102.3</u> Lawfully existing facilities and conditions.

Facilities, or parts thereof, lawfully existing on the effective date of this code (July 1, 2008) , as to which the design or installation of a facility would not be allowed or approved under this code may be continued in compliance with the old Fire Code and other laws, rules and regulations or permit conditions applicable at the time such facility was lawfully allowed or approved, and as such provisions may be amended from time to time.

For example, an existing below-grade flammable liquid storage room lawfully designed and installed in a university prior to July 1, 2008, and that on June 30, 2008 was in compliance with the design and installation requirements for such facilities set forth in the old Fire Code and *rules* is a *lawfully existing facility* which may be continued in compliance with the provisions of the old Fire Code and the *rules* in effect on June 30, 2008, notwithstanding the fact that such below-grade *facility* would not be allowed or approved under the new Fire Code.

Exceptions:

1. Facilities and conditions lawfully existing prior to the effective date of this code (July 1, 2008) shall comply with the requirements of the new Fire Code when specifically required by this code.

2. Facilities and conditions lawfully existing prior to the effective date of this code (July 1, 2008) shall comply with the requirements of this code when the commissioner determines such facility or condition to constitute a life safety hazard.

3. Facilities and conditions existing prior to the effective date of this code (July 1, 2008) shall comply with the requirements of this code when the part of the building, structure, facility or premises in which the facility is located or the condition exists undergoes a change in use or occupancy on or after such effective date.

4. Facilities and conditions existing prior to the effective date of this code (July 1, 2008) shall comply with the requirements of this code when the part of the building, structure, facility or premises in which the facility is located or the condition exists, undergoes alteration, whether made voluntarily, or as a result of damage, deterioration or other cause, on or after such effective date.

Operational Requirements

- Operational requirements are those that relate to the operation and supervision of equipment and premises.

  Pre-existing permits, pre-existing certificate of fitness requirements, recordkeeping, prohibitions against smoking, and posting of signage are examples of operational requirements.

Maintenance Requirements

- Maintenance requirements are those that relate to keeping equipment and premises in good working order and in safe condition.

  Housekeeping; servicing, periodic testing and inspection of equipment; and prevention and removal of obstructions to means of egress are examples of maintenance requirements.

Design Requirements

- Design requirements are those that relate to the installation of systems and fire protection that can reduce and/or prevent a fire incident or health hazard condition.

  The installation of a fire suppression, fire alarm, or mechanical ventilation system and design criteria not originally required of a lawfully existing installation are examples of design requirements.

Applicable Regulations

- New Fire Code section 2706 (aka FC 2706).
- NFPA 45 (2004 edition) with some limitations as set forth in FC 2706.
- 3 RCNY 10-01 (old Lab Rule) still in force for lawfully existing laboratories.
- Proposed new Rule 2706-01 (aka R 2706-01) to repeal the old Rule (3 RCNY 10-01).

Laboratory Unit Requirements

From the new Fire Code

- FC 2702.1 – An enclosed space of a minimum one-hour fire rated construction, designed or used as a non-production laboratory.

- FC 2706.2 - Laboratory chemicals within a laboratory unit shall be stored, handled and used in accordance with the general requirements of the new Fire Code and NFPA 45 (2004) for laboratory unit fire hazard class D requirements.

From the new Building Code

- BC 419.5 – Buildings or portions thereof occupied as a non-production laboratory may be classified as a Group B (Business) occupancy. Non-production laboratories not in compliance with the provisions of Fire Code for laboratory chemical quantity limitations shall be classified as Group H (High Hazard) occupancy.

- BC 419.6.2 – Laboratory units shall be provided throughout with an automatic sprinkler system.

  Note: The entire building shall be provided throughout with an automatic sprinkler system when the aggregate floor area of all laboratory units within any building exceeds 20,000 square feet.

(not required of lawfully existing laboratories)

- BC 419.6.2 – In all non-production laboratory buildings that are two or more stories above or below the grade level (level of exit discharge), standpipes shall be installed.

  (not required of lawfully existing laboratories)

- BC 419.6.3 – A manual fire alarm system shall be installed.

  (not required of lawfully existing laboratories)

Laboratory Permit

- A permit is required to store, handle or use hazardous materials in a laboratory unit in amounts exceeding one gallon of flammable liquid, one gallon of combustible liquid or 75 scf of flammable gas (an 8.5”x 31” cylinder).

- Laboratories that *do not* store or use flammable or combustible liquids or flammable gases in quantities requiring a permit but *do* store or use other types of hazardous materials (oxidizers, flammable solids, etc.) may choose to comply with the new Fire Code to avoid reclassification of such laboratory occupancy as a “control area”.

Control Area Limitations

FC Table 2703.8.3.2	Laboratory (any floor)	Control Area (1st floor)	Control Area (3rd floor)	Control Area (7th floor)
Max # of labs or control areas	Unlimited	4	2	2
Flammable Liquids	30 to 200 gals	30 to 480 gals	15 to 240 gals	1.5 to 24 gals
Flam Solids	10 to 15 lbs	1 lb	0.5 lb	0.05 lb
Oxidizers	40 to 50 lbs	250 to 1000 lbs	125 to 500 lbs	12.5 to 50 lbs
Water Reactives	2.5 to 5 lbs	50 to 200 lbs	25 to 100 lbs	2.5 to 10 lbs

Certificate of Fitness

FC 2706.4 – Non-production laboratory operations requiring a permit shall be under the personal supervision of a certificate of fitness holder.

At least one certificate of fitness holder shall be present on each floor of the laboratory unit on which laboratory operations are being conducted while the laboratory is in operation.

Accessory laboratory chemical storage rooms shall be under the general supervision of a certificate of fitness holder.

Laboratory Prohibitions

1. Store, handle or use any explosive.
2. Store, handle or use any unclassified detonable organic peroxide, detonable pyrophoric material, detonable unstable (reactive) material or detonable water-reactive material.
3. Store, handle or use any Class 4 unstable (reactive) material.
4. Store, handle or use any Class 4 oxidizing material.
5. Store, handle or use below grade any flammable gas.
6. Use an open flame for heating for distilling any flammable solid, flammable liquid or flammable gas.

Maximum allowable quantities per lab unit and volume density requirements for new laboratories

FC 2706.6.1 Flammable and combustible liquids.

- The density and total quantity of flammable and combustible liquids allowed within a laboratory unit, excluding storage rooms, shall be in accordance with Table 10.1.1 of NFPA 45 for laboratory unit fire hazard class D.

Exceptions: For laboratory units other than educational or instructional laboratories pursuant to NFPA 45.

1. The density of flammable and combustible liquids allowed within a laboratory unit may be increased to those set forth in Table 10.1.1 of NFPA 45 for laboratory unit fire hazard class B provided the total quantity of flammable and combustible liquid, including any in storage cabinets or safety cans, does not exceed 25 gallons.

2. The density of flammable and combustible liquids allowed within a laboratory unit may be increased to those set forth in Table 10.1.1 of NFPA 45 for laboratory unit fire hazard class B provided the total quantity of flammable and combustible liquid, including any in storage cabinets or safety cans, does not exceed 30 gallons and the walls, floors and ceilings of the laboratory unit are separated from all adjoining areas by 2-hour fire rated construction.

3. The quantity of flammable and combustible liquids allowed within a laboratory unit, excluding quantities in storage cabinets or safety cans, may be increased to 100 gallons and the total quantities of flammable and combustible liquids, including quantities in storage cabinets or safety cans, may be increased to 200 gallons provided the walls, floors and ceilings of the laboratory unit are separated from all adjoining areas by 2-hour fire rated construction.

NFPA 45, Table 10.1.1 as modified by FC 2706		Excluding quantities in storage cabinets (any fire rating)		Including quantities in storage cabinets AND a minimum 2-hr laboratory fire rating	
Lab Unit Fire Hazard Class***	Flammable & Comb Liq Class	Maximum Qty/100 ft2 of lab unit	Maximum Qty per lab unit	Maximum Qty/100 ft2 of lab unit	Maximum Qty per lab unit
D	I	1 gallon	75 gals*	2 gals	150 gals**
D	I, II & III	1 gallon	75 gals*	2 gals	150 gals**
B	I	5 gallons	25 gals	10 gallons	30 gals
B	I, II & III	10 gallons	25 gals	20 gallons	30 gals
* Increased to 100 gals if not an educational or instructional lab as per FC 2706.6					
** Increased to 200 gals if not an educational or instructional lab as per FC 2706.6					
*** Educational & instructional labs to comply with Class D requirements only					
Class I = Flash pt < 100 F; Class II = Flash pt 100 F – 140F; Class III = Flash pt > 140F					

Sample calculations for new laboratories

- 1,000 ft^2 research lab, 1 hour rated, sprinklered, flammable liquids only, with all storage within approved cabinets.

  Using the "Class D" density of 1 gal/100 ft^2 = 10 gallons
  Using the "Class B" density of 10 gals/100 ft^2 = 100 gallons???

  No! The use of Class B densities results in a 25 gallon cap.

- 1,500 ft^2 research lab, 2 hour rated, sprinklered, flammable liquids only, with all storage within approved cabinets.

  Using the "Class D" density of 2 gals/100 ft^2 = 40 gallons
  Using the "Class B" density of 20 gals/100 ft^2 = 300 gallons???

  No! The use of Class B densities results in a 30 gallon cap.

- 3,000 ft^2 research lab, 2 hour rated, sprinklered, flammable liquids only, with all storage within approved cabinets.

  Using the "Class D" density of 2 gal/100 ft^2 = 60 gallons
  Using the "Class B" density of 20 gals/100 ft^2 = 600 gallons???

  No! The use of Class B densities results in a 30 gallon cap.

- Lawfully existing laboratories operating under the old Fire Code chemical storage limits that meet all of the design requirements of the new Fire Code will be allowed request an increase in their maximum allowable flammable liquid storage. It appears that labs exceeding an area of 1,500 ft^2 (if 2 hour fire rated) or 3,000 ft^2 (if 1 hour fire rated) with approved storage cabinets would reap the most benefits from this new Code.

Maximum allowable quantities of other hazardous materials that may be found in laboratory occupancies.

As per FC 2706.6	Maximum quantity in 1-hr fire rated lab	Maximum quantity in 2-hr fire rated lab
Water-Reactive Material	2.5 lbs	5 lbs
Pyrophoric Material	0.5 lb	1 lbs
Highly Toxic Material	5 lbs	5 lb
Toxic Material	250 lbs	250 lbs
Corrosive Material	250 gals	250 gals
Flammable Solids	10 lbs	15 lbs
Oxidizers/Org Peroxides	40 lbs*	50 lbs*
Unstable reactive material	6 lbs**	12 lbs**
*maximum 2 lbs of Class 3 oxidizers & 1 lb of Class I organic peroxides **maximum 1 lb of Class 3 unstable reactive material		

Maximum allowable quantities of gases per lab unit as per NFPA 45

- Oxidizing and Flammable gases – one 5′ tall cylinder per 125 ft^2 of lab with at least 4 cylinders allowed per lab regardless of size. Quantities can be doubled for sprinklered labs.

- Gases with a health hazard rating of 3 or 4 – one 2′ tall cylinder per 250 ft^2 of lab with at least 2 of these cylinders allowed per lab regardless of size.

- Cylinders not "in use" (connected to a regulator; connected to a manifold; or an unconnected reserve stored alongside a connected cylinder) shall not be stored within a laboratory.

(Will only be applied to flammable, oxidizing and health hazard gases).

Safety Requirements

- Where more than 5 gallons of corrosive liquids or flammable liquids are stored, handled, or used, safety showers must be available within 25 feet (FC 2706).

- A tag must be affixed to all fixed overhead showers indicating proper performance (NFPA 45). We will require that testing be done annually.

- Where more than 5 gallons of corrosive liquids are stored, handled or used, neutralizing or absorbing agents shall be provided (FC 2706).

- A tag must be affixed to all fume hoods indicating proper face velocity. Testing must be done annually at a 12" to 18" sash height, with a minimum face velocity of 80 fpm and a maximum of 120 fpm (NFPA 45). A maximum of 150 fpm in existing hoods is allowed where required (OSHA Standard). Face velocities out of range will require ASHRAE 110 testing.

- Fume hood exhaust ducts from different laboratory units are now allowed to connect to a common exhaust duct system when the connection is made within an approved mechanical room, a protected shaft or a point outside the building (NFPA 45). Fume hood ducts must be noncombustible.

- Occupied laboratories should operate at 8 room air changes per hour while ventilation rates in unoccupied labs can be reduced to 4 room air changes per hour (NFPA 45).

- Curtains and drapes used in laboratories must be documented as “flame proof” (FC 2706).

  Documentation must be provided by a person holding a “flame proofing certificate of fitness”. Curtains may be chemically treated (good for 3 years) or must be “inherently flame resistant” (good for the life of the curtain).

As per NFPA 45, secondary means of egress must be provided when:

- A compressed gas cylinder (larger than a lecture bottle) or a cryogenic container is located such that it could prevent safe egress in the event of accidental release of its contents.

  (Only applicable to flammable, oxidizing or health hazard gases).

- A fume hood is located adjacent to the primary means of egress.

  (Only applicable to flammable, oxidizing or health hazard gas use).

- A laboratory work area exceeds 1000 ft^2.
  (pre-existing labs can not block second means of egress)

Note: A door to an adjoining laboratory work area (or lab unit of equal or lower fire hazard classification) is considered to be a second means of egress.

Oxygen Sensor Requirement

- FC 3205.4 (from cryogenic chapter in new Fire Code)

  Oxygen sensors equipped with an audible alarm shall be provided in cryogenic gas dispensing areas to continuously monitor the level of oxygen in the area. The alarm shall actuate when oxygen concentration drops below 19.5 percent.

- FC 3201.3 (from cryogenic chapter in new Fire Code)

  Inert cryogenic gases, including argon, helium and nitrogen, shall comply with the requirements of CGA P-18, requiring oxygen sensors where these gases are stored, used or dispensed.

- NFPA 45 (from Annex F)

  The transferring of cryogenic gas or the use of equipment connected to cryogenic gases should be monitored by an oxygen meter with a "low oxygen" alarm (NFPA 45).

  Note: Applicable only when the total cryogenic gas capacity in one fire area exceeds the permit limit of 60 gallons.

Storage of gases in corridors

- Ordinarily, compressed gas cylinders should not be stored in corridors. However, we understand that the operating requirements and space limitations of research labs can cause undo hardships as these areas are the only ones available for such accessory storage. As such, compressed gas cylinder storage in corridors shall be limited to non-flammable, non-oxidizing and non-health hazard gases in quantities not requiring a permit (up to 3,000 ft^3).

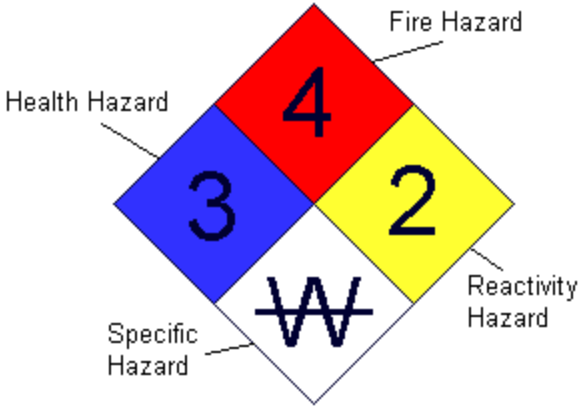
- Cryogenic container storage in corridors shall be limited to non-flammable, non-oxidizing and non-health hazard gases in quantities not requiring a permit (up to 60 gallons).

  Note: Storage in linear equipment rooms (LERs) designed to be fire separated from lab spaces and not designed to be a primary means of egress corridor shall be treated like a lab space.

Signage

- NFPA 45 does not recommend the use of NFPA 704 diamond signs for entrances to lab units or storage rooms, preferring a "lettered" sign instead. Therefore the existing "Laboratory – Potentially Hazardous Substances" sign or the new R 2706-01 lab rule sign requirement, "Laboratory – Caution: Hazardous Materials" in addition to the basic "Radioactive", "Biohazard" and "Water Reactive" signage shall be maintained.

- "No Smoking" signs shall be required even in institutions that totally prohibit smoking (FC 2703.7.1).



Chemical Storage Rooms

Unchanged conditions in new Fire Code include:

- 2-hr fire rated construction with a 1½ hr fire door
- Automatic sprinkler system
- Safety shower
- Ventilation at 6 air changes/hr
- Sill at doorway
- No flammable gas storage below grade

- Class 1, Division 2 explosion proof electrical equipment (old Rule was not clear on this; new Rule FC 2706-01 makes it clear).

New changes reflected in the new Fire Code include:

- Capacity shall not exceed a total volume of 300 gallons of chemicals or a liquid density of 5 gallons per square foot of floor area.
- Chemicals shall not be used within the storage room.
- Flammable gas storage shall not exceed 2500 scf.

Note: Additionally, FC 3404.3.5 (from the flammable liquids chapter in the new Code) prohibits Class I liquids below grade; Class II and Class IIIA liquids are only allowed in below grade sprinklered areas; Class IIIB liquids are allowed in below grade non-sprinklered areas when surrounded by sprinklered areas.

New Building Code requirements (BC 419) include:

- Storage rooms shall be classified as a group S-1 (Storage) occupancy.
- Storage rooms not in compliance with the laboratory chemical quantity limitations shall be classified as a group H (High Hazard) occupancy.
- Storage rooms shall not open directly to an exit or any enclosed exit access corridor.

Miscellaneous Items

- G-97 COF (will only be required when storing cryogenic gases in excess of 60 gals in equipment rooms and storage rooms.
- C-14 AIP (requirements for those AIP applicants still require BS degree but those with 60 credits, 21 in science can take the written)
- Refrigerators (we will still require the "store no flammables" sign and flammable storage refrigerators)
- Expiration dates on chemicals (still required, 6 months on chemicals that form peroxides; can test and extend date 6 more months)
- Labels on bottles (those for immediate use on bench tops need not be labeled if containers less than 1 liter; code sheets allowed)
- Incompatible chemicals allowed within same cabinet when separated by distance & secondary containment provides shielding.
- Flammable chemical waste will count towards flammable storage limits.
- NOVs and VOs. Which and when each one is issued is dependent on the type of violation among other factors.

Reference Material

- New Fire Code, proposed Rules (1st, 2nd and 3rd installments), new Fire Code FAQ section and certificate of fitness information can be found at:

  www.nyc.gov/fdny (go to "Fire Code", "Fire Rules" or "Certificate of Fitness" links)
- Sandy Camacho, Deputy Chief Inspector, Lab Unit

  (718) 999 – 2502 ; camachs@fdny.nyc.gov
- NFPA 45 (2004) can be purchased at the National Fire Protection Association's website.