

Fire Inspector Certification

Program

*New Jersey Uniform Fire Code
Inspector training program*

Module 12 Hazardous Materials-part 3



This Module will Cover:

- *Chapter 58 – Flammable Gases & Flammable Cryogenic Gases*
- *Chapter 59 – Flammable Solids*
- *Chapter 60 - Highly Toxic & Toxic Materials*
- *Chapter 61 – Liquefied Petroleum Gases*
- *Chapter 62 – Organic Peroxides*
- *Chapter 63 – Oxidizers, Oxidizing Gases & Oxidizing Cryogenic Materials*
- *Chapter 64 – Pyrophorics Materials*
- *Chapter 65 – Pyroxylin Plastics*
- *Chapter 66 – Unstable Reactives*
- *Chapter 67 – Water Reactives*

Questions on Part II

- *Do you have any questions on what was covered in Part II ?*

Chapter 58 – Flammable Gases & Flammable Cryogenic Fluids



Hazard Categories –Appendix E

- **Flammable Gases:**
 - Acetylene
 - Ethane
 - Ammonia
- **Cryogenic Flammables**
 - Hydrogen
 - Carbon monoxide
 - Deuterium
 - Ethylene
 - Methane

5803 General Requirements

- **Requirements in control areas:**
 - Prohibited in A, E,I,R and offices B occupancies
 - Cylinders shall be secure
 - Medical Gases shall be stored in gas rooms or cabinets
 - Shall have manual and automatic shut offs
 - Ignition sources shall be controlled
 - Bonded & grounded if flammable
 - Liquefied containers shall be upright
 - Storage in accordance with Chapter 50 Tables 5003.1.1(1) & 5003.1.1(3)

5806 Flammable Cryogenics

- *Storage prohibited for stationary containers outside as established by local law or statutes.*
- *Storage may be above or below ground tanks*
- *Tanks must have venting and overfill protection*
- *Vacuum jackets ASTM standard stainless steel or corrosive protective*

5806.4 Underground Tanks

- **Flammable Cryogenics:**
 - Tanks must be 3 feet from building foundations
 - Tank must have 12" of fill and 4" of concrete extending 12" beyond tank in all directions
 - Tank base shall have 6" inches of inter materials below tank
 - Tank shall be anchored
 - Tank shall have proper venting 5503.3
 - Overfill protection required
 - Corrosion protection required



5807 Metal Hydride Storage Tanks

- *Listed and approved*
- *Inspected and tested 5 year intervals*
 - System markings
 - Valve markings
 - Pressure relief device markings
 - Pressure Vessel Markings



5808 Hydrogen Fuel Gas Storage Rooms

- *Constructed to UCC*
- *May not be below grade*
- *Negative pressure in room*
- *Operable windows not permitted*
- *Mechanical exhaust ventilation*
- *Gas detection system UL 2017*
- *Fail safe system on gas detection*
- *Explosion control*
- *Standby power supply*



Chapter 59- Flammable Solids



Hazard Categories- Appendix E

- | | |
|------------------------------------|-----------------------------|
| • <i>Camphor</i> | • <i>Combustible metals</i> |
| • <i>Cellulose nitrate</i> | • <i>Cesium</i> |
| • <i>Naphthalene</i> | • <i>Magnesium</i> |
| • <i>Inorganic solids</i> | • <i>Zirconium</i> |
| • <i>Phosphorus</i> | |
| • <i>Potassium sulfide</i> | |
| • <i>Sulfur</i> | |
| • <i>Anhydrous, sodium sulfide</i> | |

5903- General Requirements

- *Below the exempt amounts shall comply with Chapter 50 sections 5002,5003 & 5901*
- *Above the exempt amounts Chapter 50 section 5003.1*
- *Outdoor Storage Table 5003.1.1(1) 5001,5003,5004 & 5906*



5906 Magnesium

- *Storage:*
 - *Quantities > 50 cu feet shall be separated from storage of other materials*
 - *Aisles shall equal pile height*
 - *Quantities > 1,000 cu feet shall be separated into piles of 1,000 cu feet*
 - *Aisles shall equal pile height*
 - *Shall not be located in non-sprinklered Type III,IV,V buildings defined in UCC*
 - *Storage in combustible containers within 30 feet of other combustibles or Type III,IV,V buildings*

5906.3 Storage of Ingots

- *Indoor:*
 - *Non combustible floor*
 - *Pile < 500,000 pounds Max*
 - *Aisles width ½ pile height*
- *Outdoor:*
 - *Max pile 1,000,000 pounds*
 - *Separation ½ height of pile*



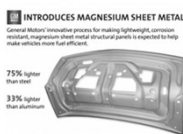
5906.4 Storage of Magnesium Scrap

- Kept separate from other materials
- 50-1,000 cu feet:
 - Steel 55 gallon drums
 - Separated by open space of 50 feet or fire barriers under UCC
- Storage greater than 1,000 cu feet:
 - Separated from buildings by 100 feet



5906.5 Use of Magnesium

- Non combustible floors
- Approved ovens
- Approved dust collection systems
 - Independent dust separators
- Power supply interlocks with exhaust system
- Electrical equipment Class II Division I
- Grounding of equipment
- Portable fire extinguisher
 - Class "D"
 - 30 feet from approved containers
 - Travel distance 75 feet



Chapter 60- Highly Toxic & Toxic Materials



Hazard Categories- Appendix E

- *Boron trichloride*
- *Hydrogen fluoride*
- *Phosgene*
- *Hydrogen sulfide*
- *Acrylonitrile*
- *Alkyl alcohol*
- *Diethyl ether*
- *Chromium IV oxide*
- *Mercury chloride*
- *Dimethyl ester*
- *Barium chloride*
- *Cadmium chloride*
- *Cadmium oxide*
- *Mercury II sulfate*
- *Oxalic acid*
- *Potassium fluoride*
- *Potassium hydroxide*
- *Sodium fluoride*

6001-General

- *Storage and use of highly toxic materials shall comply with this chapter and chapter 53 for compressed gases*



6003 – Storage

- *Quantities not exceeding the exempt amounts in control areas:*
 - *Table 5003.1.1.(2), 5001,5003,6001*
- *Quantities exceeding the exempt amounts:*
 - *Table 5003.1.1.(2), 6001, 6003.1.3 –6003.1.5.3 and Chapter 50*
 - *Exhaust scrubbers required under UCC*
 - *Liquid tight floor areas*
 - *Isolated by approved cabinets or construction*

6004 Toxic Compressed Gases

- *Special limitations in A,E,I,U,R, offices,retail and classrooms in B,F,M,&S*
 - *Exceptions cylinders < 20cu feet at STP*
- *Gas Cabinets*
 - *Ventilation rate: 200-150 feet per minute*
 - *Connected to exhaust system*
 - *Room must also have ventilation*
 - *Maximum number of cylinders 3 per cabinet*
- *Exhaust systems shall be enclosed*

6004.2.2.6 Gas Rooms

- *Must have exhaust systems*
- *Approved automatic sprinkler system*
 - *Alternative systems not permitted*
- *Gas treatment systems*
 - *Listed and approved gas detection*
 - *Listed and approved fail safe valves*
- *Performance*
 - *Gas levels must decrease to ½ IDLH level*
 - *Must be based upon worst case scenario*

6004.2.2.7.5 Portable Tanks

- *Maximum flow rate of release shall meet Table 6004.2.2.7.5 by approved excess flow or reduced flow valves*
- *Valves shall be permanently marked for flow*

TABLE 6004.2.2.7.5
RATE OF RELEASE FOR CYLINDERS AND PORTABLE TANKS

VESSEL TYPE	NONLIQUEFIED (minutes)	LIQUEFIED (minutes)
Containers	5	30
Portable tanks	40	240

Other Considerations

- *Emergency power*
- *Automatic fire detection system*
- *Gas detection system*
- *Gas supply shut offs*
- *Automatic valve closures*



6004 Outdoor Storage

- *Weather protection and automatic sprinklers are required for containers not in gas cabinets or enclosures*
 - *Exceptions: non combustible gases*
 - *30 foot separation from combustibles or fire barrier*
- *Cylinders in gas cabinets or enclosures*
 - *Treatment system*
 - *Emergency power*
 - *Gas detection system*



6004.3.2 Outdoor Storage

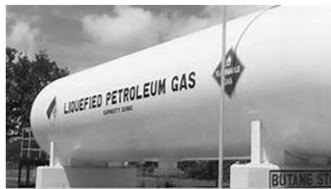
- *Compressed gases in cabinets*
 - *5 feet from buildings*
 - *25 feet from exit discharges*
 - *75 feet from lot line, public way, street*
- *Distance reduction:*
 - *2 hour fire barrier in line of sight to exposure*
 - *2 hour fire barrier not less than 5 feet from exposure*
 - *Fire barrier shall not have more than 2 sides at 90 degrees or three at 135 degrees*

6006- Ozone Generators

- *Scope: 0.5 pounds for 24 hours*
- *Located in approved cabinet*
- *Must be properly labeled NEMA 250*
- *Approved signs "HIGHLY TOXIC"*
- *Rooms ventilated mechanically in accordance with UCC*
- *Piping and valves are of approved materials*
- *Automatic shutdowns*
- *Manual shutdowns –10 feet of exit*



Chapter 61 - LPG



6103 Installation

- *Installed to fuel gas subcode of UCC and NFPA 58*
- *Shall not be used in basements, pits or similar areas*
- *Temporary heating NFPA 58 sections 6.19.4, 6.19.5 & 6.19.8*
- *Factory – maximum aggregate 735 pounds manifolded containers separated by 20 feet*



6103 Installation

- ***Use Group E & I***
 - *Research & classrooms E not more than 50 pounds water capacity or Institutional not more than 12 pounds water capacity*
 - *Temporary demonstration 12 pounds water capacity*
 - *Torch assemblies – 2-1/2 pounds water capacity*
 - *Food preparation – approved appliance NFPA 58 sections 11.13 & 11.14*

**Table 6104.3
Location of Containers**

TABLE 6104.3
LOCATION OF LP-GAS CONTAINERS

LP-GAS CONTAINER CAPACITY (water gallons)	MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS AND BUILDINGS, PUBLIC WAYS OR LOT LINES OF ADJOINING PROPERTY THAT CAN BE BUILT UPON		MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS** (feet)
	Mounted or underground LP-gas containers* (feet)	Above-ground LP-gas containers* (feet)	
Less than 125 ^{1,2}	10	2 ³	None
125 to 250	10	10	None
251 to 500	10	10	3
501 to 2,000	10	25 ^{1,2}	3
2,001 to 30,000	50	50	5
30,001 to 70,000	50	75	(0.25 of sum of diameters of adjacent LP-gas containers)
70,001 to 90,000	50	100	
90,001 to 120,000	50	125	

For SI: 1 foot = 304.8 mm, 1 gallon = 3.785 L.

See all notes below table

6105 Prohibited Use

- ***May not be used to operate devices not approved for LPG***
- ***Shall not be released to atmosphere except as permitted in NFPA 58 section 7.3***



6107 Safety Precautions

- *LPG cylinders shall not be tampered with*
- *NO-SMOKING within 25 feet of LPG*
- *Combustible shall be kept 10 feet from LPG*
- *Containers over 100 pounds shall be marked with warnings "Flammable Gas"*
- *LPG over 250 gallons shall have marker signs*
 - *Company information 24 hr emergency contact telephone*
- *Fire protection over 4,000 gallons NFPA 58 section 6.25*
- *Portable fire extinguishers section 906*

6109 LPG Awaiting Resale

- *Minimize exposure to excessive temperature, physical damage and tampering*
- *Shall not be stored in exits, or exit access or stairways*
- *Shall not be stored on roofs*
- *Shall not be stored in basements or pits*
- *Container valves shall be protected*
- *Storage accessible to public*
 - *2-1/2 pound cylinders not to exceed 200 pounds*

Table 6109.12 LPG Awaiting Resale

TABLE 6109.12
SEPARATION FROM EXPOSURES OF LP-GAS CONTAINERS AWAITING USE,
RETAIL OR EXCHANGE STORED OUTSIDE OF BUILDINGS

MINIMUM SEPARATION DISTANCE FROM STORED LP-GAS CYLINDERS TO (feet)

QUANTITY OF LP-GAS STORED (pounds)	Nearest important building or group of buildings or line of adjacent property that may be built upon	Line of adjoining property occupied by schools, places of religious assembly, hospitals, athletic fields or other public or private gathering places; assemblies; or other public	LP-gas regulating station	Overway or opening in a building with top or more means of egress	Overway or opening in a building with one means of egress	Combustible materials	Motor vehicle fuel dispenser
720 or less	0	0	5	5	10	10	20
721 - 2,500	0	10	10	5	10	10	20
2,501 - 6,000	10	10	10	10	10	10	20
6,001 - 10,000	20	20	20	20	20	10	20
Over 10,000	25	25	25	25	25	10	20

For 30: 1 liter = 0.035 231 cu. in. 1 gallon = 12.874 kg.

Separation from exposures outside of buildings

6109.15 LPG Cylinder Exchange for Resale

1. *Secure lockable ventilated cabinet*
2. *Accessible only by authorized personnel*
3. *Sign: "DO NOT BRING LP-GAS CYLINDERS INTO BUILDING"*
4. *Emergency contact information within 10 feet of storage cabinet –size, color, location determined by Fire Official*

6109.15.1 Automatic Exchanges

1. *Vending system for single cylinder transactions*
2. *Cylinders can only be inserted upright*
3. *Electric,mechanical or pneumatic door opening device*
4. *Electrical equipment shall be Class1,Division 2*
5. *Manual override permitted by authorized personnel*
6. *Inspections shall be conducted as required by the Fire Official*

LP-Gas Resale Exchanges



Manual



Automatic

6110 LP-Gas Containers not in Service

1. *Disconnected from appliance*
2. *LPG outlet shall be closed or plugged*
3. *Relief valve shall be in direct contact with vapor space*

Permanently out of service cylinders shall be removed from site



6111- Parking LP-Gas vehicles

- *Operator may be absent from vehicle when obtaining assistance due to accident, breakdown or other emergencies*
- *Shall not be left unattended within 500 feet of residential, educational or institutional buildings*
- *Absents longer then 1 hour:*
 - *Vehicle must be off public street*
 - *Inside bulk plant*
 - *Approved locations 50 feet from buildings*
- *Garages: section 11.11 of NFPA58*



Chapter 62 – Organic Peroxides



Hazard Categories –Appendix E

- **Class 1**
 - 1-butyl hydrogen peroxide –90%
 - Benzyl peroxide –98%
- **Class 2**
 - Acetyl peroxide-25%
 - 3,5,5 trimethylhexane
 - Peroxyacetic acid 4.3%
- **Class 3**
 - Acetyl cyclohexane
 - Sulfonyl peroxide –29%
 - Methyl ethyl ketone peroxide-9%
- **Class 4**
 - Benzyl peroxide –75%
 - Methyl ethyl ketone-9%
 - P-methanehydroperoxide

6203 General Requirements

- *Quantities not exceeding the exempt amounts per control area 5003.1,5001,5003,6201 & 6203*
 - **Special Limitations:**
 - *A,E,I,&U: Detonable Class 1 peroxides*
 - *Storage cabinets with no other materials*
 - *R – prohibited*
 - *B,F,M,&S: Detonable Class 1 peroxides*
 - *Shall not be stored in offices or retail sales areas*
 - *B,F,M Classrooms: Detonable Class 1 peroxides*
 - *Storage cabinets with no other materials*
- Quantities exceeding the exempt amounts per control area: Section 5003.1 and Chapter 50*

6204.1 Storage

- **Indoor Storage: exceeding the exempt amounts per control areas**
 - *Table 5003.1.1.(1) sections 5001,5003,5004*
 - *Detonable Class 1 peroxides Chapter 56*
- **Conditions:**
 - *Detached storage*
 - *Table 6204.1.2 – Distances from detached buildings*
 - *Liquid tight floor*
 - *Electrical wiring Class I Division 2*
 - *Smoke Detection*

Table 6204.1.2-Organic Peroxides - Distances

TABLE 6204.1.2
ORGANIC PEROXIDES—DISTANCE TO EXPOSURES FROM DETACHED STORAGE BUILDINGS OR OUTDOOR STORAGE AREAS

ORGANIC PEROXIDE CLASS	MAXIMUM STORAGE QUANTITY (POUNDS) AT MINIMUM SEPARATION DISTANCE					
	Distance to buildings, lot lines, public streets, public alleys, public ways or means of egress			Distance between individual detached storage buildings or individual outdoor storage areas		
	50 feet	100 feet	150 feet	50 feet	75 feet	100 feet
I	2,000	20,000	175,000	2,000	20,000	175,000
II	100,000	200,000	No Limit	100,000 ^a	No Limit	No Limit
III	200,000	No Limit	No Limit	200,000 ^a	No Limit	No Limit
IV	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
V	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit

For SI: 1 foot = 304.8 mm, 1 pound = 0.454 kg.

a. Where the amount of organic peroxide stored exceeds this amount, the minimum separation shall be 50 feet.

TABLE 6204.1.2

6204.1.7 Storage Arrangement

- *Maximum Quantities – Table 6204.1.2*
- *6204.1.7 Storage Arrangement:*
 - *Closed containers*
 - *Bulk storage shall not be in piles or bins*
 - *2 foot clearance between storage and metal walls*
 - *55 gallons drums stored no more than 1 drum high*

Table 6204.1.7 Storage of Organic Peroxides

TABLE 6204.1.7
STORAGE OF ORGANIC PEROXIDES

ORGANIC PEROXIDE CLASS	PILE CONFIGURATION				MAXIMUM QUANTITY PER BUILDING
	Minimum width (feet)	Maximum height (feet)	Minimum distance to next pile (feet)	Minimum distance to walls (feet)	
I	5	8	4 ^a	4 ^a	Note c
II	10	8	4 ^a	4 ^a	Note c
III	10	8	4 ^a	4 ^a	Note c
IV	16	10	3 ^{b,c}	4 ^a	No Requirement
V	No Requirement	No Requirement	No Requirement	No Requirement	No Requirement

For SI: 1 foot = 304.8 mm.

a. Not less than one main aisle with a minimum width of 8 feet shall divide the storage area.

b. Distance to noncombustible walls is allowed to be reduced to 2 feet.

c. See Table 6204.1.2 for maximum quantities.

d. The distance shall be not less than one-half the pile height.

PILE CONFIGURATIONS

6204.1.7 Storage Arrangement

- *Class I & II peroxides shall be on ground floor*
- *Class III shall not be stored in basements*
- *Class I materials require explosion control*
- *Stand by power required for:*
 - *Exhaust & ventilation system*
 - *Treatment systems*
 - *Gas detection*
 - *Smoke detection*
 - *Temperature controls*
 - *Fire alarm system*
 - *Emergency alarm system*

6204.2 Outdoor Storage

- *Quantities exceeding the exempt amount per control area*
 - *Table 5003.1.1.(3), 5001,5003 & 5004 and this chapter*
 - *Distance –Table 6204.1.2*
 - *Electrical wiring –Class I, Division 2*
 - *50 feet separation from other hazardous materials*

Chapter 63 - Oxidizers, Oxidizing Gases & Oxidizing Cryogenic Materials



Hazard Categories Appendix E

- **Oxidizers**
 - Oxygen
 - Ozone
 - Nitric acid
 - Chlorates
 - Sulfuric acid
 - Bromine
 - Nitrogen
 - Nitrates
- **Oxidizing cryogenics**
 - Oxygen
 - Fluorine
 - nitric oxide
- **Cryogenic oxidizers**
 - Oxygen
 - Fluorine
 - nitric oxide

6303 General Requirements

- *Quantities under the exempt amounts per control areas: sections 5003.1, 5001, 5003, 6301 & 6303 Chapter 53*
- *Special Limitations Class 4 liquids & solid oxidizers:*
 - *A, E, I & U: Storage cabinets with no other materials*
 - *R: prohibited*
 - *B, F, M & S offices: prohibited*
 - *B, F, M, Classrooms: Storage cabinets with no other materials*
- *Class 3 liquids & solids: 20 gallons liquid / 200 lbs solids max*
- *Oxidizing gases not exceeding 250 cu ft. compressed or 46 pounds liquefied gases*
 - *Oxidizing gases prohibited in A, E, I, R or offices in B uses*

6303 General Requirements

- **Conditions: Exceeding the Exempt Amounts per control area:**
 - *Emergency manual of automatic failsafe shut offs*
 - *Installed at the supply source*
 - *Shut off at point of use*
 - *Manual or automatic*
 - *Ignition source controls (5003.7)*
 - *Class 1 oxidizers (table 6303.2)*

Table 6303.2**TABLE 6303.2
STORAGE OF CLASS 1 OXIDIZER LIQUIDS AND SOLIDS**

STORAGE CONFIGURATION	LIMITS (feet)
Piles	
Maximum width	24
Maximum height	20
Maximum distance to aisle	12
Minimum distance to next pile ^a	4
Minimum distance to walls ^b	2
Maximum quantity per pile	200 tons
Maximum quantity per building	No Limit

For SI: 1 foot = 304.8 mm, 1 pound = 0.454 kg, 1 ton = 0.907185 metric ton.

- a. The minimum aisle width shall be equal to the pile height, but not less than 4 feet and not greater than 8 feet.
b. There shall be no minimum distance from the pile to a wall for amounts less than 9,000 pounds.

6304 Storage

- **Indoor Storage: (Table 5003.1.1(1) , 5001,5003,5004 this chapter**
 - **Explosion control**
 - **Automatic sprinkler system**
 - **Liquid tight floors**
 - **Smoke detection system**
 - **Storage Conditions (Table 6304.1.5(1) thru (3)**
 - **Class 2 not permitted in basements**

Tables 6304.1.5(1),(2),(3)**TABLE 6304.1.5(1)
STORAGE OF CLASS 2 OXIDIZER LIQUIDS AND SOLIDS**

STORAGE CONFIGURATION	Control area storage	Group H occupant storage	Detached storage
Piles			
Maximum width	16 feet	25 feet	25 feet
Maximum height	Note a	Note a	Note a
Maximum distance to aisle	8 feet	12 feet	12 feet
Minimum distance to next pile	Note b	Note b	Note b
Minimum distance to walls	2 feet	2 feet ^c	2 feet ^c
Maximum quantity per pile	MAQ	100 tons	100 tons
Maximum quantity per building	MAQ	2000 tons	No Limit

For SI: 1 foot = 304.8 mm, 1 pound = 0.454 kg, 1 ton = 0.907185 metric ton.

- a. Maximum storage height in nonsprinklered buildings is limited to 6 feet.
In sprinklered buildings see NFPA 400 for storage heights based on ceiling sprinkler protection.
b. The minimum aisle width shall be equal to the pile height, but not less than 4 feet and not greater than 8 feet.
c. For protection level and detached storage under 4,500 pounds, there shall be no minimum separation distance between the pile and any wall.

**TABLE 6304.1.5(2)
STORAGE OF CLASS 3 OXIDIZER LIQUIDS AND SOLIDS**

STORAGE CONFIGURATION	Control area storage	Group H occupant storage ^a	Detached storage
Piles			
Maximum width	12 feet	16 feet	20 feet
Maximum height	Note a	Note a	Note a
Maximum distance to aisle	8 feet	10 feet	10 feet
Minimum distance to next pile	Note b	Note b	Note b
Minimum distance to walls	4 feet	4 feet ^c	4 feet ^c
Maximum quantity per pile	NA	30 tons	100 tons
Maximum quantity per building	MAQ	1200 tons	No Limit

For SI: 1 foot = 304.8 mm, 1 pound = 0.454 kg, 1 ton = 0.907185 metric ton.

- a. Maximum storage height in nonsprinklered buildings is limited to 6 feet.
In sprinklered buildings see NFPA 400 for storage heights based on ceiling sprinkler protection.
b. The minimum aisle width shall be equal to the pile height, but not less than 4 feet and not greater than 8 feet.
c. For protection level and detached storage under 2,500 pounds, there shall be no minimum separation distance between the pile and any wall.

**TABLE 6304.1.5(3)
STORAGE OF CLASS 4 OXIDIZER LIQUIDS AND SOLIDS**

STORAGE CONFIGURATION	LIMITS (feet)
Piles	
Maximum length	10
Maximum width	4
Maximum height	8
Minimum distance to next pile	8
Maximum quantity per building	No Limit

For SI: 1 foot = 304.8 mm.

6304 Storage

- *Class 4 oxidizers shall be separated from other materials*
- *Shall not be stored on or next to combustibles*
- *Detached storage*
 - *Class 4 not closer than 50 feet to other hazardous materials*
- *Oxidizing cryogenic gases Table 6304.2.1*

Table 6304.2.1

QUANTITY OF GAS STORED (cubic feet at RTP)	DISTANCE TO A BUILDING NOT ASSOCIATED WITH THE MANUFACTURE OR DISTRIBUTION OF OXIDIZING GASES OR PUBLIC WAY OR LOT LINE THAT CAN BE BUILT UPON (ftm)	DISTANCE BETWEEN STORAGE AREAS (ftm)
0 – 50,000	5	5
50,001 – 100,000	10	10
100,001 or greater	15	10

For SI: 1 foot = 304.8 mm; 1 cubic foot = 0.02832 m³.

a. The minimum required distances shall not apply where fire barriers without openings or penetrations having a minimum fire-resistance rating of 2 hours intercept the line of sight between the storage and the exposure. The configuration of the fire barrier shall be designed to allow natural ventilation to prevent the accumulation of hazardous gas concentrations.

6306 –LOX – Home Health Care

- ***1-1,1-4,Residential:***
 - *Provide information and instructions on use*
 - *Maximum container size 15.8 gallons*
 - *Containers labeled*
 - *Location requirements:*
 - *Away from exits*
 - *Away from doors*
 - *Away from falling objects*
 - *Away from electrical hazards*
 - *Away from flames and high temperature appliances*
 - *LOX shall be constrained during use*



6306 –LOX – Home Health Care

- **Container Handling:**
 - Handled by carts or trucks
 - Exception rolling bases & ambulatory containers
- **Filling:**
 - Shall be filled outdoors
 - Compatible drip pan to prevent contact with combustibles
- **Smoking prohibited**
- **Signs: “oxygen-no smoking”**
- **Premises sign where required by the Fire Official**
- **Fire department notification-where required by the fire official**

Chapter 64- Pyrophoric Materials



Multitank for Aluminum Alkyls, 1.8 m³

Hazard Categories Appendix E

- | | |
|----------------------------|------------------------------|
| • Gases: | • Solids: |
| – Diborane | – Cesium |
| – Phosphine | – Lithium |
| – Silane | – White or yellow phosphorus |
| • Liquids: | – Potassium |
| – Diethylaluminum chloride | – Rubidium |
| – Dimethyl arsine | – Sodium |
| – Triethyl boron | – Plutonium |
| – Trimethyl aluminum | – Thorium |

6403- General Requirements

- *Quantities not exceeding the exempt amounts per control area:*
 - Sections 5001,5003,6401 & 6403
- *Conditions:*
 - Emergency shut offs for compressed gases
 - Automatic shut off valves in piping
 - Manual valves 15 feet from supply source
 - Manual or automatic Shut off valves at connection of supply to equipment.

6403.2- General Requirements

- *Quantities exceeding the exempt amounts per control areas: section 5003.1 chapter 50 and this chapter*



6404 Storage

- *Indoor Storage : Table 5003.1.1.(1)*
 - Liquid tight flooring
 - Max 100 sq.ft. per pile not exceeding 5 feet in height
 - Aisles –10 feet
 - Tanks not to exceed 500 gallons
 - Pyrophorics gases – detached building
 - Incompatible materials separated by 1 hour fire barriers under UCC
- *Outdoor Storage: Table 5003.1.1(3) sections 5001,5003,5004 and this chapter*
 - Separations from buildings and lot lines
 - Solids & liquids 2X Chapter 57 for 1B flammable liquids
 - Gasses Table 6004.2.1
 - Weather protection & automatic fire extinguishing system

Table 6404.2.1

TABLE 6404.2.1 PYROPHORIC GASES—DISTANCE FROM STORAGE TO EXPOSURES ^a						
MAXIMUM AMOUNT PER STORAGE AREA (cubic feet)	MINIMUM DISTANCE BETWEEN STORAGE AREAS (feet)	MINIMUM DISTANCE TO LOT LINES OF PROPERTY THAT CAN BE BUILT UPON (feet)	MINIMUM DISTANCE TO PUBLIC STREETS, PUBLIC ALLEYS OR PUBLIC WAYS (feet)	MINIMUM DISTANCE TO BUILDINGS ON THE SAME PROPERTY Revised construction or opening within 20 feet	Two-hour construction and no opening within 20 feet	Four-hour construction and no opening within 20 feet
250	5	25	5	5	0	0
2,500	10	50	10	10	5	0
7,500	20	100	20	20	10	0

For SI: 1 foot = 304.8 mm, 1 cubic foot = 0.02832 m³.

a. The minimum required distances shall be reduced to 5 feet when protective structures having a minimum fire resistance of 2 hours interrupt the line of sight between the container and the exposure. The protective structure shall be at least 5 feet from the exposure. The configuration of the protective structure shall allow natural ventilation to prevent the accumulation of hazardous gas concentrations.

Chapter 65 – Pyroxylin Plastics

1904 Pyroxylin

Pyroxylin lacquers and plastics served as a springboard for Dupont. They launched the company out of the powder business of the 19th century and into the forefront of the 20th century revolution in synthetic materials.

Pyroxylin is a generic name for nitrocellulose compounds that form a film when dissolved in a mixture of ether and alcohol, from which plastics can be produced. _

Hazard Categories Appendix E

- *Nitro cellulose*
- *Gun cotton*
- *Nitro cellulose film*



Nitro cellulose

Also know as – Gun Cotton, Flash Paper ,Nitrocellulose film



6503- General Requirements

- *Display – placed on tables 3'X10' feet spaced 3 feet apart.*
 - *No storage permitted under tables*
 - *Tables may not interfere with egress*
 - *Lighting not permitted above tables*



6504- Storage & Handling

- *Storage –25lbs or more approved vault or cabinet with automatic sprinklers*
 - *Max cabinet capacity 1,000 pounds*
- *No heat sources within 2 feet*
- *Building must be sprinklered in storage rooms.*
- *No ignition sources in rooms over 25 lbs of pyroxylin*
- *Heating shall be by hot water or low pressure steam*

Chapter 66- Unstable Reactives



Hazard Categories Appendix E

- | | |
|--|---|
| <ul style="list-style-type: none"> • <i>Class 4</i> <ul style="list-style-type: none"> – Acetyl peroxide – Ethyl nitrate – Picric acid – Trinitro benzene • <i>Class 3</i> <ul style="list-style-type: none"> – Hydrogen peroxide-52% – Nitro methane – Perchloric acid – Paranitroaniline | <ul style="list-style-type: none"> • <i>Class 2</i> <ul style="list-style-type: none"> – Acrolein – Acryl acid – Vinyl acetate – Styrene • <i>Class 1</i> <ul style="list-style-type: none"> – Acetic acid – Sodium hydroxide – Titanium tetrachloride |
|--|---|

6603 –General Requirements

- *Quantities not exceeding maximum amounts per control area*
 - 5001,5003,6601 & 6603
- *Occupancy limitations:*
 - A,E,I & U : Class 3&4 materials stored in cabinets with no other materials
 - R: Class 3&4 materials prohibited
 - M Class 4 materials prohibited in retail areas
 - B,F,M,&S Offices: Class 3&4 prohibited
 - B,F & M Classrooms: Class 3&4 materials shall be stored in cabinets with no other products
- *Quantities exceed the exempt amounts per control area*
 - Section 5001.3 and Chapter 50 and this chapter

6604 - Storage

- **Indoor Storage exceeding the exempt amounts per control areas: Table 5003.1.1(1) sections 5001,5003,5004**
 - Class 3&4 unstable detonable materials- UCC requirements
- **Conditions:**
 - Detached storage
 - Explosion control –class 3&4 materials
 - Liquid tight floors
 - 500 cu ft piles separated by 4 ft aisles max
 - No basement storage

6604.2 – Outdoor Storage

- **Exceeding the exempt amounts per control areas:**
 - Table 5003.1.1(3) sections 5001,5003,5004 & chapter 66
 - Class 3&4 (detonable) materials Table 5604.5.2.(2) based on TNT equivalent weight
 - Class 3 (Deflagration hazard) Table 5604.5.2.(3)
 - Class 1&2 (unstable reactive) – 20 feet from buildings, lot lines, public ways or 2 hour fire barrier
 - Piles 1,000 cu feet max
 - Aisles 10 feet of half pile height

Tables 5604.5.2 (2) – (Class 3&4 Explosive)

TABLE 5604.5.2(2)
TABLE OF DISTANCES (D) FOR BUILDINGS AND MAGAZINES CONTAINING EXPLOSIVES—DIVISION 1.3 MASS-FIRE HAZARD^{a,b,c}

QUANTITY OF DIVISION 1.3 EXPLOSIVES (NET EXPLOSIVES WEIGHT)		DISTANCES IN FEET			
Pounds over	Pounds not over	Inhabited Building Distance (IBD)	Distance to Public Traffic Route (PTR)	Intermagazine Distance (MD)	Intraline Distance (ILD) or Intrajoint Distance (IFD)
0	1,000	75	75	50	50
1,000	5,000	115	115	75	75
5,000	10,000	150	150	100	100
10,000	20,000	190	190	125	125
20,000	30,000	215	215	145	145
30,000	40,000	235	235	155	155
40,000	50,000	250	250	165	165
50,000	60,000	260	260	175	175
60,000	70,000	270	270	185	185
70,000	80,000	280	280	190	190
80,000	90,000	295	295	195	195
90,000	100,000	300	300	200	200
100,000	200,000	375	375	250	250
200,000	300,000	450	450	300	300

For SI: 1 foot = 304.8 mm, 1 pound = 0.454 kg

a. Black powder, when stored in magazines, is defined as low explosive by the Bureau of Alcohol, Tobacco, Firearms and Explosives (BATF).

b. For quantities less than 1,000 pounds, the required distances are those specified for 1,000 pounds. The use of lesser distances is allowed where supported by approved test data and/or analysis.

c. Linear interpolation of explosive quantities between table entries is allowed.

Tables 5604.5.2 (3) – (Class 3 deflagrate)

TABLE 5604.5.2(3)
TABLE OF DISTANCES (Q-D) FOR BUILDINGS AND MAGAZINES CONTAINING EXPLOSIVES—DIVISION 1.4^a

QUANTITY OF DIVISION 1.4 EXPLOSIVES (NET EXPLOSIVES WEIGHT)		DISTANCES IN FEET			
Pounds over	Pounds not over	Inhabited Building Distance (IBD)	Distance to Public Traffic Route (PTR)	Intermagazine Distance ^b (IMD)	Intrusive Distance (I.D.) or Infragrant Distance ^c (IFD)
50	Not Limited	100	100	50	50

For 50: 1 foot = 304.8 mm, 1 pound = 0.454 kg.

a. A separation distance of 100 feet is required for buildings of other than Type I or Type II construction as defined in the building subcode of the Dglew
Construction Code.

b. For earth-covered magazines, specific separation is not required.

1. Earth cover material used for magazines shall be relatively cohesive. Solid or wet clay and similar types of soil are too cohesive and shall not be used. Soil shall be free from unsanitary organic matter, trash, debris and stones heavier than 10 pounds or larger than 6 inches in diameter. Compaction and surface preparation shall be provided, as necessary, to maintain structural integrity and avoid erosion. Where cohesive material cannot be used, as in sandy soil, the earth cover over magazines shall be finished with a suitable material to ensure structural integrity.

2. The earth fill or earth cover between earth-covered magazines shall be either solid or sloped, in accordance with the requirements of other construction features, but not less than 2 feet of earth cover shall be maintained over the top of each magazine. To reduce erosion and facilitate maintenance operations, the cover shall have a slope of 2 horizontal to 1 vertical.

c. Restricted to articles, including articles packaged for shipment, that are not regulated as an explosive under Bureau of Alcohol, Tobacco, Firearms and Explosives regulations, or packaged articles used in process operations that do not propagate a detonation or deflagration between articles. This table shall not apply to consumer fireworks, 1.4G.

Chapter 67 – Water Reactive Solids & liquids



Hazard Categories Appendix E

- **Class 3:**
 - Aluminum alkyls, ethyl nitrates, bromine trifluoride
- **Class 2:**
 - Calcium carbide, lithium hydride, potassium peroxide, sodium metal, potassium metal
- **Class 1:**
 - Acetic acid, hydrogen peroxide, sulfur monochloride, titanium tetrachloride

6703- General Requirements

- *Quantities below the exempt amounts per control area:*
 - 5001,5003,6701,6703
- *Quantities above the exempt amount per control area:*
 - 5003.1 and Chapter 50

6704 Storage

- *May be indoor or detached buildings*
- *Liquid tight floors*
- *Waterproof rooms*
- *Water tight containers*
- *Separation of piles*
 - 500 cu feet – 4 feet aisles
- *Class 2&3 solids or liquids require explosion control (section 911)*
- *Outdoor storage Table 5003.1.1(3)*
 - Class 3 – 75 feet from buildings & lot lines
 - Class 2 – 20 feet from buildings & lot lines or 2 hr barrier 30" inches above
 - Class 3 – 500cu ft, and class 2 1,000 cu ft in piles
- *Secondary containment*

The End Module –Part III