NFPA 42

Code for the Storage of Pyroxylin Plastic

1997 Edition

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An International Codes and Standards Organization

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Code for the

Storage of Pyroxylin Plastic

1997 Edition

This edition of NFPA 42, *Code for the Storage of Pyroxylin Plastic,* was prepared by the Technical Committee on Hazardous Chemicals and acted on by the National Fire Protection Association, Inc., at its Annual Meeting held May 19–22, 1997, in Los Angeles, CA. It was issued by the Standards Council on July 24, 1997, with an effective date of August 15, 1997, and supersedes all previous editions.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

This edition of NFPA 42 was approved as an American National Standard on August 15, 1997.

Origin and Development of NFPA 42

NFPA 42 (formerly NFPA 40E), *Code for the Storage of Pyroxylin Plastic,* was developed by combining the requirements established in two other standards, NFPA 42-1967, *Storage, Handling and Use of Pyroxylin Plastics in Factories,* and NFPA 43-1967, *Standard for the Storage and Sale of Pyroxylin Plastic in Warehouses and Wholesale, Jobbing and Retail Stores.*

NFPA 42 and NFPA 43 were originally the responsibility of the Technical Committee on Explosives. In 1972, responsibility was transferred to the Technical Committee on Storage, Handling and Transportation of Hazardous Chemicals. In late 1972, this Technical Committee investigated the effectiveness of both standards, since very little pyroxylin plastic was in use and its manufacture in the United States had almost disappeared. Rather than withdraw either standard, it was decided to combine them to produce a single code that would cover all storage of pyroxylin plastic, with the exception of cellulose nitrate motion picture film and nitrocellulose used in the manufacture of lacquer.

The project of combining NFPA 42 and NFPA 43 was begun in 1973 and completed in January 1975. NFPA 40E was adopted at the 1975 NFPA Fall Meeting in Pittsburgh, PA on November 19, 1975, becoming the 1975 edition. At the same time, NFPA 42 and NFPA 43 were withdrawn.

Minor amendments were adopted at the 1980 NFPA Fall Meeting for the 1980 edition, the 1985 NFPA Fall Meeting for the 1986 edition, and the 1992 NFPA Fall Meeting for the 1993 edition.

For the 1997 edition, the Committee revised the definition of cabinet and added a definition for segregated to clarify the scope and application of the code. The Committee updated the terminology used to describe fire doors to be consistent with that used in NFPA 80, *Standard for Fire Doors and Fire Windows.* The Committee also updated the sprinkler terminology in Chapter 4 to be consistent with modern sprinkler technology. The other changes were editorial in nature to conform with the NFPA *Manual of Style.*

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This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in membership may have occurred. A key to classifications is found at the back of this document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Appendix A.

Information on referenced publications can be found in Chapter 5 and Appendix B.

Chapter 1 General

1-1 Scope.

1-1.1 This code shall apply to any building where pyroxylin plastic is stored.

1-1.2 This code shall apply to pyroxylin plastic, whether in the form of raw material, unfinished and finished products, or scrap.

1-1.3* This code shall not apply to the storage of cellulose nitrate motion picture film.

1-2 Purpose. The purpose of this code is to provide for the safe storage of pyroxylin plastic, other than cellulose nitrate motion picture film and nitrocellulose used in the manufacture of lacquer.

1-3 Definitions. The following definitions shall apply throughout this code.

Approved.* Acceptable to the authority having jurisdiction.

Authority Having Jurisdiction.* The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

Cabinet. A specially constructed and equipped metal or fire-resistive enclosure of less than 30-ft^3 (0.85-m^3) capacity that is used for the storage of pyroxylin plastic.

Finished Stock. Pyroxylin plastic that has undergone all operations, insofar as each particular factory is concerned, and that is ready for packing and shipping.

Finished-Stock Storeroom. A specially constructed and protected room that is constructed in accordance with Section 4-8.

Isolated Storage Building. A building not used for any purpose except the packing, receiving, shipping, and storage of pyroxylin plastic or articles manufactured from pyroxylin plastic with their necessary containers and wrappings, and that is isolated as specified in Section 2-7 and 3-2.1.

Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed.* Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets identified standards or has been tested and found suitable for a specified purpose.

Pyroxylin Plastic. Any plastic substance, material, or compound, other than cellulose nitrate film, that has soluble cotton or similar cellulose nitrate as a base when in the form of blocks, slabs, sheets, tubes, or fabricated shapes.

Class A Pyroxylin Products. Those products made from material over $^1/_{10}$ in. (2.5 mm) thick and weighing over 0.5 oz (14 gm) and that are not finely divided during manufacture into teeth, scrollwork, or projections.

Class B Pyroxylin Products. Those products not defined as Class A products. Class B pyroxylin products include articles of an individual weight of 0.5 oz (14 gm) or less, regardless of the thickness of the material from which they are made.

Raw Material. Any pyroxylin plastic in the form of blocks, slabs, rods, tubes, and other shapes intended to be used for further manufacture.

Segregated.* An item that is stored in the same room or inside area, but physically separated by distance from incompatible materials.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Tote Box. A box constructed as specified in Section 4-7 that is used for the handling of stock in process or finished stock while in tote box storerooms.

Tote Box Storerooms. A specially protected room that is constructed as specified in Section 4-7.

Unfinished Stock. Any stock after it leaves the raw stock storage vault until it is completely finished and ready for storage or shipment.

Vault. A small room of not over 1500-ft^3 (42.5-m^3) capacity, constructed and protected in accordance with Section 4-3.

Weight or Pounds. Weight of the pyroxylin plastic, not the packing materials, cartons, packing boxes, containers, or the article or material to which the pyroxylin plastic is secured or attached.

Chapter 2 Storage Buildings

2-1 Construction.

2-1.1 Buildings where pyroxylin plastic is stored shall be of Type I construction, as defined in NFPA 220, *Standard on Types of Building Construction.*

Exception: Wood frame buildings not exceeding three stories in height and non-fire-resistive buildings of other than wood frame construction not exceeding four stories or 55 ft (17 m) in height shall be permitted to be used for the storage of pyroxylin plastic.

2-1.2 Floors in buildings of other than Type I construction shall consist of double $^7/_8$-in. (22-mm) tongue-and-grooved boards or the equivalent.

2-1.3 Every stairway, elevator shaft, light and ventilating shaft, chute, and other opening between floors shall be enclosed to prevent the spread of fire or smoke. The enclosures shall comply with the requirements in NFPA *101®, Life Safety Code®*.

2-1.4 All building exits shall comply with the requirements in NFPA *101, Life Safety Code.*

2-1.5 Required partitions shall provide not less than 1-hr fire endurance rating when tested in accordance with NFPA 251, *Standard Methods of Tests of Fire Endurance of Building Construction and Materials.*

2-1.5.1 All openings in required partitions shall be protected by 1-hr fire rated doors or windows.

2-1.5.2 The doors and windows shall be installed in accordance with the requirements in NFPA 80, *Standard for Fire Doors and Fire Windows.*

2-2 Heating.

2-2.1 No stove, forge, torch, boiler, furnace, flame, fire, or electric or similar appliance likely to produce an exposed spark shall be allowed in any room or compartment used for the storage of pyroxylin plastic.

2-2.2 Either direct or indirect heating shall be permitted. However, if radiators are within 4 ft (1.2 m) of the floor, only low pressure steam not exceeding 5 lb (2.3 kg) or hot water shall be permitted.

Exception: Only hot water heating shall be permitted for heating storage vaults.

2-2.3 The fan and heater for a hot air system shall be located in an area partitioned off from the storage area. Floor registers of hot air systems shall not be used and registers shall not be less than 6 in. (15 cm) above the floor.

2-2.4 All radiators, heating coils, pipes, or returns that are near the floor or located so as to come into contact with any combustible material, waste, or dirt shall be guarded with $^1/_4$-in. (6.4-mm) mesh galvanized steel wire cloth, 20 U.S. gauge or its equivalent. The bottom of such guards shall be arranged to lift up for cleaning. The tops shall slope at an angle that will prevent their use as shelves.

Exception: All steam pipes within 6 ft (2 m) of the floor, not protected as specified above, and passing through partitions or racks or near woodwork shall be covered with approved pipe covering.

2-3 Electrical Installations.

2-3.1 All wiring and equipment shall comply with the installation requirements of NFPA 70, *National Electrical Code®*.

2-3.2 Where necessary, lights shall be protected against mechanical injury by substantial wire guards.

2-3.3 The use of portable lights or extension cords in any room where pyroxylin plastic is stored shall not be permitted.

2-4 Fire Protection.

2-4.1 All parts of one- and two-story buildings where pyroxylin plastic is stored shall be protected by automatic sprinklers.

Exception: Sprinkler protection shall not be required for isolated storage buildings when properly separated by distance from other buildings. (See Chapter 3.)

2-4.2 Buildings over two stories high where pyroxylin plastic is stored shall be completely protected by automatic sprinklers.

Exception: In those buildings where most operations are of a nonhazardous nature and the use of pyroxylin plastic is incidental to the overall operations, sprinkler protection shall be required in those parts of the building where pyroxylin plastic is being stored.

2-4.3 Sprinkler system installations shall comply with NFPA 13, *Standard for the Installation of Sprinkler Systems.*

2-4.3.1 The water supply for automatic sprinklers shall be based on the number of sprinklers liable to be affected in any fire section between fire walls or fire-resistive partitions. It shall be assumed that any of the following numbers of sprinklers can be affected and the condition giving the maximum flow used as a basis:

(a) All sprinklers in a vault

(b) All sprinklers in a tote box storeroom

(c) Three-fourths of the sprinklers in finished-stock storeroom

(d) All sprinklers in a section of an isolated storage building

2-4.3.2 The water supply for an automatic sprinkler system shall be based on a flow of 20 gpm (76 Lpm) per sprinkler for 20 minutes, with a minimum rate of flow of 500 gpm (1900 Lpm). Such flow shall be with an effective pressure at the top line of sprinklers of not less than 40 psi (276 kPa).

2-4.4 Water-type portable fire extinguishers suitable for use on Class A fires shall be installed in accordance with NFPA 10, *Standard for Portable Fire Extinguishers.*

2-4.5 In areas exceeding 3000 ft^2 (280 m^2), small hose stations shall be provided, as permitted in 3-2.2 of NFPA 10, *Standard for Portable Fire Extinguishers* Such hose stations shall be capable of protecting all portions of the storage area.

2-5 Management.

2-5.1 Every building where pyroxylin plastic is stored shall be in the charge of a responsible executive familiar with the importance of fire prevention and any local laws or ordinances.

2-5.2 The executive shall, as part of his or her duty, ensure that this code is observed and that employees are instructed as to fire hazards and the proper handling of pyroxylin plastic.

2-6 Smoking. Smoking shall not be permitted in any building where pyroxylin plastic is stored, and conspicuous "No Smoking" signs shall be posted in prominent places.

2-7 Restrictions on Building Location. No building that is situated within 50 ft (15 m) of the nearest wall of any building occupied as a school, theater, or other place of public amusement or assembly shall be used for the storage of pyroxylin plastic.

Exception: Quantities less than 100 lb (45 kg).

Chapter 3 Isolated Storage Buildings

3-1 General. All requirements in Chapter 2 shall apply to isolated storage buildings.

3-2 Distance from Other Buildings, Combustible Material.

3-2.1 If not protected by a complete system of automatic sprinklers in accordance with Section 3-4, the storage building shall be at a distance from any combustible material stored in the open and from any other building in accordance with Table 3-2.1.

Exception: The storage building shall not need to comply with the separation distances in Table 3-2.1 if in accordance with the following:

(a) The exposed building is sprinklered and has noncombustible walls and cornice and wall openings are fully protected, or

(b) The exposed building has a parapeted blank masonry wall facing the exposure.

Table 3-2.1 Separation Distances for Pyroxylin Plastic Storage Buildings

Lb (kg) of pyroxylin plastic stored		Distance to property line, building, or combustible material stored in the open	
lb	(kg)	ft	(m)
1 – 1000	(0.45 – 454)	40	(12)
1001 – 2000	(454.1 – 907)	55	(17)
2001 – 3000	(908 – 1361)	65	(20)
3001 – 4000	(1362 – 1814)	70	(21)
4001 – 5000	(1815 – 2270)	75	(23)
5001 – 10,000	(2271 – 4540)	100	(30)
10,001 – 20,000	(4541 – 9070)	130	(40)
20,001 – 30,000	(9071 – 13,610)	150	(46)
30,001 – 40,000	(13,611 – 18,140)	165	(50)
40,001 – 50,000	(18,141 – 22,680)	180	(55)
50,001 – 75,000	(22,681 – 34,020)	200	(61)
75,001 – 100,000	(34,021 – 45,360)	225	(69)
100,001 – 150,000	(45,361 – 68,040)	250	(76)
150,001 – 300,000	(68,041 – 136,080)	300	(91)

3-2.2 The storage building, if located within 100 ft (30 m) of any other building or combustible material stored in the open, shall have all walls equivalent in fire resistance to 4 in. (10 cm) of concrete or three-cell, 8-in. (20-cm) tile. All openings in such walls shall be protected by shutters or doors equivalent in fire resistance to a two-ply, tin-clad fire door or shutter constructed and arranged in accordance with NFPA 80, *Standard for Fire Doors and Fire Windows.*

3-2.2.1 Skylights shall be protected in such a manner as to prevent radiated heat or flying brands from igniting the contents of the building.

3-2.2.2 Where necessary, roofs shall be suitably insulated with noncombustible heat insulating materials to prevent building up a temperature in excess of 100°F (38°C) in the storage area by heat from the sun's rays.

3-2.3 If the storage building directly adjoins or communicates with a factory building, it shall be classified as a vault and shall be limited in regards to size, arrangement, and protection as specified for vaults in Section 4-3.

Exception: Finished stock shall be permitted to be stored in a special finished-stock storeroom in accordance with Section 4-8.

3-2.4 A storage building protected by automatic sprinklers and with a storage capacity of 1501 ft^3 (42 m^3) or more or 10,001 lb (4540 kg) or more shall have no direct communication with any other building. It shall not have any wall opening or other opening within 50 ft (15 m) of any opening in any wall of any building, or within 50 ft (15 m) of any combustible wall or storage of any combustible material in the open. The walls of a building in the same plane or parallel planes as the storage building and facing in the same direction as an opening is situated shall not be considered as coming within the intent of this requirement.

3-3 Storage Capacity.

3-3.1 The storage building shall not exceed a capacity of 100,000 lb (45,400 kg) in shipping cases or 50,000 lb (22,700 kg) of other material in any one section between blank, parapeted division walls having a 4-hr fire resistance rating.

3-3.2 If the capacity of any area between division walls, as specified in 3-3.1, exceeds 7500 lb (3400 kg), the storage space shall be subdivided into racks and bins separated by partitions equivalent to tightly matched $^7/_8$-in. (22-mm) tongue-and-groove boards, each section to be independently vented or open to aisle space. The partitions shall be arranged so as to afford the minimum of obstruction to the distribution from sprinklers, if present.

Exception: Where storage consists only of material in shipping cases.

3-3.3 Where storage exceeds 25,000 lb (11,300 kg), packing, receiving, and shipping in connection with such storage shall be in a separate room cut off by a parapeted wall of 4-hr fire resistance rating with double standard fire doors on openings to the storage section.

3-3.4 Areas separated from the section containing pyroxylin plastic by blank parapeted walls having a 4-hr fire resistance rating shall be permitted to be used for storage of other articles.

3-4 Sprinkler Protection.

3-4.1 Storage buildings that do not comply with the separation distances in 3-2.1 shall be equipped with an automatic sprinkler system installed in compliance with NFPA 13, *Standard for the Installation of Sprinkler Systems.*

3-4.2 Water supplies shall comply with 2-4.3.1.

3-4.3 Sprinklers shall be spaced so that there is one sprinkler for every 32 ft^2 (3 m^2).

3-4.4 Sprinklers in buildings used for storage of loose scrap shall be installed in the ratio of one sprinkler for each 1000 lb (454 kg) of storage.

Exception: The ratio in 3-4.4 shall not apply if the scrap is in tanks or other receptacles kept filled with water.

3-5 Smoke Vents. Adequate vents shall be provided and arranged as specified in Section 4-6.

Exception: Where the building is protected throughout with automatic sprinklers, vent area shall not need to exceed 100 in.^{2} (645 cm^2) of free vent area for each 1000 lb (454 kg) of storage capacity.

Chapter 4 Storage at Manufacturing Plants

4-1 Raw Stock.

4-1.1 Where raw material is received in excess of 25 lb (11 kg) in any building or fire area, it shall be stored in a cabinet or vault constructed in accordance with Sections 4-2 and 4-3, respectively.

4-1.2 Not more than 1000 lb (454 kg) of raw material shall be permitted to be stored in cabinets in any one workroom. No more than 500 lb (227 kg) shall be permitted to be stored in any one cabinet and no more than 250 lb (113 kg) shall be permitted to be stored in one compartment of a cabinet.

4-1.3 All raw material in excess of 1000 lb (454 kg) shall be stored in a vault or vaults.

Exception: Stock in process.

4-2 Cabinet Construction and Protection.

4-2.1 No cabinet shall exceed 30-ft^3 (0.8-m^3) capacity.

4-2.2 Cabinets, walls, and doors shall be permitted to be made of No. 18 gauge metal, double walled with 1 $\frac{1}{2}$ in. (38 mm) of air space, or shall be constructed of a material having a 20-min fire resistance rating in accordance with NFPA 251, *Standard Methods of Tests of Fire Endurance of Building Construction and Materials* (also identified as ASTM E-119).

4-2.3 The shelves or racks within the cabinet shall be of metal and arranged to facilitate distribution of water from sprinklers.

4-2.4 Cabinets having a capacity in excess of 250 lb (113 kg) of pyroxylin plastic shall be divided into at least two distinct compartments.

4-2.4.1 The separating partition shall be substantially airtight and of substantial construction equivalent to the sides.

4-2.4.2 Separating partitions shall have the same fire resistance rating as that given in 4-2.2.

4-2.5 Each compartment shall be provided with an independent door and vent.

4-2.6 The racks or drawers shall be arranged so that the material immediately adjacent to the partition does not touch the partition. Spacers shall be provided to keep such material at least $\frac{1}{2}$ in. (13 mm) away from the partition.

4-2.7 Doors to compartments shall be arranged so as to remain normally closed. They shall be kept closed by a three-point latch. The fit of the door into the frame shall be sufficiently tight to prevent the entrance of flames due to the burning of pyroxylin plastic in an adjoining compartment.

4-2.8 Doors on divided cabinets shall swing from the center so that they will not expose the contents of one compartment to the other.

4-2.9 Cabinets shall be provided with vents constructed in accordance with Section 4-6.

4-2.10 Cabinets holding over 50 lb (23 kg) of pyroxylin plastic shall be equipped with at least one automatic sprinkler. If divided into two or more compartments, they shall have at least one automatic sprinkler in each compartment.

4-3 Vault Construction.

4-3.1 No vault shall exceed 1500 ft^3 (42 m^3) in capacity, and no storage space shall be provided in any vault for more than 10,000 lb (4540 kg) of raw material.

4-3.2 Proximity to boilers, stacks, and other sources of heat shall be avoided.

4-3.3 Vaults shall be supported by masonry or steel of sufficient strength to carry the load safely. Beams shall rest at both ends on steel girders, iron or steel columns, or walls or piers of masonry. The supports shall afford at least a 4-hr fire endurance rating as determined by NFPA 251, *Standard Methods of Tests of Fire Endurance of Building Construction and Materials.* Hollow tile shall not be used for foundation walls or for walls of other than the top vault where vaults are superimposed.

4-3.3.1 Floors shall be of fire-resistive material.

4-3.3.2 Walls shall be of reinforced concrete at least 6 in. (15 cm) in thickness, of brick at least 8 in. (20 cm) in thickness, or of hollow tile at least 12 in. (30 cm) in thickness.

4-3.3.3 Walls shall be constructed so as to be without cracks or holes that would permit escape of gases of combustion into the building.

4-3.3.4 The roof of the vault shall be an independent reinforced concrete roof at least 6 in. (15 cm) thick. In a Type I building where the floor above is equivalent to 6 in. (15 cm) of reinforced concrete, the floor above shall be permitted to serve as the roof if side walls are rigidly tied into it. In construction of this type, a false ceiling constructed of metal lath and cement plaster 1 in. (2.5 cm) thick, or the equivalent, and with no openings to the concealed space above, shall be permitted to be used to limit the total interior vault space to 1500 ft^3 (42 m^3). The vent shall be permitted to extend through this false ceiling and concealed space.

4-3.3.5 No skylights or windows other than those specified under Section 4-6 shall be permitted therein.

4-3.3.6 A fire door shall be provided on each face of the wall on door openings. Doors shall be 1 $\frac{1}{2}$-hr rated (formerly identified as Class B) as defined in NFPA 80, *Standard for Fire Doors and Fire Windows.* The interior door shall be automatic. The outer door shall be of the swinging type and close into a rabbet, or otherwise be made tight to prevent passage of flame around edges. The outer door shall be self-closing and, if fastened open, shall be arranged to close automatically in case of fire originating in or out of the vault.

4-3.3.7 Shelving and racks in vaults shall be of substantial construction throughout and shall be arranged so as to facilitate distribution of water from automatic sprinklers. Shelves shall be constructed with a 1-in. (2.5-cm) space between slats not less than $\frac{1}{2}$ in. (13 mm) or greater than 2 in. (5 cm) wide and shall be permitted to be made of iron pipe, rods, channels, angles, or wooden slats. Vertical partitions extending from the floor to above the top shelf shall be provided to divide racks into sections. Means shall be provided to keep the stock or containers on each side of such partitions 1 in. (2.5 cm) away from the partitions. Racks, material, and doors shall not obstruct any vent openings, and stock shall not be placed higher than 2 ft (0.6 m) below sprinkler deflectors. Material shall not be stored or kept on the floor, unless in shipping containers. *[For details of typical arrangements of shelves, slats, and automatic sprinklers, see Figure 4-3.3.7(a) and Figure 4-3.3.7(b).]*

4-3.3.8 Partitions shall be of substantial construction such as, for example, $\frac{7}{8}$-in. (22-mm) tongue-and-grooved boards free from cracks and knotholes or its equivalent in resistance to heat and gases. Materials shall be protected against mechanical injury where necessary.

4-4 Vault Fire Protection.

4-4.1 Vaults shall be equipped with automatic sprinklers in a ratio of one sprinkler to each 834 lb (378 kg) of pyroxylin plastic or one sprinkler to each 125 ft^3 (3.5 m^3) of total vault space.

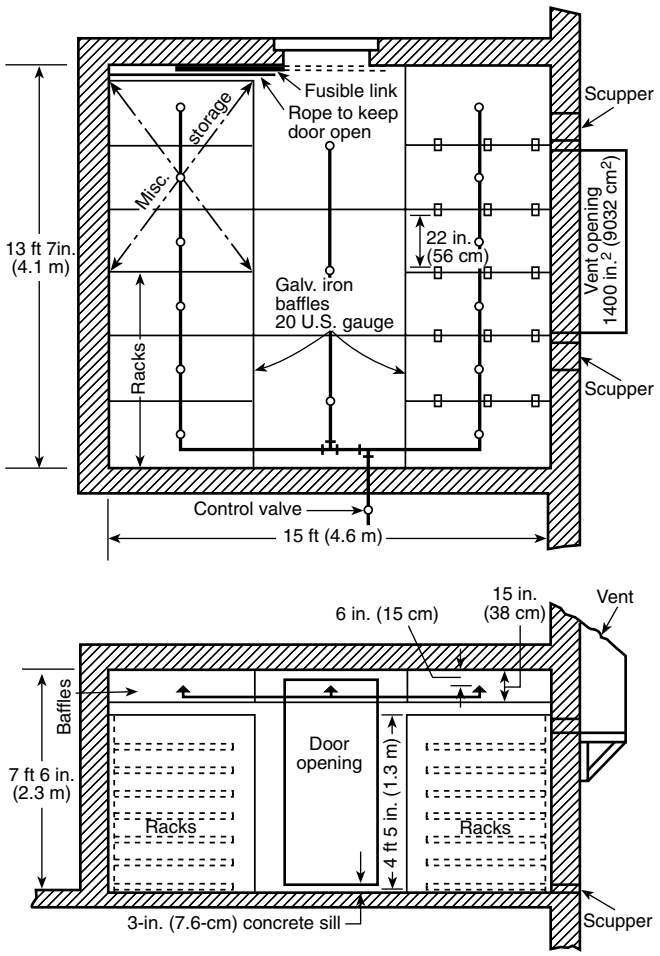

Figure 4-3.3.7(a) Raw stock storage vault showing general arrangement of sprinklers, racks, and baffles.

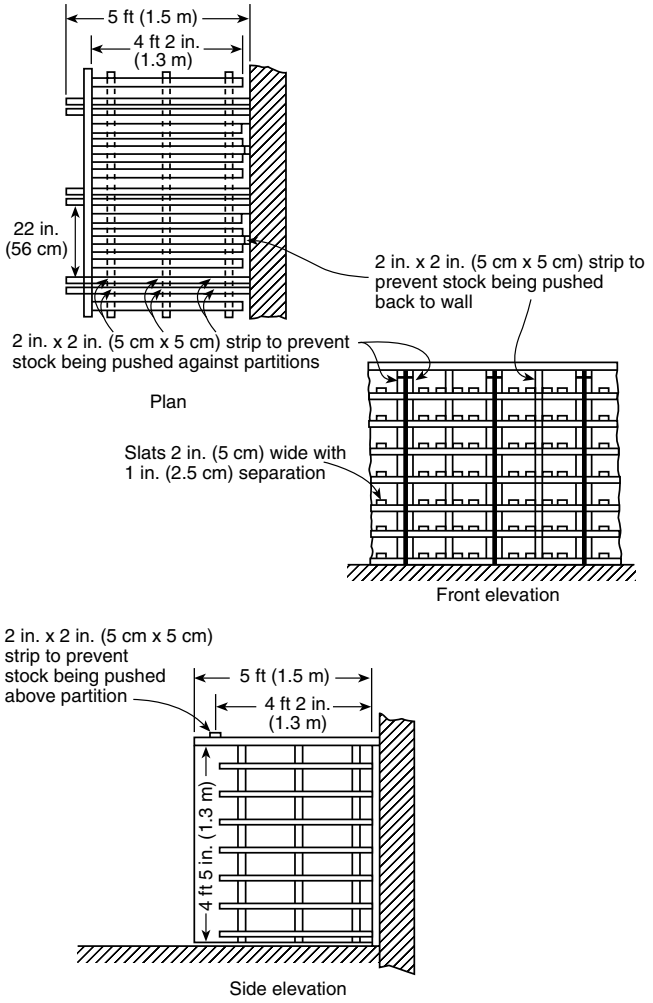

Figure 4-3.3.7(b) Details of storage racks in raw stock storage vault.

4-4.2 A vault that is divided into two or more sections shall have at least one automatic sprinkler in each section.

4-4.3 Sheet-metal baffles shall be provided to facilitate operation of sprinklers. Where an approved automatic sprinkler system with open heads is permitted by the authority having jurisdiction, the baffles between heads shall be permitted to be omitted.

4-4.4 Arrangement of sprinklers shall be submitted to the authority having jurisdiction for approval in each case.

4-4.5 Sprinkler systems for vaults shall be equipped with a 1-in. (2.5-cm) drip line with a $\frac{1}{2}$ -in. (13-mm) outlet valve.

4-4.6* Where the design of the building is such that an excessive floor load would result from having the vault filled with water, the vault shall be provided with one or more scuppers having exterior covers and screen with an aggregate area equal to 3 in.^{2} (19 cm^2) for each sprinkler head installed in the vault.

4-5 Vault Heat and Light.

4-5.1 Heating, where required to prevent sprinkler pipes from freezing, shall be accomplished by hot water or low pressure steam with automatic control limiting steam pressure to 10 lb (4.5 kg) and limiting the vault temperature to no more than 70°F (21°C). Radiators shall be placed at the ceiling over aisle space with wire guards arranged so that no pyroxylin can be placed within 12 in. (30 cm) of such pipes or radiators

4-5.2 All vault lights shall be at the ceiling.

4-5.3 All wiring shall be in metal conduit.

4-5.4 Lamps shall be attached to rigid fixtures and shall be enclosed by a globe and protected against damage.

4-5.5 Lights shall be equipped with keyless sockets and operated by a switch located outside of the vault and shall be arranged so as to indicate by means of a pilot light near the switch whether the lights in the vault are on or off.

4-6 Vault Vents.

4-6.1 Each vault or compartment of a cabinet shall be vented separately to the outer air.

4-6.2 The vent shall have a minimum effective sectional area in the ratio of 140 in.^{2} (903 cm^2) for each 1000-lb (454-kg) capacity. For a standard vault of 1500 ft^3 (42 m^3) the vent opening shall be 1400 in.^{2} (9032 cm^2).

4-6.3 The outlet of each vent shall be above the roof of the building or made to face on a street, court, or other clear space at least 50 ft (15 m) from any openings. Openings in walls of another building in the same plane or parallel planes and facing in the same direction as the vent is situated shall not be considered as coming within the intent of this requirement.

4-6.4 All interior or horizontal or vertical flues shall be constructed of 5-in. (13-cm) reinforced concrete or of a construction equivalent to that of a metal chimney (smokestack) as specified in NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances.*

Exception: If the maximum amount of pyroxylin plastic in the vault is 250 lb (113 kg), the flue shall be permitted to be of riveted sheet metal of at least No. 18 gauge covered with 1 in. (2.5 cm) of approved heat insulation and installed no closer than 9 in. (23 cm) to any combustible material.

4-6.5 Exterior metal flues shall be constructed in accordance with the requirement for metal chimneys (smokestacks) in NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances.*

4-6.6 Each vent opening directly through an exterior wall shall be protected against the weather by a single thickness of glass $^1/_{16}$ in. (1.6 mm) thick that is painted a dark color, or by other noncombustible fragile material. The glass shall be mounted in a sash and arranged to open automatically in case of fire by the use of an approved releasing device placed inside the vault. The total area of the glass shall be taken as the effective sectional area of the vent opening. No pane of glass shall be smaller than 200 in.^{2} (1290 cm^2). Other protection that is equivalent to the above shall be permitted to be accepted.

4-6.7 A light wire screen, no coarser than $^1/_8$-in. (3-mm) mesh, also shall be placed over each vent, and arranged so as not to interfere with the automatic operation of the sash. Bars or a screen designed to prevent burglary or injury to contents shall not have a mesh of less than 4 in. (10 cm), shall be located inside of the light wire screen, and shall give a vent opening equal to that required in 4-6.6.

4-6.8 A permanent guard shall be installed to prevent any of the contents from being forced against the mouth of the vent when the vent opening is 10 in. (25 cm) or less in any dimension.

4-7 Tote Box Storeroom. See Figure 4-7.

4-7.1 Tote boxes shall be substantially constructed of nonsparking materials and kept in good condition. Covers shall be permitted to be provided.

4-7.2 Tote boxes shall be limited in capacity to the amount required per operator for one-half day's work and to not over 75 lb (34 kg) of Class A or 35 lb (16 kg) of Class B material or articles, and in no case exceeding 12,000 in.^{3} (196,600 cm^3).

4-7.3 Tote boxes containing finished or partly finished material shall be stored in a cabinet, vault, or tote box storeroom.

4-7.4 Tote box storerooms shall not exceed 1000 ft^2 (93 m^2) in area.

4-7.5 Tote box storerooms shall be separated from other parts of the floor by walls or partitions as required in 2-1.5.

Exception: Glass shall not be permitted in the wall or partition.

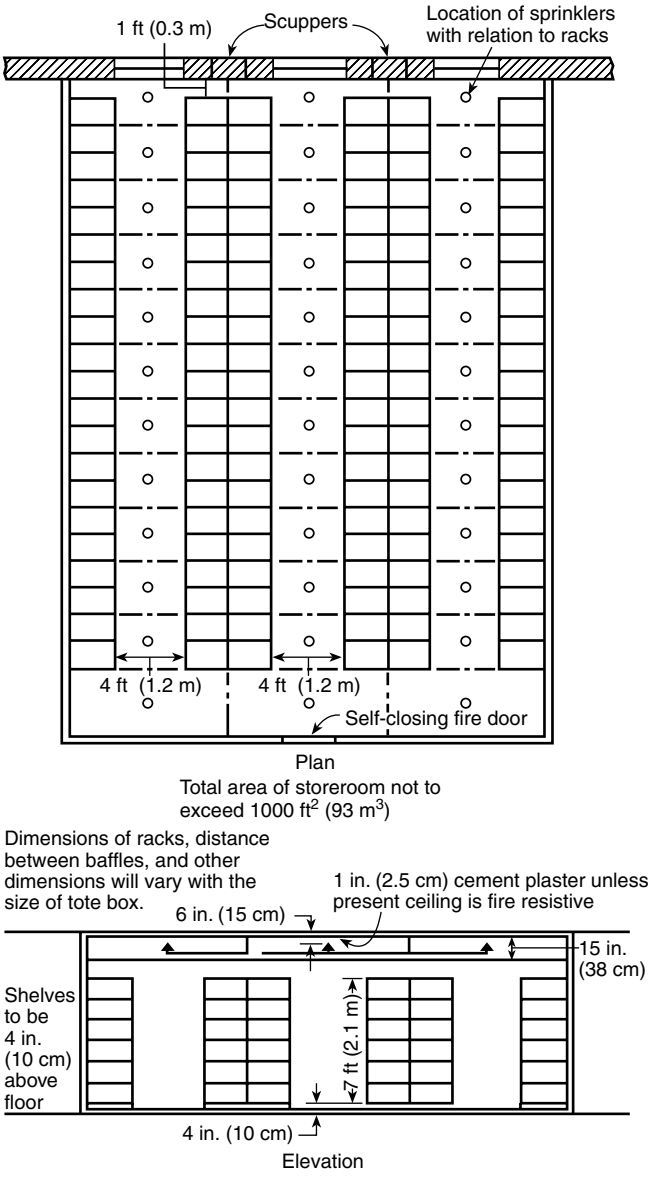

Figure 4-7 Tote box storeroom showing general arrangement of racks and sprinklers.

4-7.6 Ceilings of tote box storerooms, unless of fire-resistive construction, shall be protected with hard cement plaster at least 1 in. (2.5 cm) thick.

4-7.7 Storage shall be on shelves divided into vertical sections with solid dividing partitions and backs preferably of noncombustible material or at least $^7/_8$-in. (22-mm) tongue-and-grooved boards or their equivalent in resistance to heat and gases. The front of the rack shall be open. *(See Figure 4-7.7.)*

4-7.8 Each section shall be not less than 4 in. (10 cm) or more than 6 in. (15 cm) wider or deeper than one tote box of Class A material or two tote boxes of Class B materials. The distance between shelves shall be at least 2 in. (5 cm) greater than the depth of the tote boxes. Shelves shall be constructed of slats not over 2 in. (5 cm) wide, with at least 1 in. (2.5 cm) of separation, and shall be permitted to be made of iron pipe, rods, channels, angles, or wooden slats.

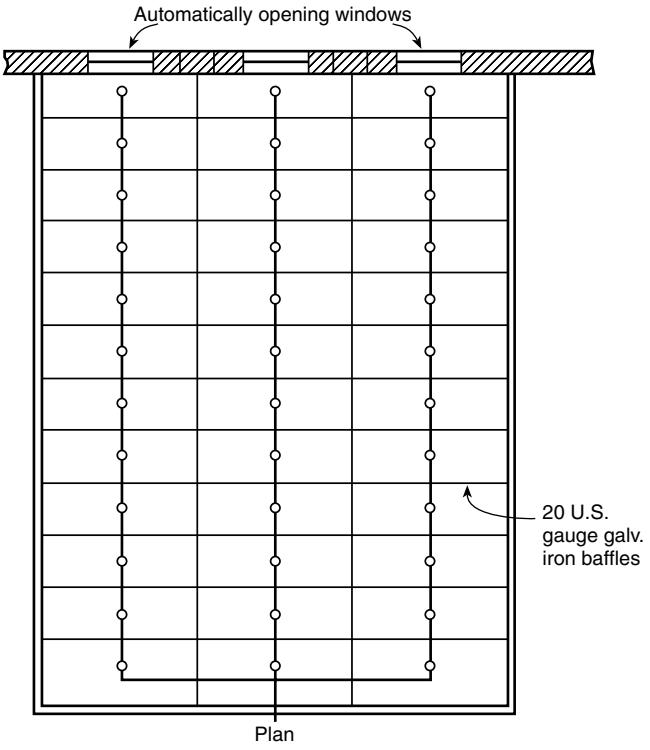

Figure 4-7.7 Tote box storeroom showing arrangement of sprinklers and baffles and section of tote box storage rack.

Aisle space of at least 4 ft (1.2 m) shall be provided. Height of racks shall not be over 8 ft (2.4 m) and in no case shall stock be stored higher than 2 ft (0.6 m) below sprinkler deflectors.

4-7.9 Sprinkler protection provided for the tote box storeroom shall consist of one sprinkler in the center of the aisle immediately in front of the dividing partition between each pair of sections. Proper baffles shall be provided between heads. *(See Figure 4-7.7.)*

4-7.10 Adequate ventilation shall be provided equal to a clear opening of at least $\frac{1}{2}$ in.^{2} (3.2 cm^2) per 1 ft^3 (0.03 m^3) of room. Thin glass windows, if unexposed, shall be acceptable.

4-7.11 Windows or other wall openings in tote box storerooms that are exposed by other buildings or structures within 50 ft (15 m) or that are located above other openings shall be bricked up or otherwise adequately protected.

4-8 Finished-Stock Storerooms. See Figure 4-8 and Figure 4-8.7.

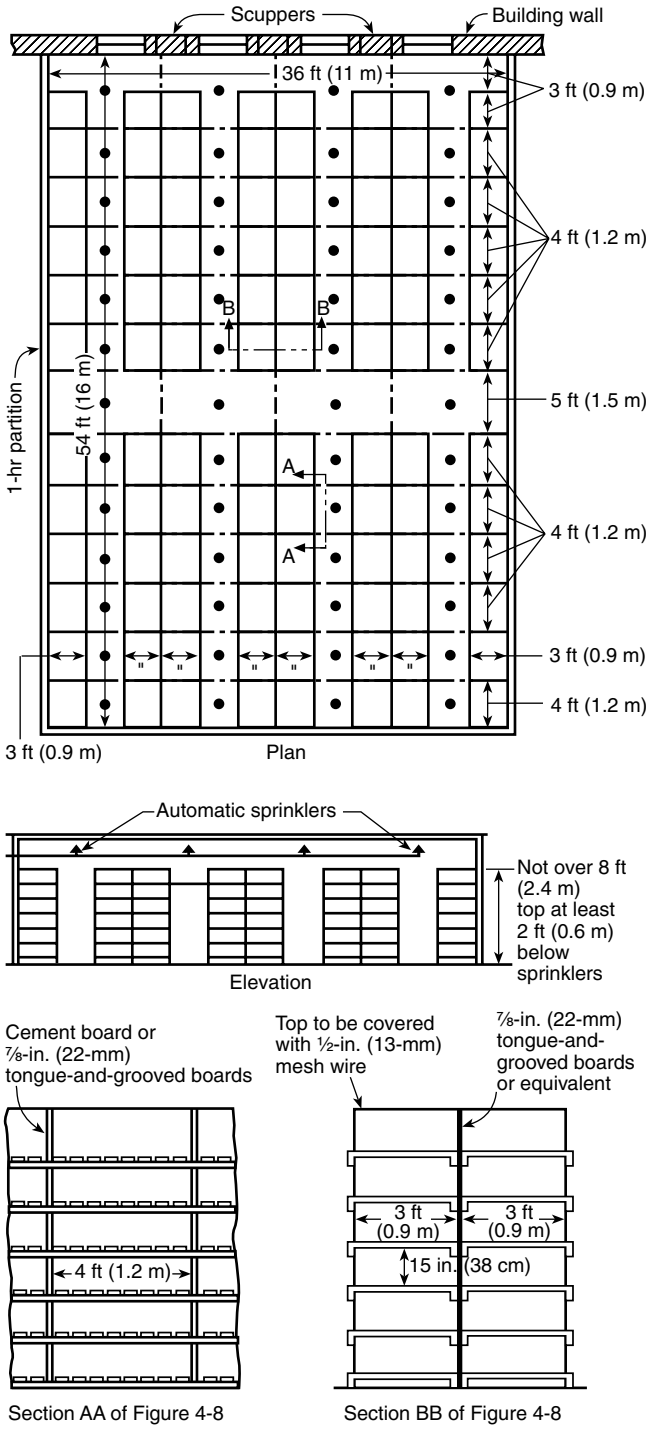

Figure 4-8 Finished-stock storeroom showing general arrangement of racks.

4-8.1 Finished stock packed in cartons or pasteboard boxes shall be stored in a special finished-stock storeroom unless stored in cabinets or vaults specified in Section 4-3 or in isolated storage buildings as specified in Chapter 3.

Exception: A maximum of three tote boxes per 100 ft^2 (9.3 m^2) shall be permitted to be kept in inspection, sorting, wrapping, packing, and shipping rooms.