

HAZARD CLASSIFICATION FOR NFPA 13 SPRINKLER DESIGN



Division of Fire Safety



MFA Course #644 - May 2010

NFPA 13 HAZARD CLASSIFICATION

Why does it matter?

Chapter 11-21

Sprinkler Demand

Hose Demand

Duration



NFPA 13 HAZARD CLASSIFICATION

Current NFPA 13?

2007 Edition



NFPA 13 HAZARD CLASSIFICATION

Why does it matter?



Light Hazard???



NFPA 13 HAZARD CLASSIFICATION

Why does it matter?

8.2 System Protection Area Limitations

8.3.3 Thermal Sensitivity

8.3.4 Small Orifice Sprinklers

8.4 Application of Sprinkler Types

8.5.2 Protection Area per Sprinkler

8.5.3 Sprinkler Spacing



NFPA 13 HAZARD CLASSIFICATION

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Massachusetts State Building Code (780 CMR)



NFPA 13 HAZARD CLASSIFICATION

Consider:

Mercantile (780 CMR) → NFPA 13?

Educational (780 CMR) → NFPA 13?

High Hazard (780 CMR) → NFPA 13?



NFPA 13 HAZARD CLASSIFICATION

High Hazard (780 CMR) → NFPA 13?

Flammable Liquids → Special Hazards



NFPA 13 HAZARD CLASSIFICATION

Mercantile (780 CMR) → NFPA 13?

Bulk Merchandising → Storage



NFPA 13 HAZARD CLASSIFICATION

SPECIAL HAZARDS

- 21.2 Flammable and Combustible Liquids
- 21.3 Aerosol Products
- 21.4 Standard for Spray Application Using Flammable or Combustible Materials
- 21.5 Solvent Extraction Plants
- 21.6 Installation and Use of Stationary Combustion Engines and Gas Turbines
- 21.7 Nitrate Film



NFPA 13 HAZARD CLASSIFICATION

Educational (780 CMR) → NFPA 13?

Educational → Light, Ordinary & Extra Hazard



NFPA 13 HAZARD CLASSIFICATION

SPECIAL HAZARDS

- 21.8 Storage of Pyroxylin Plastic
- 21.9 Laboratories Using Chemicals
- 21.10 Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes
- 21.11 Acetylene Cylinder Charging Plants
- 21.12 Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks
- 21.13 Utility LP-Gas Plants



NFPA 13 HAZARD CLASSIFICATION

SPECIAL HAZARDS

- 21.14 Production, Storage, and Handling of Liquefied Natural Gas (LNG)
- 21.15 Protection of Information Technology Equipment
- 21.16 Standard on Incinerators, and Waste and Linen Handling Systems and Equipment
- 21.17 Standard for Ovens and Furnaces
- 21.18 Industrial Furnaces Using a Special Process Atmosphere
- 21.19 Class A Hyperbaric Chambers



NFPA 13 HAZARD CLASSIFICATION

SPECIAL HAZARDS

- 21.33 Light Water Nuclear Power Plants
- 21.34 Electric Generating Plants and High Voltage Direct Current Converter Stations
- 21.35 Hydroelectric Generating Plants
- 21.36 Code for the Protection of Cultural Resource Properties — Museums, Libraries, and Places of Worship



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SPECIAL HAZARDS

- 21.20 Life Safety Code
- 21.21 Fixed Guideway Transit Systems Generating Plants
- 21.22 Motion Picture and Television Production Studio Soundstages and Approved Production Facilities
- 21.23 Animal Housing Facilities
- 21.24 Water Cooling Towers
- 21.25 Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves
- 21.26 Cleanrooms



NFPA 13 HAZARD CLASSIFICATION

- STORAGE**
- Chapter 13 – Miscellaneous Storage
 - Chapter 14 – Class I – IV: On Floor, Shelf, etc
 - Chapter 15 – Plastics: On Floor, Shelf, etc.
 - Chapter 16 – Class I – IV: Racks
 - Chapter 17 – Plastics: Racks
 - Chapter 18 – Tires
 - Chapter 19 – Rolled Paper
 - Chapter 20 – Special Storage



NFPA 13 HAZARD CLASSIFICATION

SPECIAL HAZARDS

- 21.27 Aircraft Hangars
- 21.28 Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways
- 21.29 Aircraft Engine Test Facilities
- 21.30 Code for the Storage of Liquid and Solid Oxidizers
- 21.31 Storage of Organic Peroxide Formulations
- 21.32 Advanced Light Water Reactor Electric Generating Plants



NFPA 13 HAZARD CLASSIFICATION

5.2 LIGHT HAZARD –

Light hazard occupancies shall be defined as occupancies or portions of other occupancies where the quantity and/or combustibility of contents is low and fires with relatively low rates of heat release are expected.



NFPA 13 HAZARD CLASSIFICATION

A.5.2 LIGHT HAZARD –

Animal shelters; Churches; Clubs; Eaves and overhangs, if of combustible construction with no combustibles beneath; Educational; Hospitals, including animal hospitals and veterinary facilities; Institutional; Kennels; Libraries, except large stack rooms; Museums; Nursing or convalescent homes; Offices, including data processing; Residential; Restaurant seating areas; Theaters and auditoriums, excluding stages and prosceniums; Unused attics



NFPA 13 HAZARD CLASSIFICATION

5.3.2 ORDINARY HAZARD II –

Ordinary hazard (Group 2) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents are moderate to high, where stockpiles of contents with moderate rates of heat release do not exceed 12 ft (3.66 m) and stockpiles of contents with high rates of heat release do not exceed 8 ft (2.4 m). Dedicated and miscellaneous storage shall be protected in accordance with Chapter 12 and Chapter 13 as applicable.



NFPA 13 HAZARD CLASSIFICATION

5.3.1 ORDINARY I HAZARD –

Ordinary hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where combustibility is low, quantity of combustibles is moderate, stockpiles of combustibles do not exceed 8 ft (2.4 m), and fires with moderate rates of heat release are expected. Dedicated and miscellaneous storage shall be protected in accordance with Chapter 12 and Chapter 13 as applicable.



NFPA 13 HAZARD CLASSIFICATION

A.5.3.2 ORDINARY II HAZARD –

Agricultural facilities; Barns and stables; Cereal mills; Chemical plants — ordinary; Confectionery products; Distilleries; Dry cleaners; Exterior Loading Docks - Exterior loading docks only utilized for loading and unloading should be classified as OH2. Where utilized for storage, exterior loading docks and all interior loading docks should be protected based upon the actual occupancy, the materials handled on the dock, as if the materials were actually stored in that configuration; Feed mills; Horse stables;



NFPA 13 HAZARD CLASSIFICATION

A.5.3.1 ORDINARY I HAZARD –

Automobile parking and showrooms; Bakeries; Beverage manufacturing; Canneries; Dairy products manufacturing and processing; Electronic plants; Glass and glass products manufacturing; Laundries; Restaurant service areas



NFPA 13 HAZARD CLASSIFICATION

A.5.3.2 ORDINARY II HAZARD –

Leather goods manufacturing; Libraries — large stack room areas; Machine shops; Metal working; Mercantile; Paper and pulp mills; Paper process plants; Piers and wharves; Post offices; Printing and publishing; Racetrack stable/kennel areas, including those stable/kennel areas, barns, and associated buildings at state, county, and local fairgrounds; Repair garages; Resin application area; Stages; Textile manufacturing; Tire manufacturing; Tobacco products manufacturing; Wood machining; Wood product assembly



NFPA 13 HAZARD CLASSIFICATION

5.4.1 EXTRA HAZARD I –

Extra hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents are very high and dust, lint, or other materials are present, introducing the probability of rapidly developing fires with high rates of heat release but with little or no combustible or flammable liquids.



NFPA 13 HAZARD CLASSIFICATION

A.5.4.2 EXTRA HAZARD II –

Asphalt saturating; Flammable liquids spraying; Flow coating; Manufactured home or modular building assemblies assemblies (where finished enclosure is present and has combustible interiors); Open oil quenching; Plastics processing; Solvent cleaning; Varnish and paint dipping



NFPA 13 HAZARD CLASSIFICATION

A.5.4.1 EXTRA HAZARD I –

Aircraft hangars (except as governed by NFPA 409, *Standard on Aircraft Hangars*); Combustible hydraulic fluid use areas; Die casting; Metal extruding; Plywood and particle board manufacturing; Printing [using inks having flash points below 100°F (38°C)]; Rubber reclaiming, compounding, drying, milling, vulcanizing; Saw mills; Textile picking, opening, blending, garnetting, or carding, combining of cotton, synthetics, wool shoddy, or burlap; Upholstering with plastic foams



NFPA 13 HAZARD CLASSIFICATION

5.6.3.1 CLASS I –

A Class I commodity shall be defined as a noncombustible product that meets one of the following criteria:

- (1) Placed directly on wood pallets
- (2) Placed in single-layer corrugated cartons, with or without single-thickness cardboard dividers, with or without pallets
- (3) Shrink-wrapped or paper-wrapped as a unit load with or without pallets



NFPA 13 HAZARD CLASSIFICATION

5.4.2 EXTRA HAZARD II –

Extra hazard (Group 2) occupancies shall be defined as occupancies or portions of other occupancies with moderate to substantial amounts of flammable or combustible liquids or occupancies where shielding of combustibles is extensive.



NFPA 13 HAZARD CLASSIFICATION

5.6.3.2 CLASS II –

A Class II commodity shall be defined as a noncombustible product that is in slatted wooden crates, solid wood boxes, multiple-layered corrugated cartons, or equivalent combustible packaging material, with or without pallets.



NFPA 13 HAZARD CLASSIFICATION

5.6.3.3 CLASS III –

- A Class III commodity shall be defined as a product fashioned from wood, paper, natural fibers, or Group C plastics with or without cartons, boxes, or crates and with or without pallets.
- A Class III commodity shall be permitted to contain a limited amount (5 percent by weight or volume or less) of Group A or Group B plastics.



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Table 16.2.1.3.2 Single- or Double-Row Racks — Storage Height Over 12 ft (3.7 m)
Up to and including 25 ft (7.6 m) Without Solid Shelves

Height	Commodity Class	Encapsulated	Ratio ^a		Sprinkler Mandatory In-Rack	Gelling Sprinkler Water Demand				
			R ₁	R ₂		With In-Rack Sprinklers		Without In-Rack Sprinklers		
						Figures	Comes	Appli Figures 16.2.1.3.1	Figures	Comes
I	No	No	8	1.0	No	16.2.1.3.2(a)	C and D	16.2.1.3.2(a)	E and H	Yes
			8	2.0	No	16.2.1.3.2(a)	A and B	16.2.1.3.2(a)	E and G	Yes
		Yes	8	1.0	No	16.2.1.3.2(a)	C and D	16.2.1.3.2(a)	E and H	Yes
			8	2.0	No	16.2.1.3.2(a)	A and B	16.2.1.3.2(a)	E and F	Yes
II	No	No	8	1.0	No	16.2.1.3.2(a)	C and D	16.2.1.3.2(a)	E and H	Yes
			8	2.0	No	16.2.1.3.2(a)	A and B	16.2.1.3.2(a)	E and F	Yes
		Yes	8	1.0	No	16.2.1.3.2(a)	C and D	16.2.1.3.2(a)	E and H	Yes
			8	2.0	No	16.2.1.3.2(a)	A and B	16.2.1.3.2(a)	E and F	Yes
III	No	No	8	1.0	No	16.2.1.3.2(a)	C and D	16.2.1.3.2(a)	E and H	Yes
			8	2.0	No	16.2.1.3.2(a)	A and B	16.2.1.3.2(a)	E and F	Yes
		Yes	8	1.0	Unsel	16.2.1.3.2(a)	C and D	16.2.1.3.2(a)	E and H	Yes
			8	2.0	Unsel	16.2.1.3.2(a)	A and B	16.2.1.3.2(a)	E and F	Yes
IV	No	No	8	1.0	No	16.2.1.3.2(a)	C and D	16.2.1.3.2(a)	E and H	Yes
			8	2.0	No	16.2.1.3.2(a)	A and B	16.2.1.3.2(a)	E and F	Yes
		Yes	8	1.0	Unsel	16.2.1.3.2(a)	C and D	16.2.1.3.2(a)	E and H	Yes
			8	2.0	Unsel	16.2.1.3.2(a)	A and B	16.2.1.3.2(a)	E and F	Yes



NFPA 13 HAZARD CLASSIFICATION

5.6.3.4 CLASS IV –

A Class IV commodity shall be defined as a product, with or without pallets, that meets one of the following criteria:

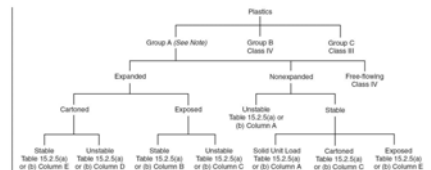
- (1) Constructed partially or totally of Group B plastics
- (2) Consists of free-flowing Group A plastic materials
- (3) Contains within itself or its packaging an appreciable amount (5 percent to 15 percent by weight or 5 percent to 25 percent by volume) of Group A plastics

• 5.6.3.4.2 The remaining materials shall be permitted to be metal, wood, paper, natural or synthetic fibers, or Group B or Group C plastics.



NFPA 13 HAZARD CLASSIFICATION

PROTECTION OF PLASTIC AND RUBBER COMMODITIES 15-151



Note: Cartons that contain Group A plastic material shall be permitted to be treated as Class IV commodities under the following conditions:

- (1) There shall be multiple layers of corrugation or equivalent outer material that would significantly delay fire involvement of the Group A plastic.
- (2) The amount and arrangement of Group A plastic material within an ordinary carton would not be expected to significantly increase the fire hazard.

FIGURE 15.2.1 Decision Tree.



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5.6.4 PLASTICS –

Group A; Group B; Group C

5.6.2 PALLETS –

Wood; Reinforced Plastic; Unreinforced Plastic; Specially Listed



NFPA 13 HAZARD CLASSIFICATION

NFPA 13:22.1.4 & NFPA 13:4.3

Owner's Certificate



NFPA 13 HAZARD CLASSIFICATION

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